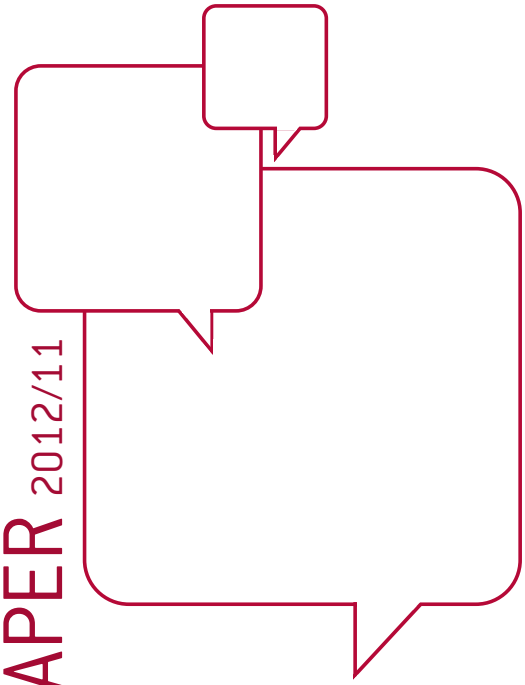

BRUEGEL WORKING PAPER 2012/11

PRODUCTIVITY, LABOUR COST AND EXPORT ADJUSTMENT: DETAILED RESULTS FOR 24 EU COUNTRIES

ZSOLT DARVAS*

Highlights

- As a background document for Bruegel Policy Contribution 2012/11 'Compositional effects on productivity, labour cost and export adjustment', this working paper presents detailed results for 24 EU countries on:
  - The sectoral changes in the economy;
  - The unit labour costs (ULC) based real effective exchange (REER) rate and its main components;
  - Export performance.

- The ULC-REERs are calculated:
  - For the total economy, the business sector (excluding agriculture, construction and real estate activities), and some main sectors;
  - Using both actual aggregates and fixed-weight aggregates, as the latter is free from the impacts of compositional changes;
  - Against 30 trading partners and against three subsets of trading partners: euro-area, non-euro area EU, non-EU.

- The REERs calculated in this paper are freely downloadable.

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Thanks are due to Dana Andreicut for excellent research assistance, Guntram Wolff for comments, and Alan Ahearne, Derry O'Brien, Fergal O'Brien and Philip Lane for valuable insights into the interpretation of Irish developments, which were utilised in the Policy Contribution.

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Contents

1. Introduction

Sectoral shifts, such as shrinkage of low labour productivity and the low-wage construction sector, can lead to apparent increased aggregate average labour productivity and average wages, especially when capital intensity differs across sectors. Compositional changes are not 'bad' *per se* and can also reflect healthy structural changes in the economy. But quantifying the impacts of these compositional changes is crucial for assessing the adjustment that countries have achieved.

Inspired by Central Bank of Ireland (2011), which assessed the importance of sectoral changes on the Irish relative unit labour costs, Darvas (2012b) assesses for 24 EU countries the importance of the impact of sectoral changes on the components of the unit labour cost (ULC) based real effective exchange rate (REER) considering 11 main sectors of the economy and 13 manufacturing sub-sectors, in order to:

- Quantify the compositional effect on measured average productivity, average hourly labour compensation, unit labour costs and ULC-REERs;
- Calculate a new measure of ULC-REER, which is free from compositional effects, for the business sector excluding construction, real estate activities and agriculture;
- Calculate a new measure of ULC-REER for certain sectors, such as manufacturing;
- Relate export performance since the onset of the crisis to various measures of REER;
- Study the components of the ULC-REER and rank countries according to their success in adjusting.

As a background document for Darvas (2012b), this working paper presents detailed results for the 24 EU countries for the period 2000Q1-2011Q4[1]. The ULC-REERs calculated in this paper are added to the dataset of Darvas (2012a), which is freely available at http://www.bruegel.org/publications/publication-detail/publication/716-real-effective-exchange-rates-for-178-countries-a-new-database/ and will be irregularly updated.

2. Definition of the ULC-REER

It is worthwhile to start with the definition of the ULC-based REER, which underlines the components that will be assessed later in this paper. By definition, the unit labour costs based real effective exchange rate index is given as:

$$reer(ulc) = \frac{neer \cdot ulc}{ulc^{(foreign)}} = \frac{neer \cdot \left(\frac{total\_labour\_compensation}{production} \right)}{ulc^{(foreign)}} = \frac{neer \cdot \left(\frac{hours\_worked \cdot wage\_per\_hour}{production} \right)}{ulc^{(foreign)}} = ,$$
$$= \frac{neer \cdot wage\_per\_hour}{ulc^{(foreign)} \cdot \left(\frac{production}{hours\_worked} \right)} = \frac{neer \cdot wage\_per\_hour}{ulc^{(foreign)} \cdot productivity}$$

where *reer(ulc)* is the unit labour cost based real effective exchange rate, *neer* is the nominal effective exchange rate (an increase indicates appreciation), *ulc* is the domestic unit labour cost, $ulc^{(foreign)}$ is the weighted average unit labour cost of trading partners, *total_labour_compensation* is total labour compensation,

[1] Cyprus, Luxembourg and Malta are excluded due to missing data. Sectoral data for Romania is available only since 2008Q1.

production is value added at constant prices, *hours_worked* is the total hours worked (which is in turn the product of the number of people employed and the average hours worked per employee), *wage_per_hour* is the nominal hourly labour compensation, and *productivity* is production divided by total hours worked.

Therefore, real effective exchange rate depreciation can be engineered through a fall in the nominal effective exchange rate, a fall in average nominal wages, productivity improvements and an increase in the unit labour cost of trading partners.

3. Methodology and main data sources

We collected data for 11 main sectors of the economy and 13 manufacturing sub-sectors, which are detailed in Tables 1 and 2 of Darvas (2012b). For EU countries and Norway, most of the data is taken from the online databases of Eurostat. However, some time series were missing and therefore we either used data from national statistical sources, or made certain approximations. For non-European OECD countries, data is taken either from Eurostat or from the OECD. All data sources and data manipulations are detailed in Section 7.

We quantify the compositional effects by calculating fixed-weight aggregates for various indicators (eg output per worker, average wages, or unit labour costs) and compare these fixed-weight indicators to actual indicators. We decompose the economy into 23 sectors: the 13 manufacturing sub-sectors and the other 10 main sectors of the economy (ie the 11 sectors less manufacturing total) and derive the weights of these 23 sectors from the 2008Q1 composition of the economy. In addition to the total economy, we also calculate fixed-weight aggregates for the manufacturing sector itself, and for the business sector excluding agriculture, construction and real estate activities.

We consider 30 trading partners for calculating the REERs and also three subsets of these 30 countries:

- 30 countries: 23 EU countries (not including Cyprus, Luxembourg, Malta and Romania) plus Australia, Canada, Japan, Korea, New Zealand, Norway and the United States. Note we have a complete dataset for Romania from 2008Q1 and therefore while Romania is not included in this basket of 30 trading partners for the REER calculation, we calculate REERs for Romania from 2008Q1.
- Euro-area 14: the current members of the euro area apart from Cyprus, Luxembourg, Malta.
- Non-euro EU 9: non-euro members of the EU except Romania.
- Non-EU 7: Australia, Canada, Japan, Korea, New Zealand, Norway and the United States.

We note that among the non-EU countries we have a complete dataset only for Norway (from Eurostat). Some, but not all, sectoral data for the other six non-EU countries is available from the OECD. Therefore, in these six countries we could not consider sectoral developments in similar detail as in the EU countries and Norway.

4. How important is the compositional effect?

Table 3 of Darvas (2012b) presented the answer to this question concerning the business sector without agriculture, construction and real estate activities. Table 1 overleaf shows the results for the total economy as well.

Table 1: Impact of compositional changes on average productivity, labour compensation, and REER (cumulative percent change from 2008Q1 to 2011Q4)

		Gross value added per hour						Labour compensation per hour						REER-ULC						
		Total economy			Business sector w.o. A.C.R.			Total economy			Business sector w.o. A.C.R.			Total economy			Business sector w.o. A.C.R.			
		Aggre-gate	Const. w.	Comp. effect	Aggre-gate	Const. w.	Comp. effect	Aggre-gate	Const. w.	Comp. effect	Aggre-gate	Const. w.	Comp. effect	Aggre-gate	Const. w.	Comp. effect	Aggre-gate	Const. w.	Comp. effect	
AT	Austria	1.6	1.1	0.5	3.7	2.1	1.5	13.0	12.3	0.6	12.3	12.4	-0.1	2.9	2.3	0.7	-0.1	0.1	-0.1	AT
BE	Belgium	0.0	-0.8	0.8	1.1	0.6	0.5	10.1	10.3	-0.2	9.2	9.6	-0.3	2.0	1.6	0.4	-0.4	-0.9	0.5	BE
BG	Bulgaria	15.0	10.2	4.4	15.8	12.4	3.1	38.5	38.2	0.2	42.2	40.3	1.3	12.3	14.5	-1.9	13.6	14.6	-0.9	BG
CZ	Czech Rep.	3.2	-1.3	4.5	2.6	-1.9	4.6	1.5	1.9	-0.5	0.6	1.6	-1.0	-7.6	-4.5	-3.3	-7.9	-4.5	-3.6	CZ
DK	Denmark	-0.1	-2.3	2.3	1.8	-1.6	3.5	6.7	6.7	0.0	6.2	6.4	-0.2	-1.7	-0.4	-1.3	-4.1	-2.3	-1.9	DK
EE	Estonia	6.9	1.0	5.8	-1.0	-8.2	7.9	7.4	2.5	4.7	5.2	1.0	4.1	-7.4	-5.1	-2.5	-2.3	-0.4	-1.9	EE
FI	Finland	-1.8	-2.3	0.5	-2.9	-1.4	-1.6	9.1	9.2	-0.1	8.4	9.1	-0.6	2.0	1.8	0.3	2.3	-0.2	2.5	FI
FR	France	2.1	1.9	0.1	1.6	1.3	0.3	10.1	9.7	0.4	10.0	10.0	0.0	0.0	-1.0	1.0	0.1	-1.2	1.3	FR
DE	Germany	-1.3	-1.5	0.2	-2.3	-3.1	0.9	7.4	7.6	-0.2	6.3	6.8	-0.5	0.5	-0.2	0.7	0.1	0.4	-0.3	DE
GR	Greece	-5.1	-1.4	-3.7	-7.2	-6.0	-1.3	-4.4	-3.4	-1.0	1.0	4.7	-3.5	-7.0	-4.7	-2.5	0.1	-0.7	0.9	GR
HU	Hungary	-0.9	-7.5	7.2	-4.1	-11.7	8.7	2.9	1.4	1.5	5.3	4.0	1.2	-18.3	-13.5	-5.6	-13.6	-8.3	-5.8	HU
IE	Ireland	9.0	-3.5	12.9	15.1	2.5	12.3	3.5	-1.2	4.7	3.7	1.1	2.6	-12.9	-7.6	-5.7	-18.0	-14.0	-4.7	IE
IT	Italy	-0.8	-1.7	0.9	-1.8	-1.4	-0.5	6.1	6.1	0.1	5.2	6.4	-1.1	-1.3	0.5	-1.8	-1.5	-1.6	0.1	IT
LV	Latvia	4.4	2.5	1.9	3.0	0.5	2.5	-5.3	-6.0	0.7	-1.7	-2.5	0.8	-15.9	-14.5	-1.7	-11.5	-11.4	-0.1	LV
LT	Lithuania	4.0	5.1	-1.0	5.9	5.2	0.6	0.1	2.8	-2.6	1.4	1.0	0.4	-9.2	-10.8	1.8	-9.8	-11.9	2.4	LT
NL	Netherlands	1.3	1.7	-0.4	1.2	0.7	0.5	8.3	7.7	0.6	7.6	8.2	-0.5	-1.5	-3.0	1.5	-2.4	-2.8	0.4	NL
PL	Poland	11.4	6.6	4.5	12.0	7.1	4.6	23.5	20.0	2.9	22.6	21.2	1.2	-16.9	-15.6	-1.5	-18.0	-17.2	-1.0	PL
PT	Portugal	3.4	-0.1	3.5	2.0	0.2	1.8	8.1	4.8	3.1	8.4	7.4	1.0	-1.5	-1.0	-0.5	-0.3	-1.9	1.7	PT
RO	Romania	3.4	5.8	-2.3	11.5	9.1	2.2	11.2	10.9	0.3	29.4	26.6	2.2	-14.7	-11.1	-4.1	-8.3	-7.3	-1.0	RO
SK	Slovakia	5.4	2.4	2.9	3.8	-0.2	4.0	9.3	8.7	0.6	5.2	5.0	0.3	6.6	4.9	1.6	4.2	6.2	-1.9	SK
SI	Slovenia	-0.8	-5.0	4.4	-0.7	-2.0	1.3	9.9	7.0	2.7	8.4	7.9	0.5	2.8	2.7	0.1	1.3	0.4	1.0	SI
ES	Spain	8.7	10.6	-1.8	5.4	5.9	-0.5	4.3	3.9	0.4	2.7	3.9	-1.2	-11.5	-13.9	2.8	-10.5	-11.0	0.5	ES
SE	Sweden	1.2	-0.8	2.0	1.4	0.6	0.8	5.0	3.9	1.1	4.2	4.6	-0.4	-2.1	-2.5	0.4	-3.2	-4.2	1.0	SE
GB	UK	-1.7	-4.5	3.0	-3.4	-6.3	3.0	10.2	9.3	0.9	12.8	12.1	0.7	-9.8	-8.2	-1.7	-5.6	-3.0	-2.7	GB

Note: an increase in REER indicates real appreciation. Business sector w.o. A.C.R. = Business sector excluding agriculture, construction and real estate activities.

Comparing the changes in the total economy REER using actual aggregates (the index which is the closest to the ULC-REER available at other databases, such as Eurostat's) and the constant-weight REER for business sector excluding agriculture, construction and real estate activities (our preferred measure), there are five countries in which there is a sizeable gap, ie between 6 and 10 percent: Hungary, Romania, Estonia, UK and Greece. The gap is also large in Latvia (4.5 percent) and the Czech Republic (3.1 percent). For these countries the REER using actual aggregates of the total economy significantly overestimates the underlying gain in competitiveness.

5. Which countries were more successful?

Table 4 in Darvas (2012b) showed the results of a ranking based on stability and growth[2] of five indicators of the business sector excluding agriculture, construction and real estate activities[3]:

1. production;
2. productivity;
3. employment;
4. the ratio of employment to the product of average hourly labour compensation and working time;
5. and export market share.

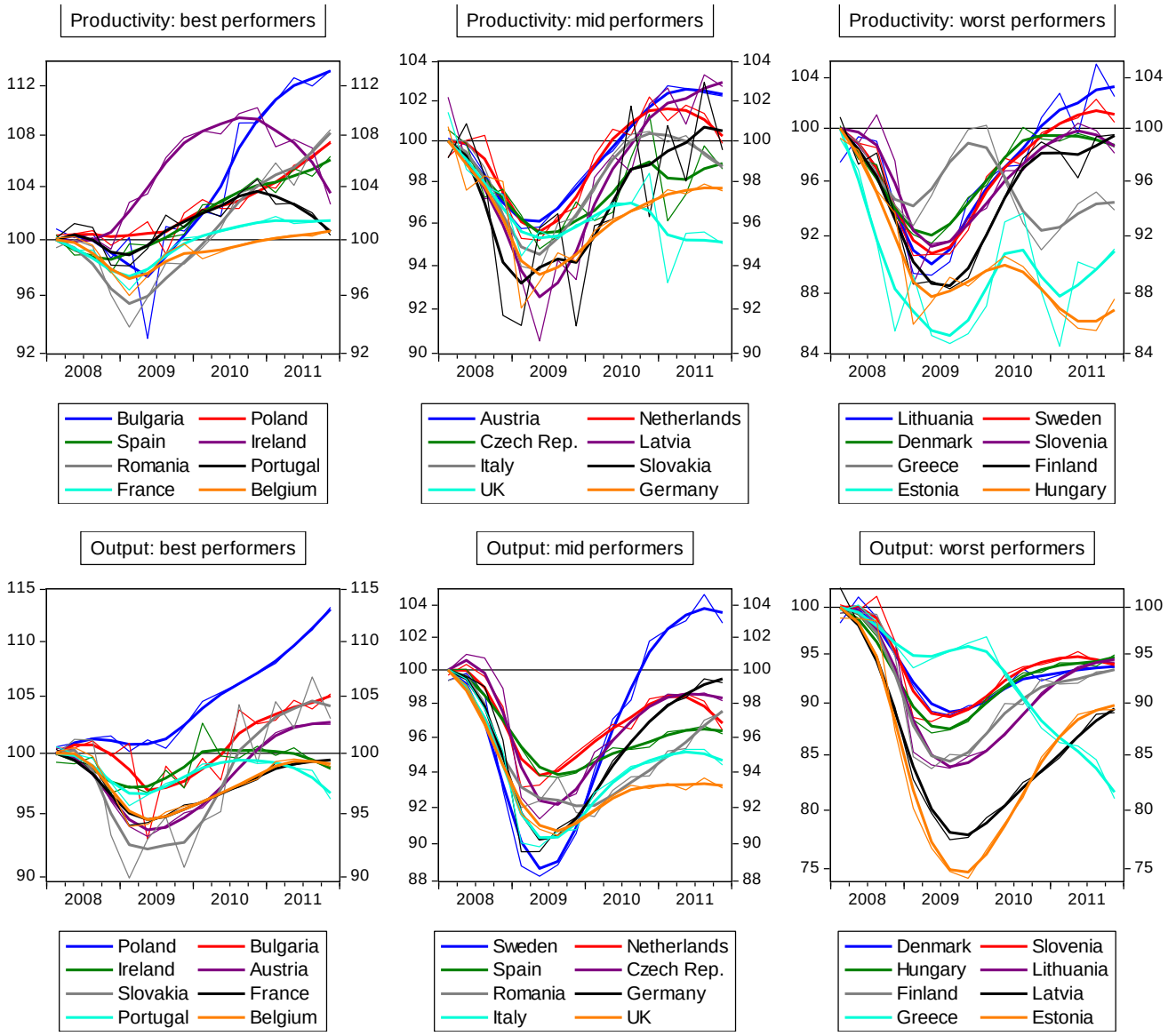
The motivation for the choice of these variables is described in Darvas (2012b).

For production, employment and export market share we use actual (and not fixed-weight) data, because for these indicators the actual aggregate is meaningful. But for productivity and the ratio of employment to the product of average hourly labour compensation and work-time we use fixed-weight aggregates, because compositional changes can lead to seeming changes in productivity and average hourly labour cost, even when there is no change in any sector of the economy.

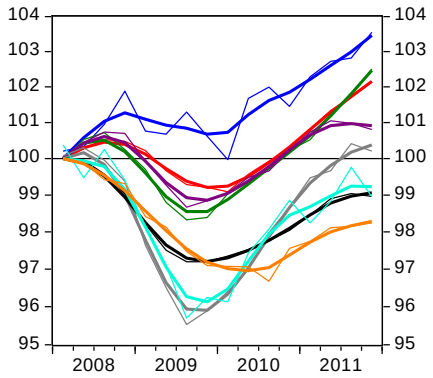
Since some of the indicators are noisy, we base the ranking on Hodrick-Prescott filtered values with a smoothing parameter 1, a very low value, so as to remove only short-term noise. Figure 1 shows the times series of the five indicators. For each indicator we order the countries according to their score for the particular indicator (which is the average of scores for stability and growth). We show both the original data (thin lines) and the Hodrick-Prescott filtered values (thick lines).

[2] We defined 'Stability' as the magnitude of the maximum fall in the indicator after 2008Q1 (up to our most recent observation, 2011Q4; smaller drop is better), and 'Growth' as the growth of the indicator from 2008Q1 to 2011Q4 (higher growth is better).
[3] For exports only the total economy data is available; yet most of exports are accomplished by our preferred aggregate of the business sector.

Figure 1: The five indicators used to rank countries (business sector excluding agriculture, construction and real estate activities, except for exports, which is for the total economy; 2008Q1=100), 2008Q1-2011Q4

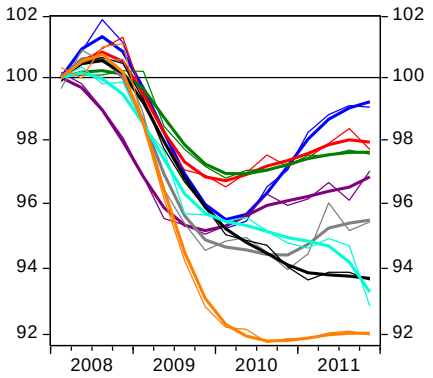


Employment: best performers



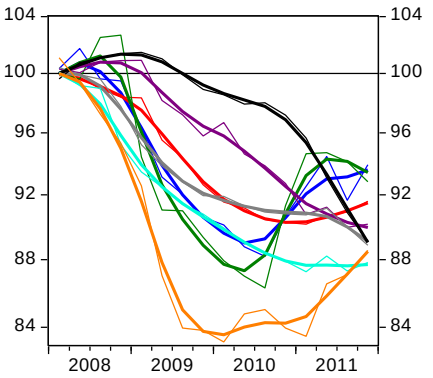
Poland, Germany, Austria, Belgium, Sweden, France, Hungary, Italy

Employment: mid performers



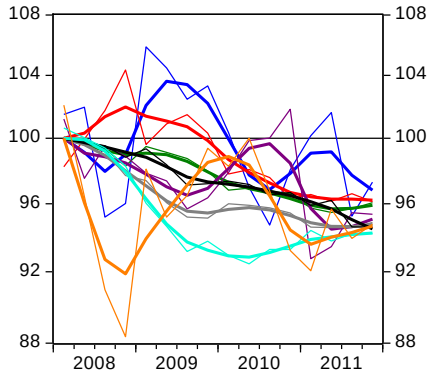
Slovakia, Czech Rep., Netherlands, UK, Finland, Slovenia, Portugal, Denmark

Employment: worst performers



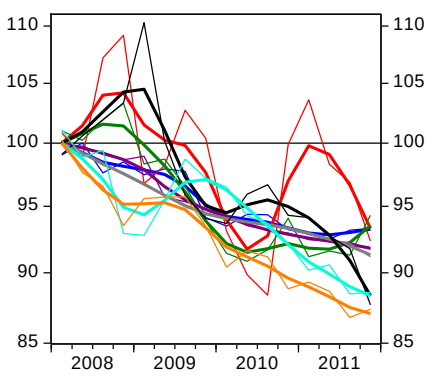
Lithuania, Romania, Estonia, Bulgaria, Spain, Greece, Ireland, Latvia

Employment/(wage*worktime): best performers



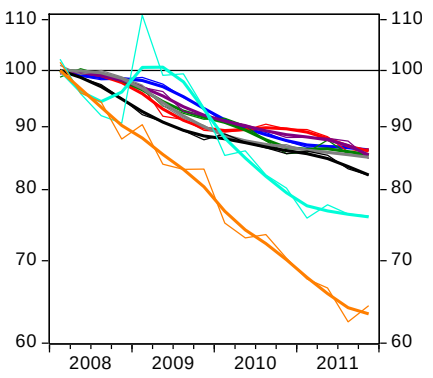
Lithuania, Czech Rep., Germany, Hungary, Austria, Belgium, Sweden, Latvia

Employment/(wage*worktime): mid performers



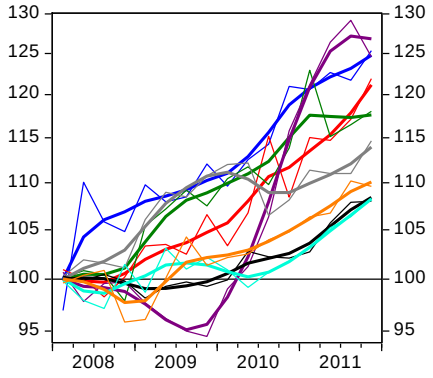
Italy, Estonia, Slovakia, Netherlands, France, Greece, Ireland, Poland

Employment/(wage*worktime): worst performers



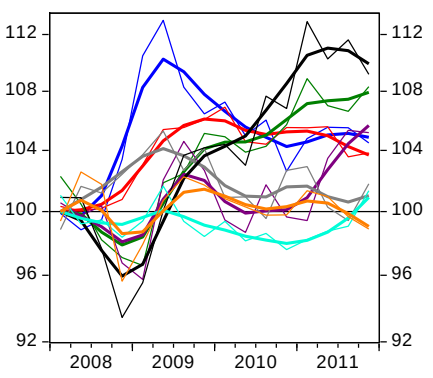
Slovenia, UK, Finland, Portugal, Denmark, Spain, Romania, Bulgaria

Exports/foreign imports: best performers



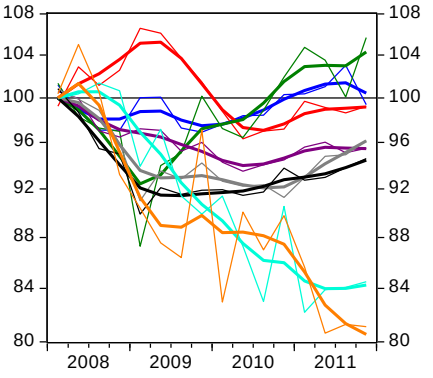
Lithuania, Bulgaria, Romania, Estonia, Poland, Germany, Latvia, Spain

Exports/foreign imports: mid performers



Ireland, Netherlands, Hungary, Portugal, UK, Czech Rep., France, Belgium

Exports/foreign imports: worst performers



Sweden, Denmark, Slovakia, Austria, Slovenia, Italy, Greece, Finland

Note to Figure 1: thin lines show the original data and the same-colour thick lines the Hodrick-Prescott filtered values with smoothing parameter 1, a very low value, in order to eliminate only very short-run noise. For each indicator we order the countries according to their score for the particular indicator (which is the average of scores for stability and growth, calculated in the basis of Hodrick-Prescott filtered data).

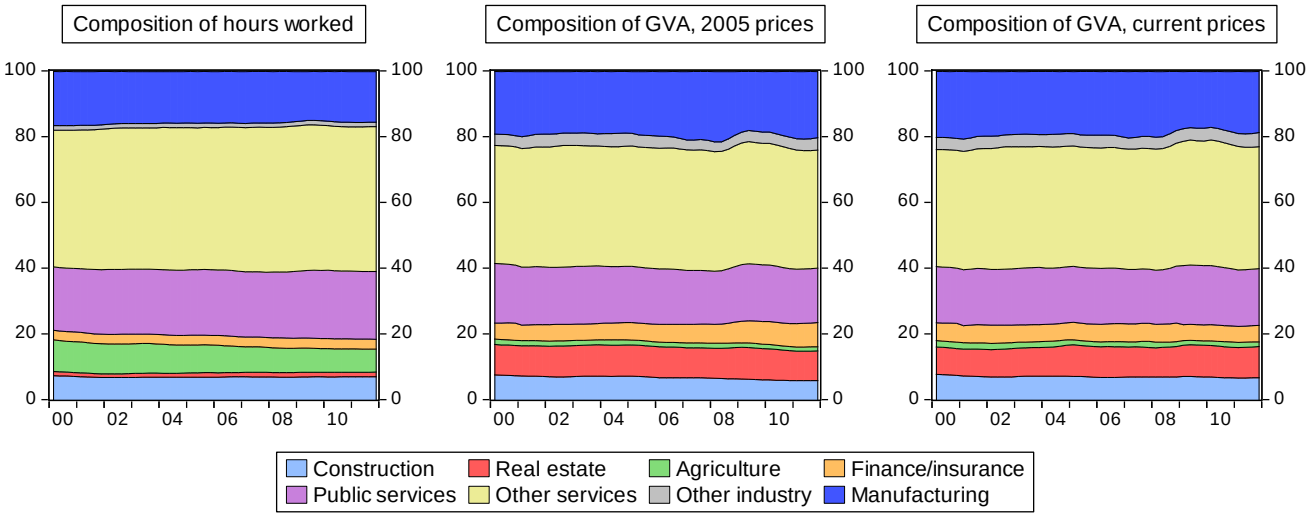
6. Detailed results for 24 EU member states

The charts on the following pages show detailed results for 24 EU countries.

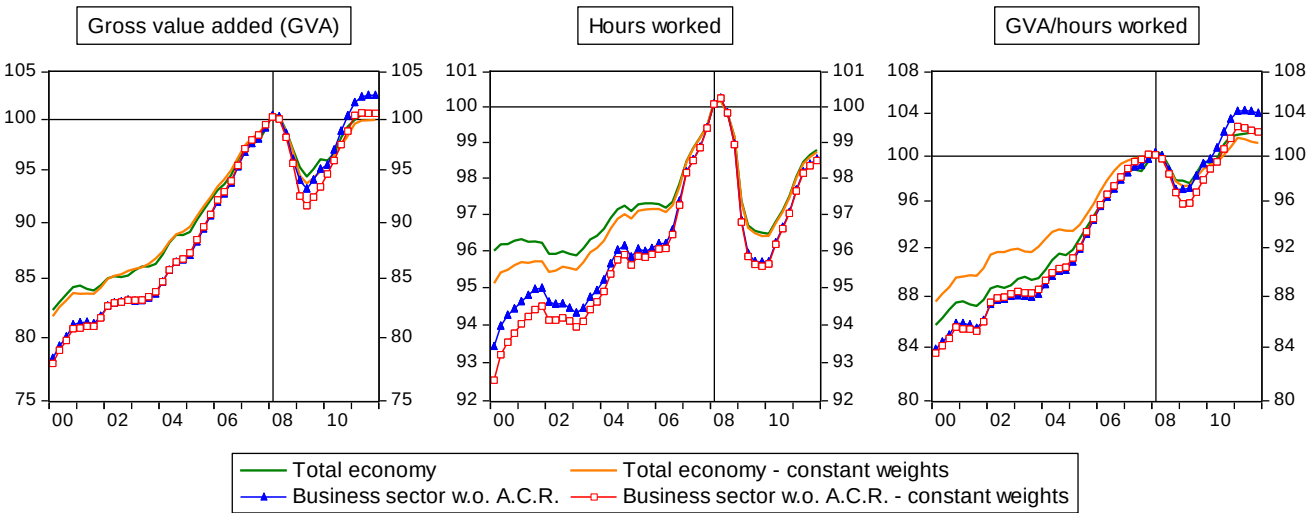
For comparison, we also show consumer price index (CPI) based REERs, which are calculated against the same set of trading partners for which ULC-REERs are calculated. In addition, we also show the CPI-REER calculated against 138 trading partners as in Darvas (2012a).

The last panel for each country also shows the weighted average import of trading partners, which is calculated by averaging the volume of imports of goods and services of 40 trading partners: 27 EU countries plus Australia, Brazil, Canada, Croatia, Iceland, Japan, Korea, New Zealand, Norway, Russia, Switzerland, Ukraine and the United States. Weights were derived on the basis of Bayoumi, Lee and Jaewoo (2006).

6.1. Austria


Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing

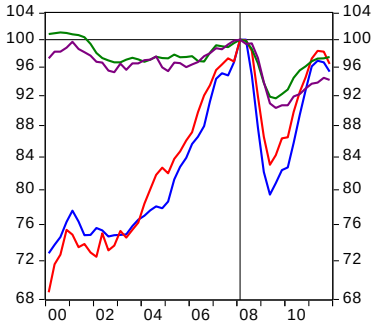

Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights


Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

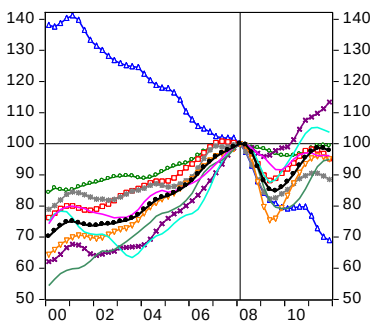
Austria, continued

Hours worked/employee (2008Q1=100)

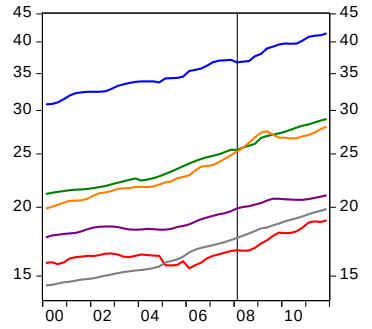
Manufacturing data from different databases (2008Q1=100)



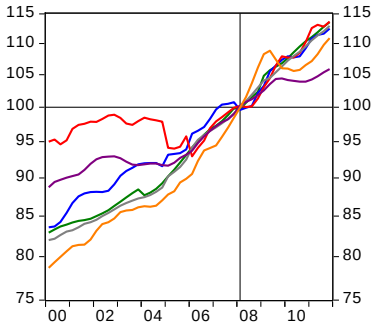
Gross production in manufacturing sub-sectors (2008Q1=100)



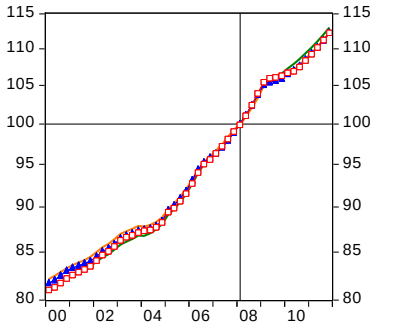
Hourly labour compensation (local currency)



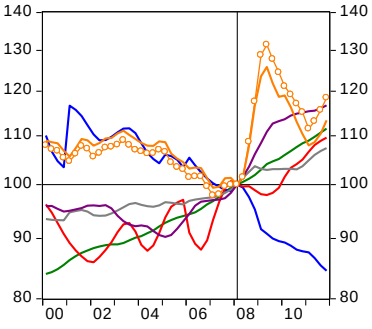
Hourly labour compensation (2008Q1=100)



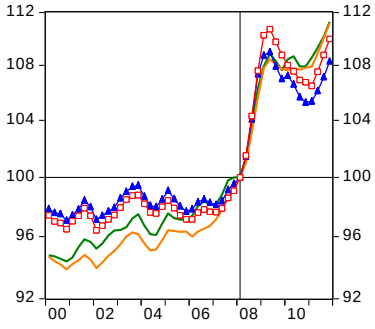
Hourly labour compensation (2008Q1=100)



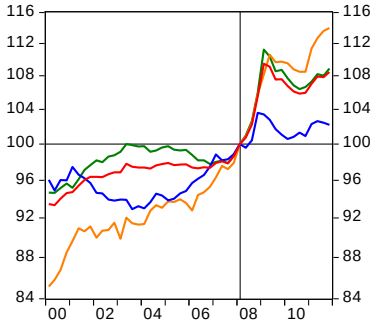
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

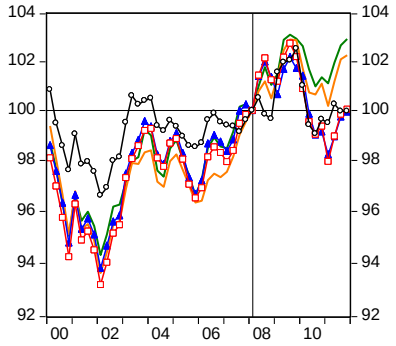


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

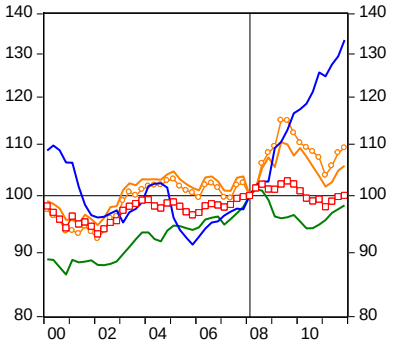


Austria, continued 2

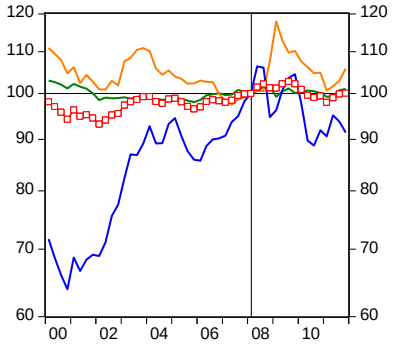
REER-ULC - aggregates (2008Q1=100)



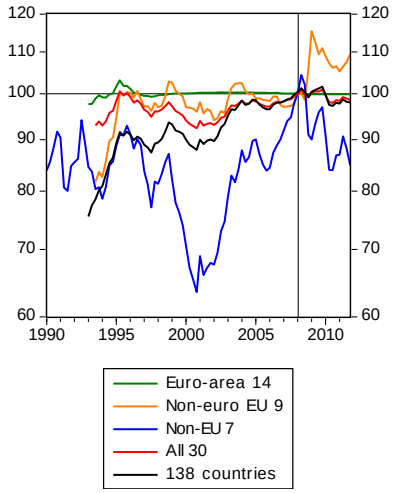
REER-ULC - sectors (2008Q1=100)



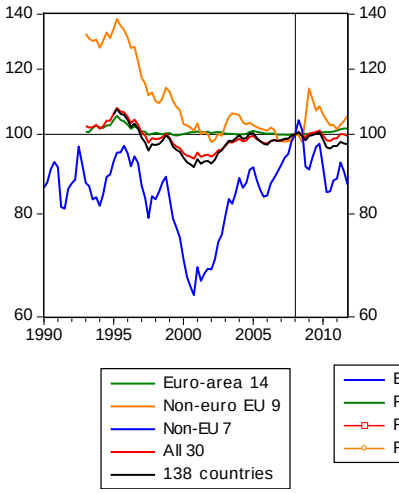
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



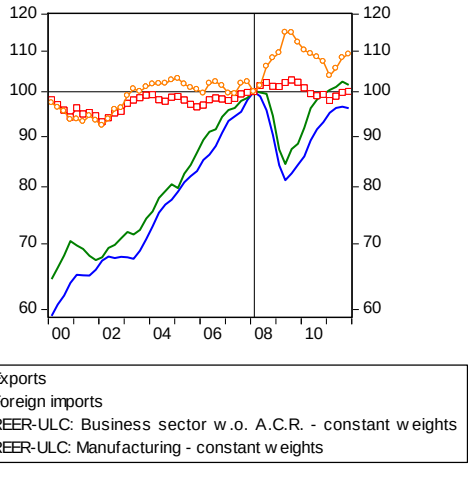
NEER (2008Q1=100)



REER-CPI (2008Q1=100)

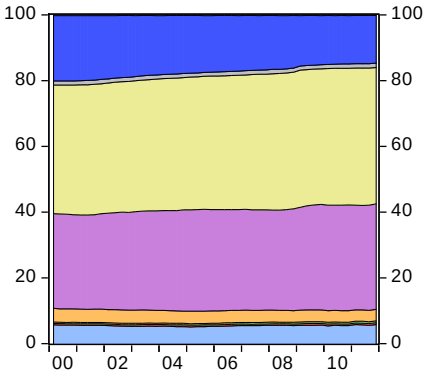


Export, export demand and REER

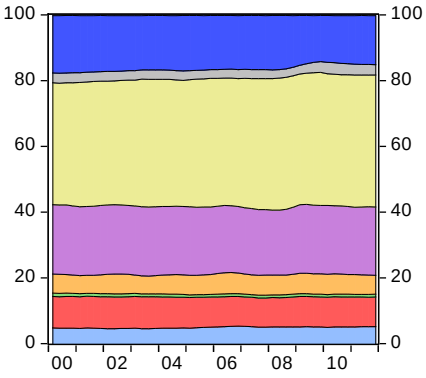


6.2. Belgium

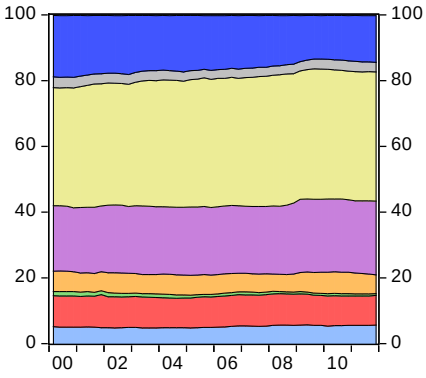
Composition of hours worked



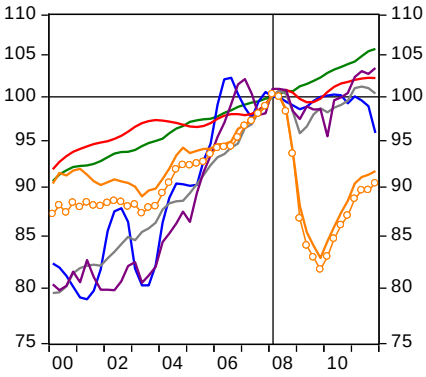
Composition of GVA, 2005 prices



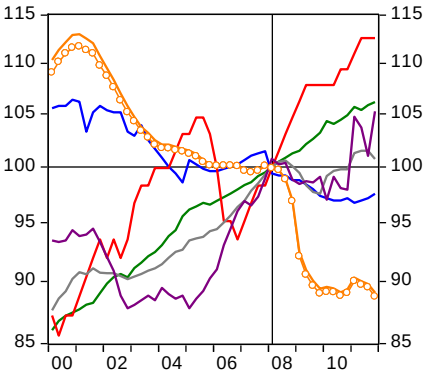
Composition of GVA, current prices



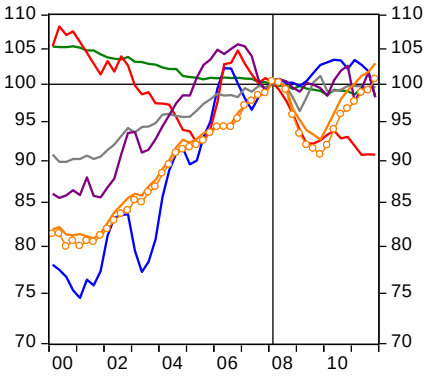
Gross value added (GVA)

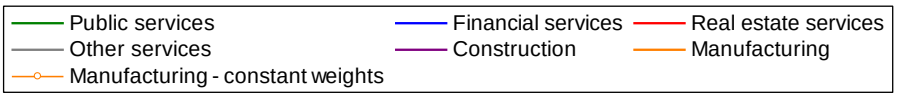


Hours worked

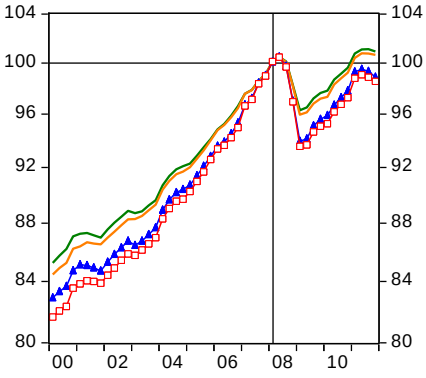


GVA/hours worked

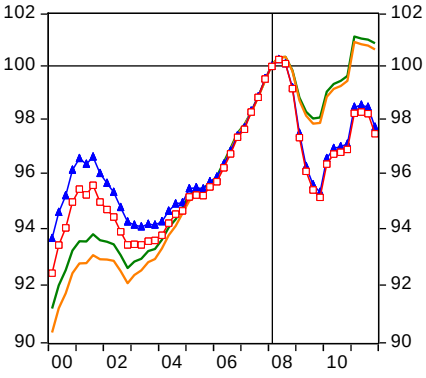




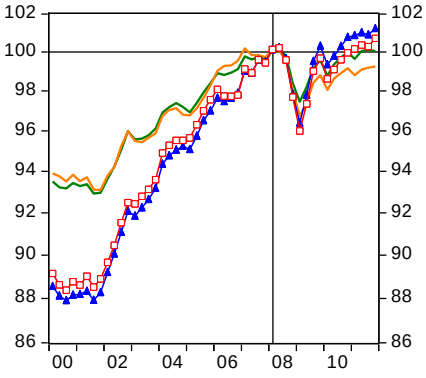
Gross value added (GVA)

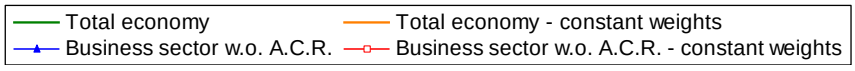


Hours worked



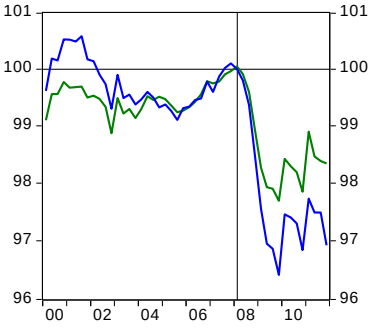
GVA/hours worked





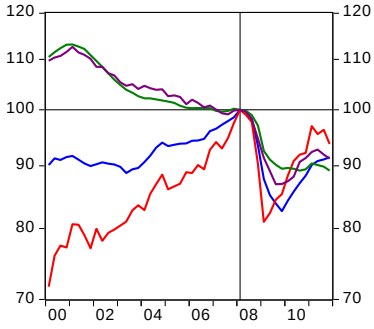
Belgium, continued

Hours worked/employee (2008Q1=100)



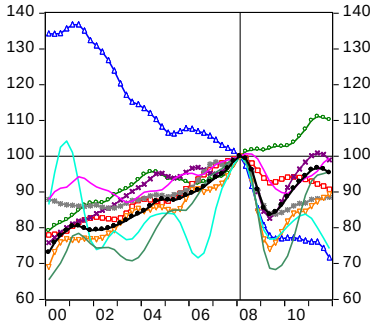
Total economy
Business sector w.o. A.C.R.

Manufacturing data from different databases (2008Q1=100)



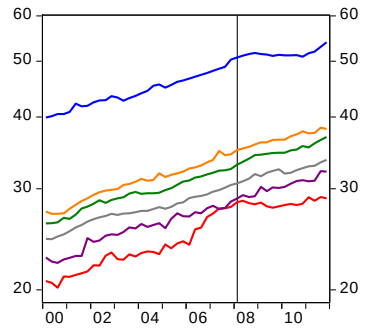
Gross value added (national accounts database)
Gross production (industry database)
Hours worked (national accounts database)
Hours worked (industry database)

Gross production in manufacturing sub-sectors (2008Q1=100)



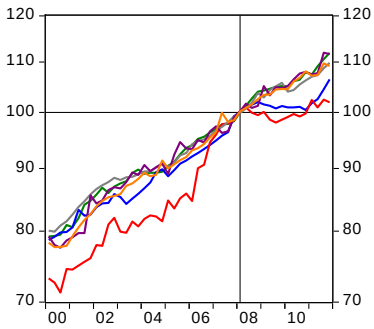
Food
Cloth
Wood
Chemic/Pharma
Plastic
Metal
Electric
Machine
Other
Total

Hourly labour compensation (local currency)



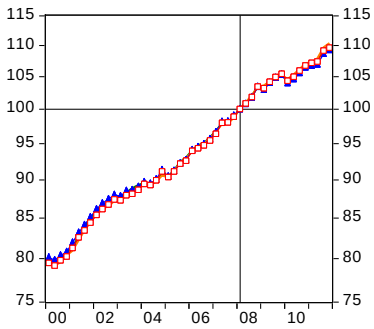
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing

Hourly labour compensation (2008Q1=100)



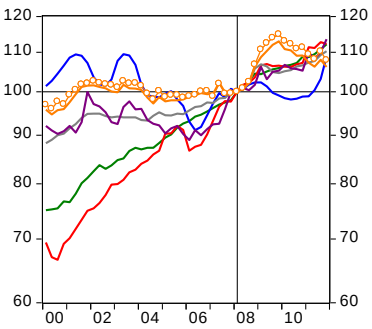
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing

Hourly labour compensation (2008Q1=100)



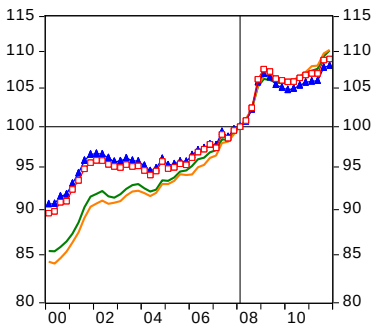
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Unit labour costs (2008Q1=100)



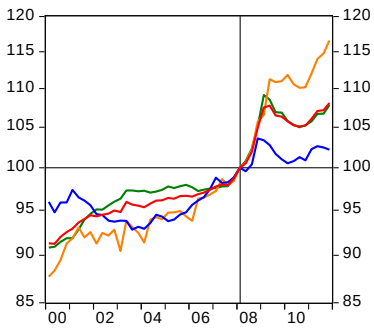
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

Unit labour costs (2008Q1=100)



Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

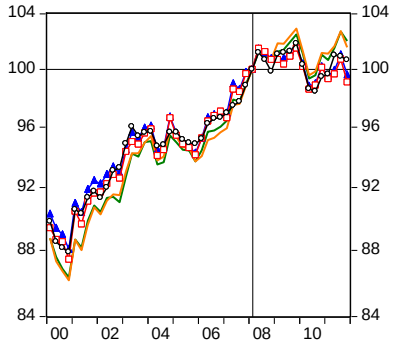
ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)



Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

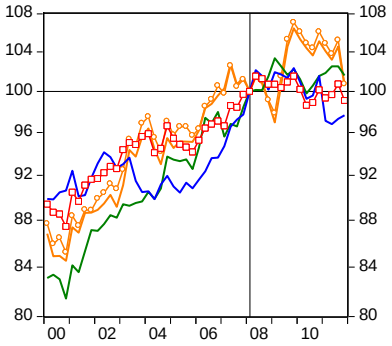
Belgium, continued 2

REER-ULC - aggregates (2008Q1=100)



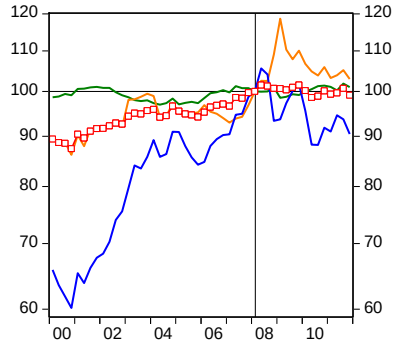
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights
Eurostat (Total economy)

REER-ULC - sectors (2008Q1=100)



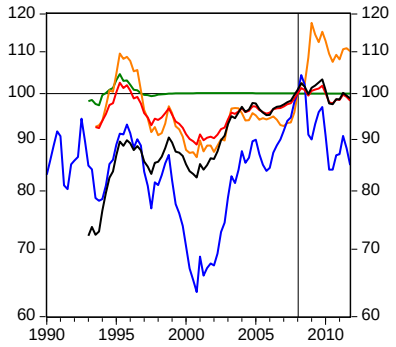
Manufacturing
Manufacturing - constant weights
Trade, transport, tourism
Information and communication
Business sector w.o. A.C.R. - constant weights

REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



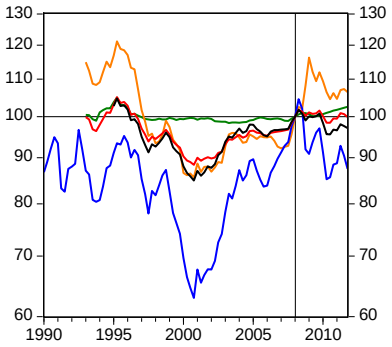
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

NEER (2008Q1=100)



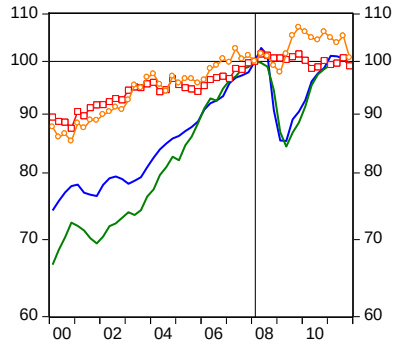
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

REER-CPI (2008Q1=100)



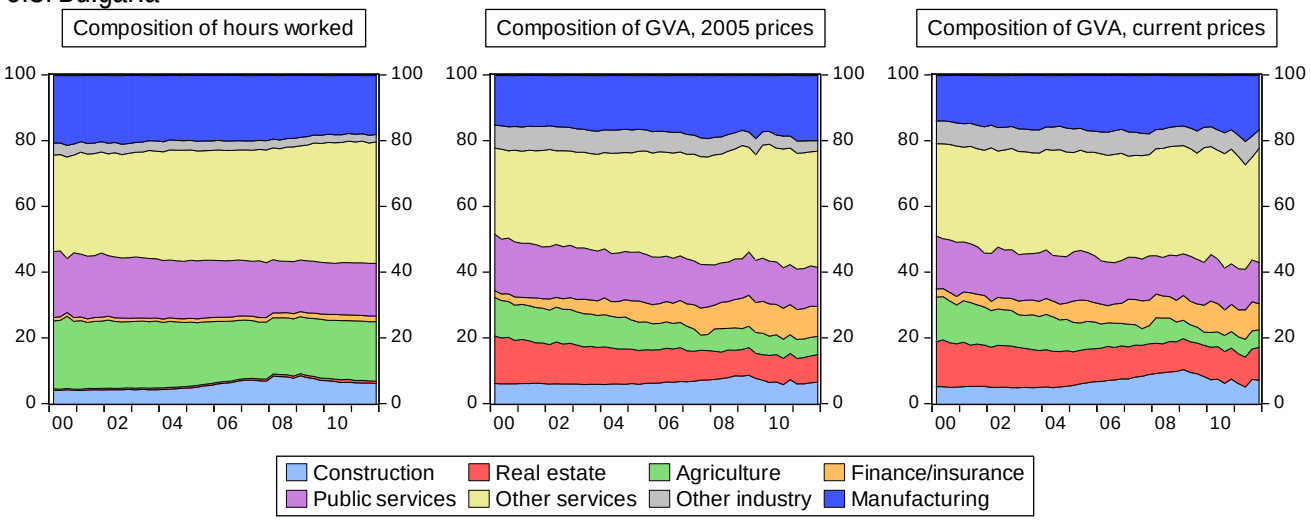
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

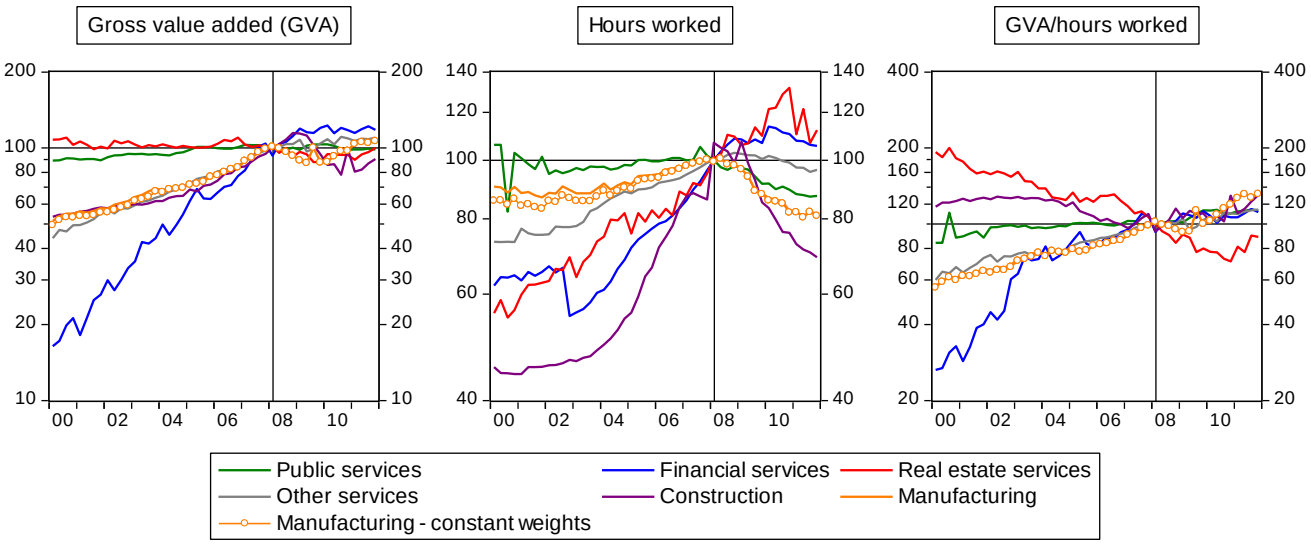
Export, export demand and REER

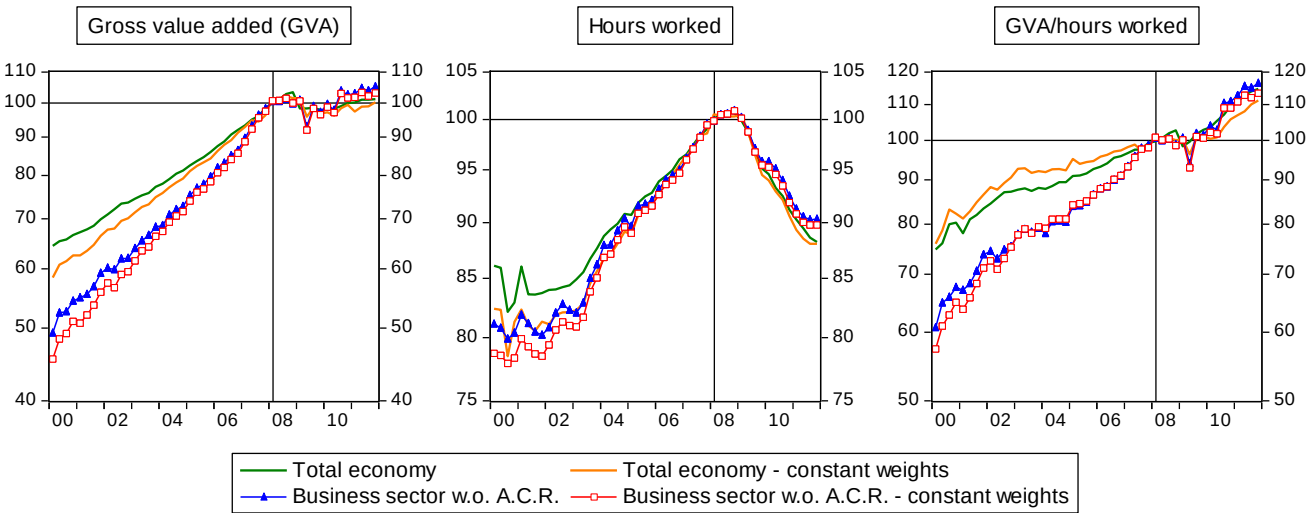


Exports
Foreign imports
REER-ULC: Business sector w.o. A.C.R. - constant weights
REER-ULC: Manufacturing - constant weights

6.3. Bulgaria

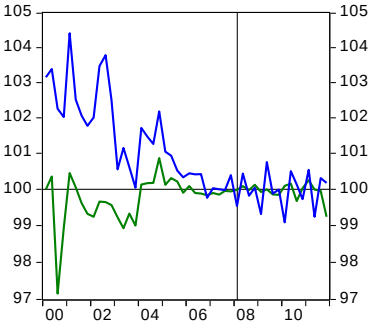

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

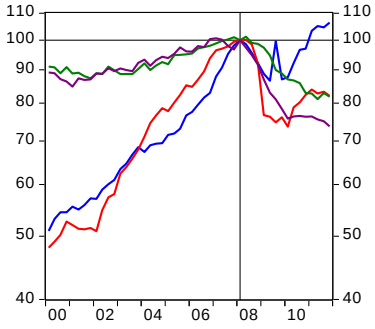

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Bulgaria, continued

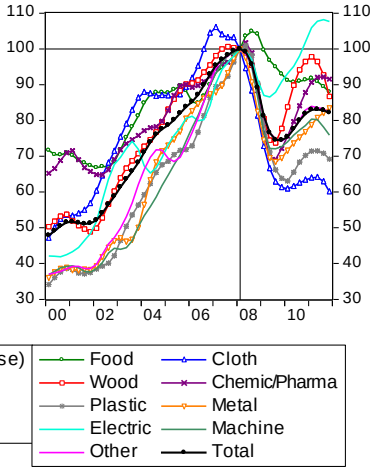
Hours worked/employee (2008Q1=100)



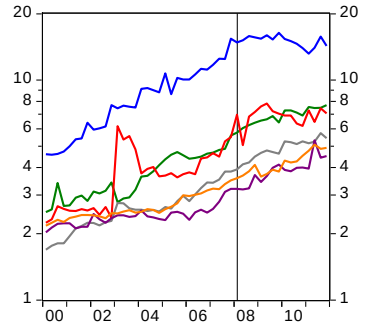
Manufacturing data from different databases (2008Q1=100)



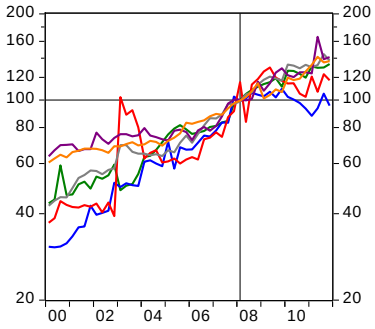
Gross production in manufacturing sub-sectors (2008Q1=100)



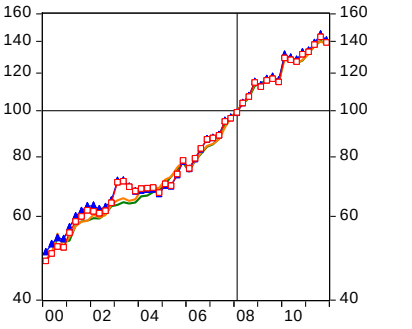
Hourly labour compensation (local currency)



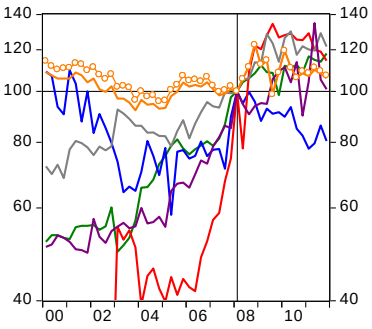
Hourly labour compensation (2008Q1=100)



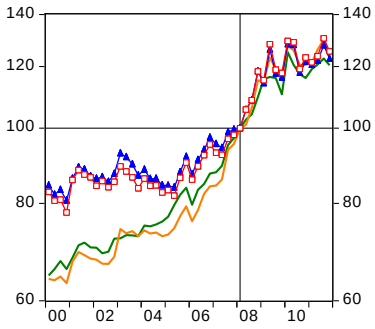
Hourly labour compensation (2008Q1=100)



Unit labour costs (2008Q1=100)



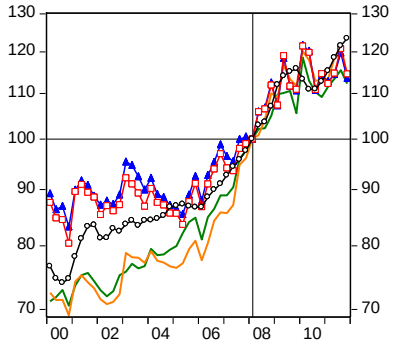
Unit labour costs (2008Q1=100)



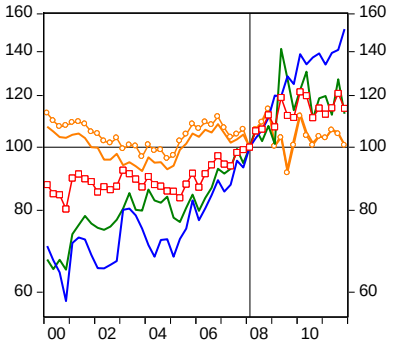
ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

Bulgaria, continued 2

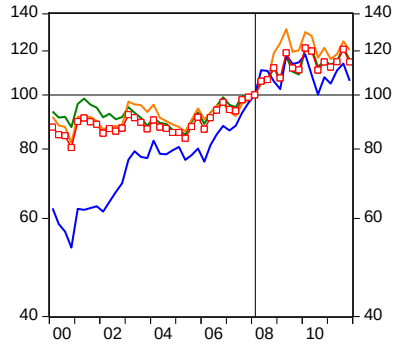
REER-ULC - aggregates (2008Q1=100)



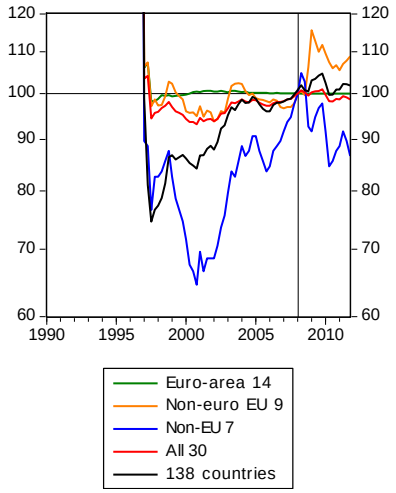
REER-ULC - sectors (2008Q1=100)



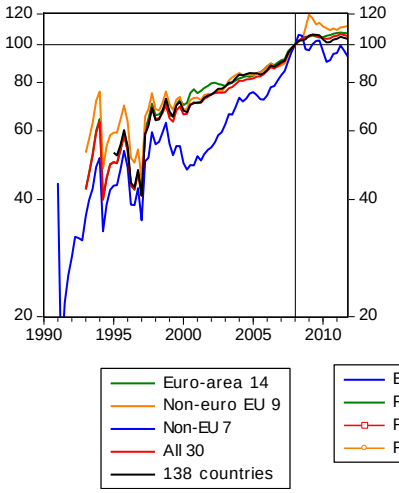
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



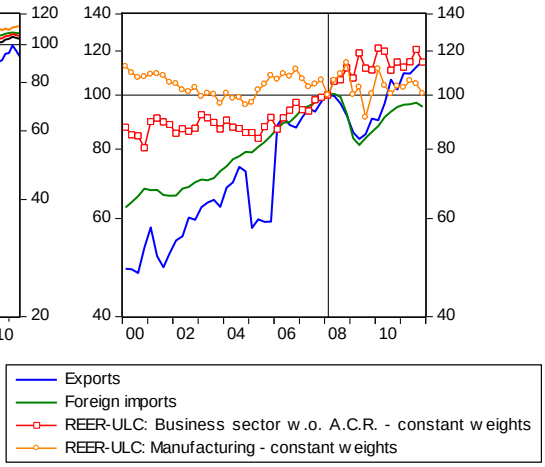
NEER (2008Q1=100)



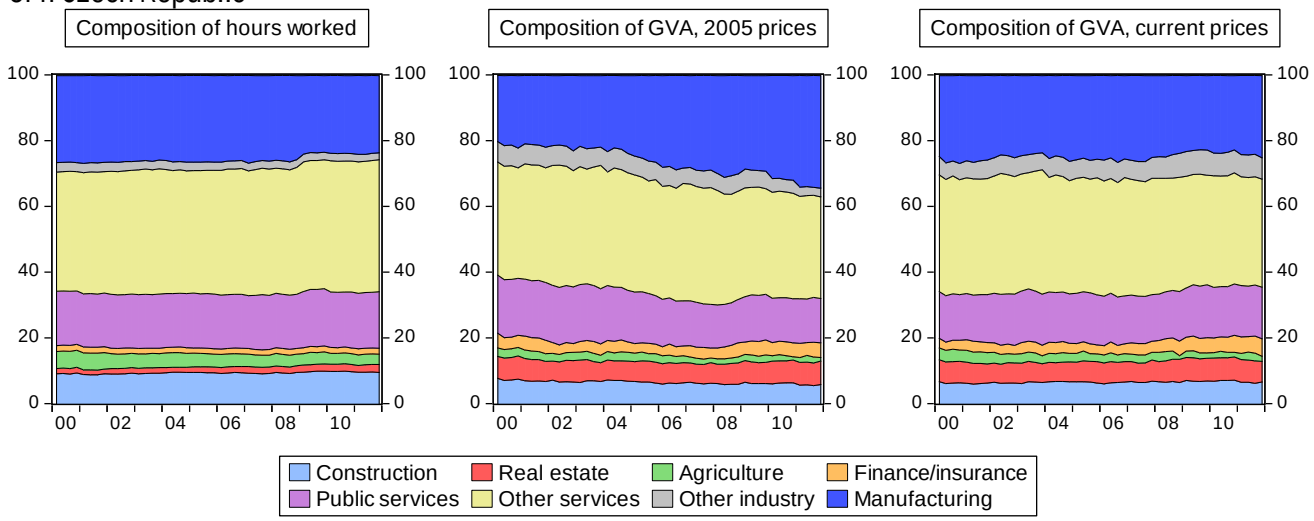
REER-CPI (2008Q1=100)

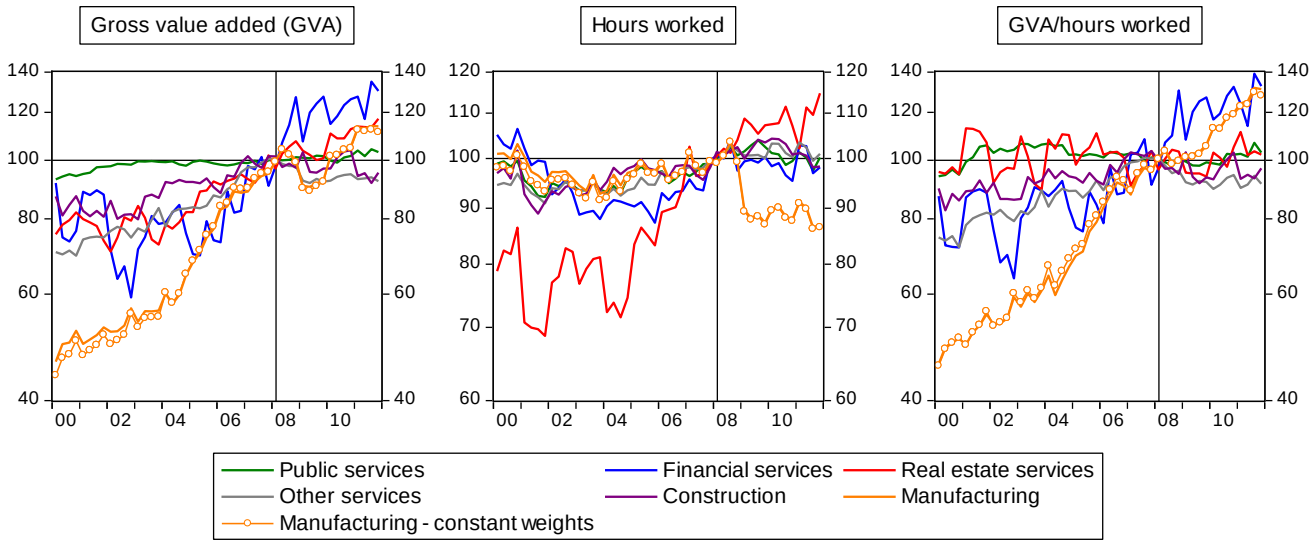


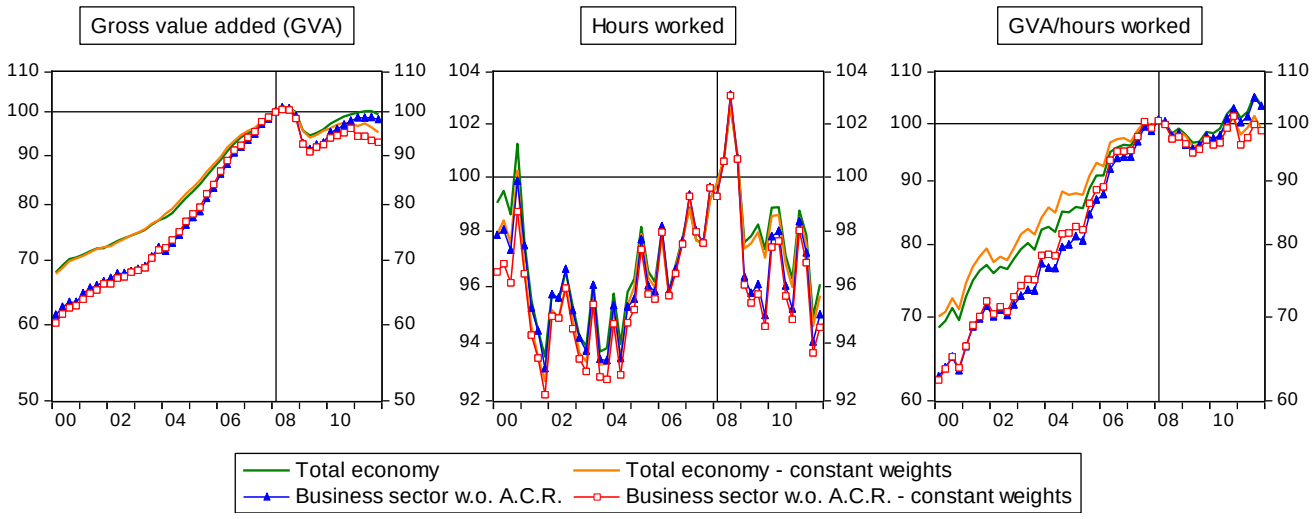
Export, export demand and REER



6.4. Czech Republic

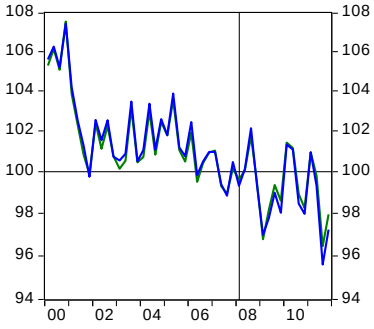






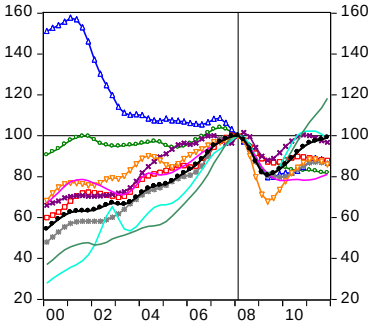
Czech Republic, continued

Hours worked/employee (2008Q1=100)

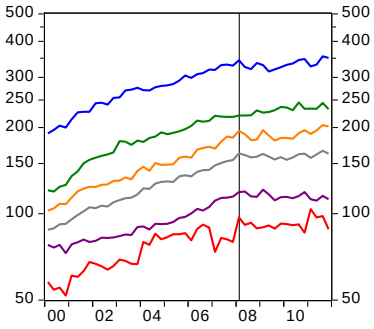


Manufacturing data from different databases (2008Q1=100)

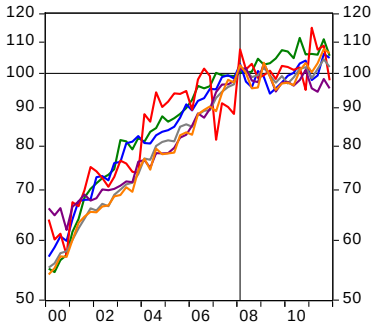
Gross production in manufacturing sub-sectors (2008Q1=100)



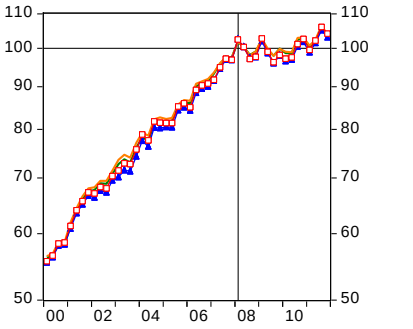
Hourly labour compensation (local currency)



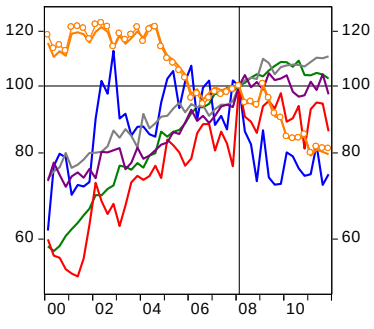
Hourly labour compensation (2008Q1=100)



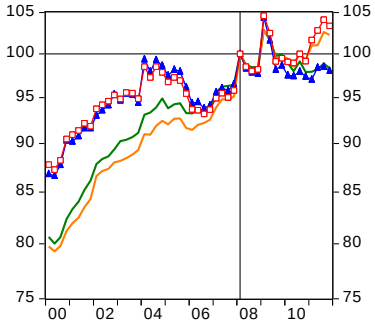
Hourly labour compensation (2008Q1=100)



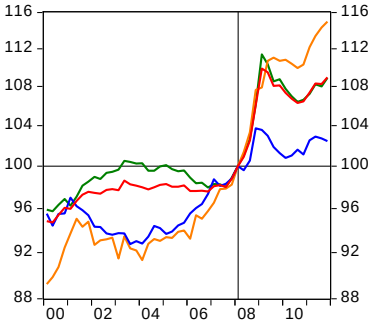
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

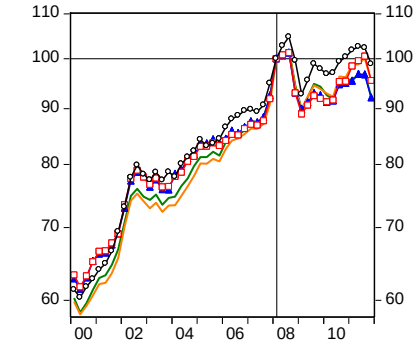


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

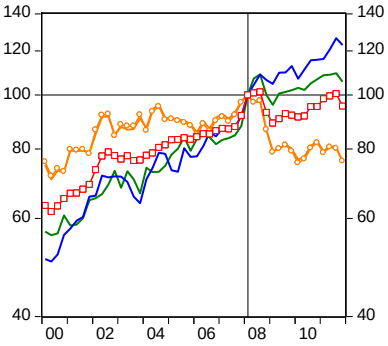


Czech Republic, continued 2

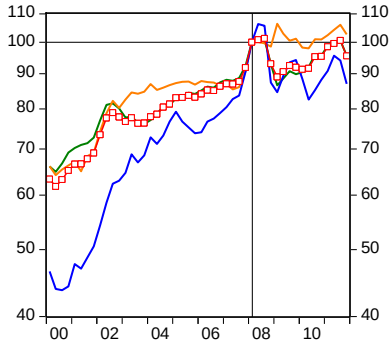
REER-ULC - aggregates (2008Q1=100)



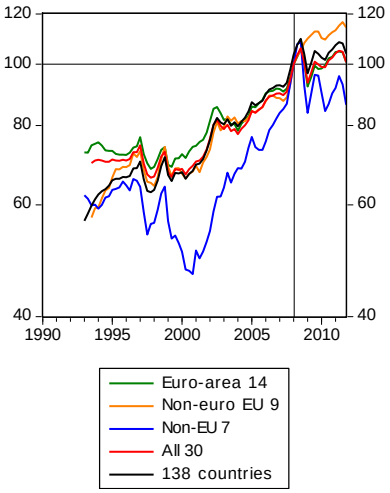
REER-ULC - sectors (2008Q1=100)



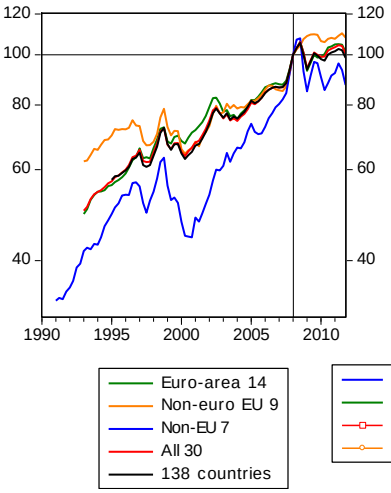
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



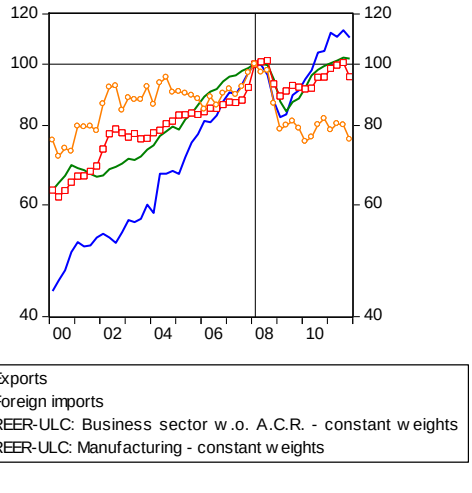
NEER (2008Q1=100)



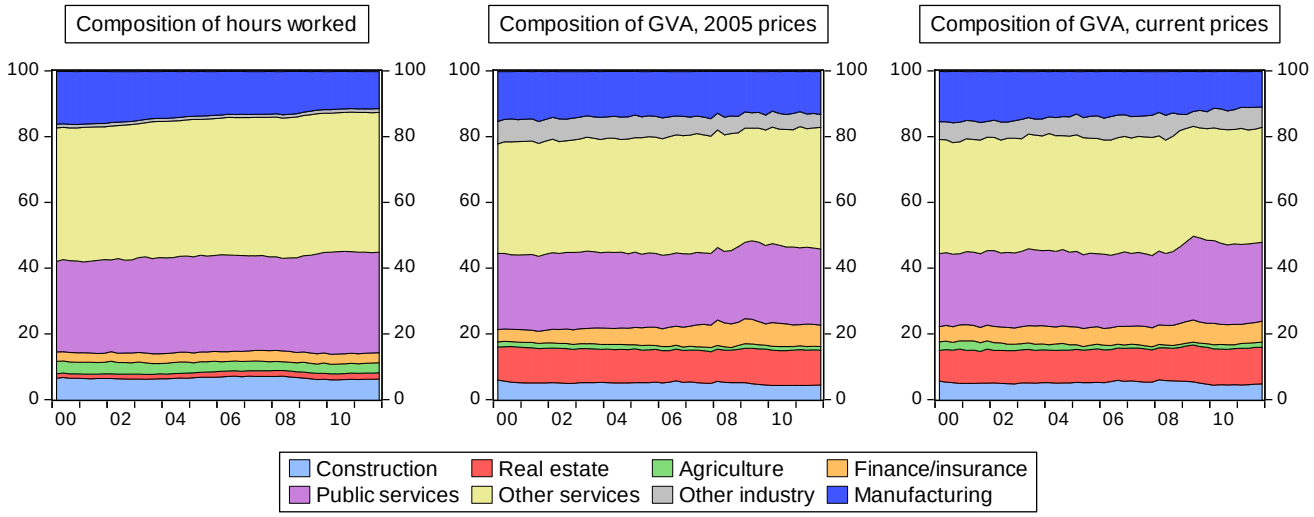
REER-CPI (2008Q1=100)

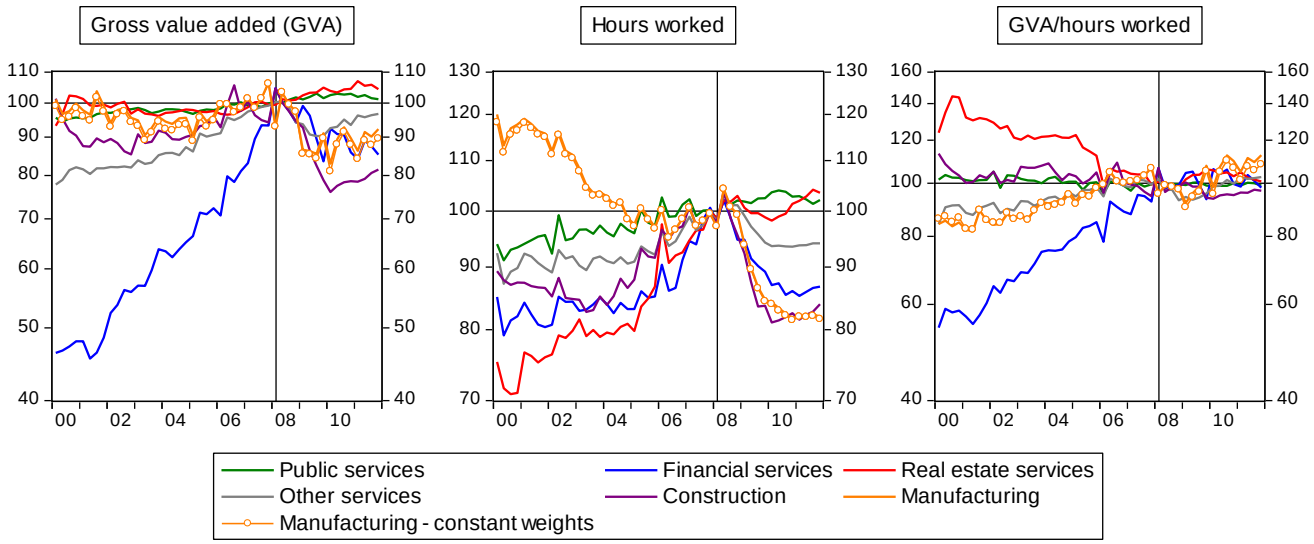


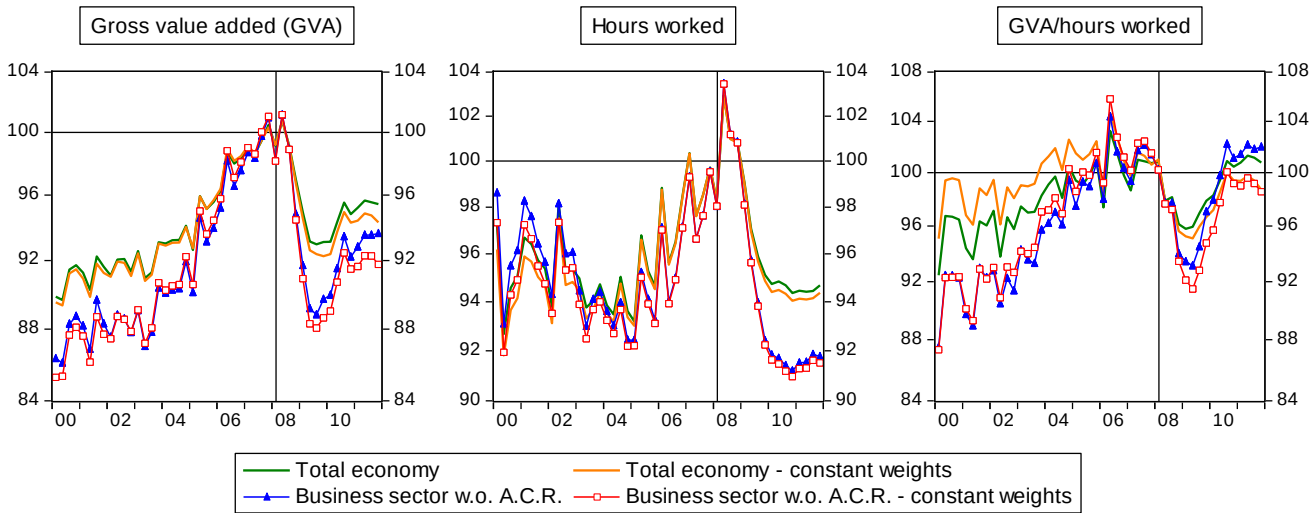
Export, export demand and REER



6.5. Denmark

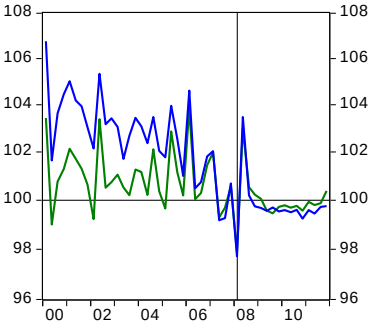

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

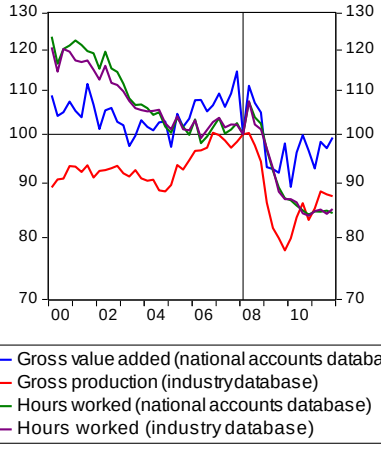

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Denmark, continued

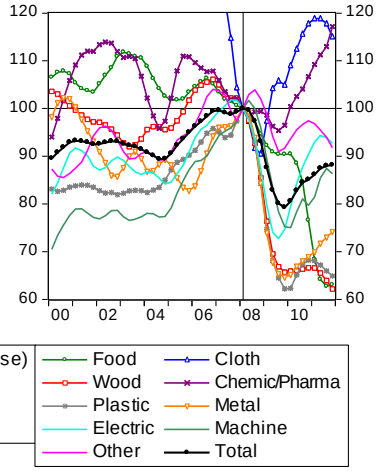
Hours worked/employee (2008Q1=100)



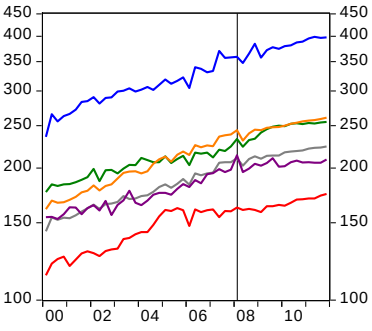
Manufacturing data from different databases (2008Q1=100)



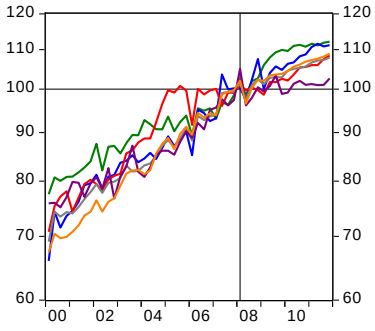
Gross production in manufacturing sub-sectors (2008Q1=100)



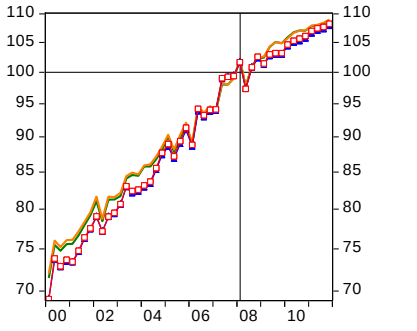
Hourly labour compensation (local currency)



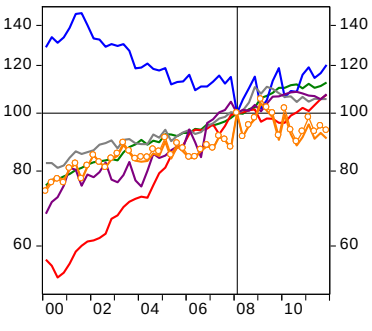
Hourly labour compensation (2008Q1=100)



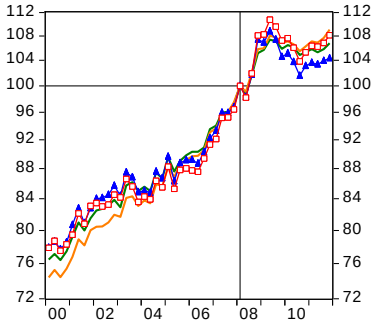
Hourly labour compensation (2008Q1=100)



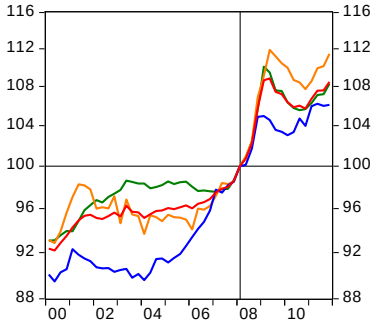
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

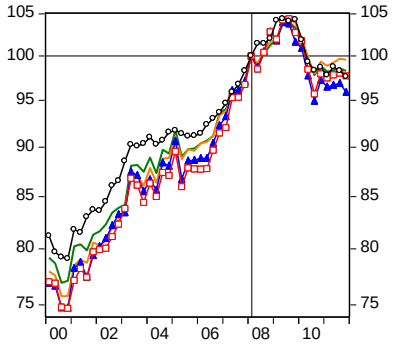


ULC of trading partners
Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)



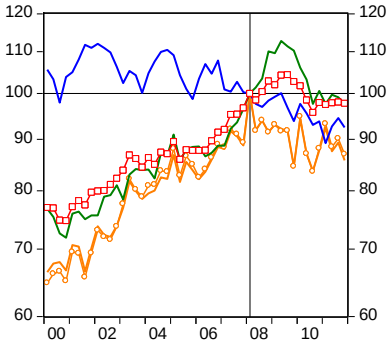
Denmark, continued 2

REER-ULC - aggregates (2008Q1=100)



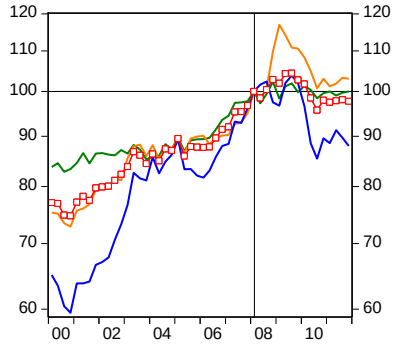
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights
Eurostat (Total economy)

REER-ULC - sectors (2008Q1=100)



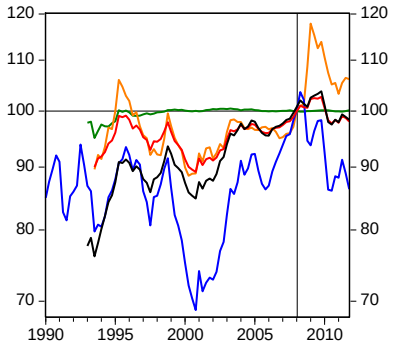
Manufacturing
Manufacturing - constant weights
Trade, transport, tourism
Information and communication
Business sector w.o. A.C.R. - constant weights

REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



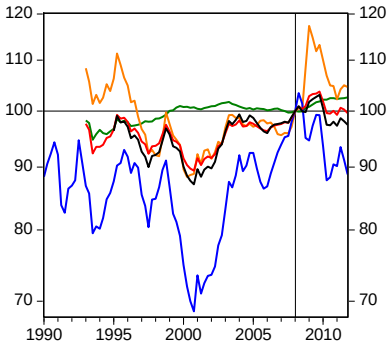
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

NEER (2008Q1=100)



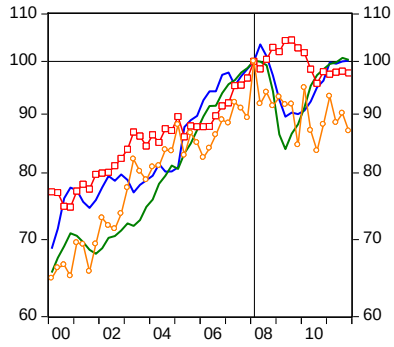
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

REER-CPI (2008Q1=100)



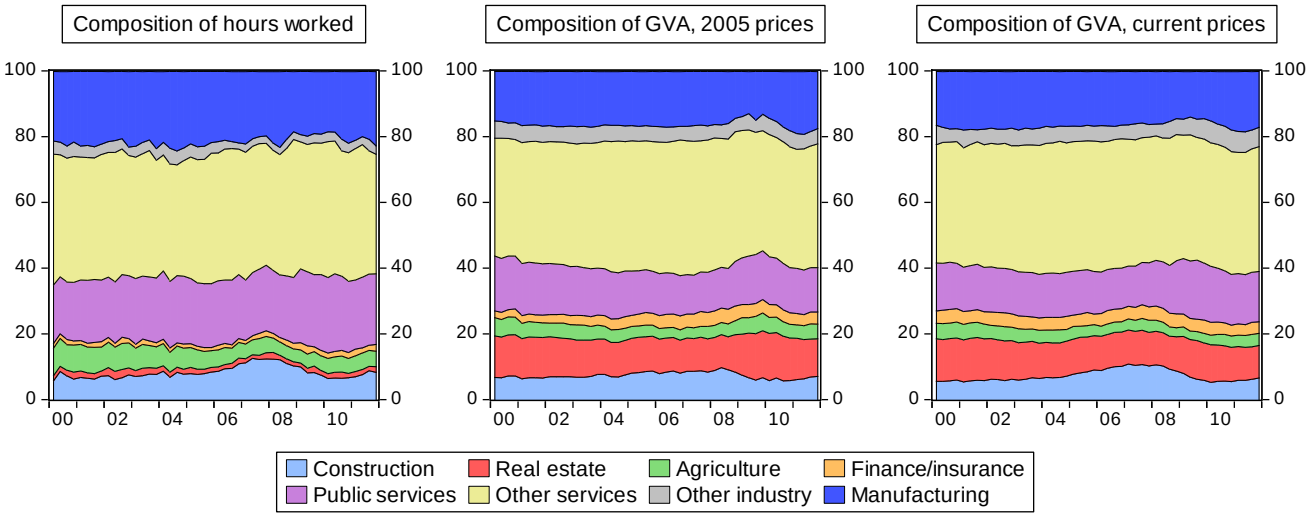
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

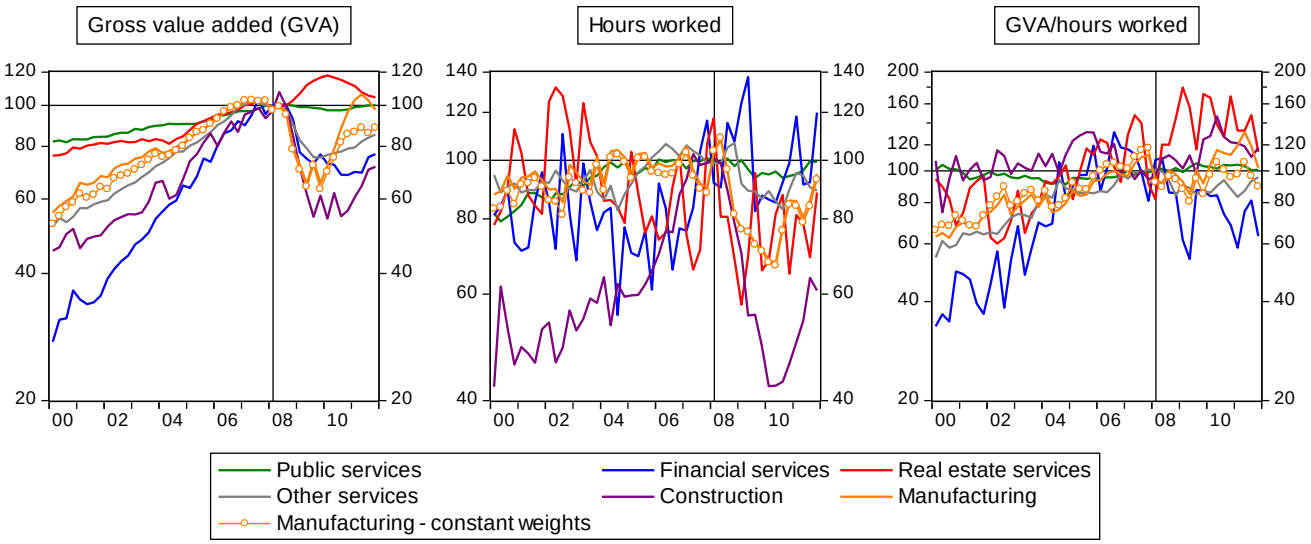
Export, export demand and REER

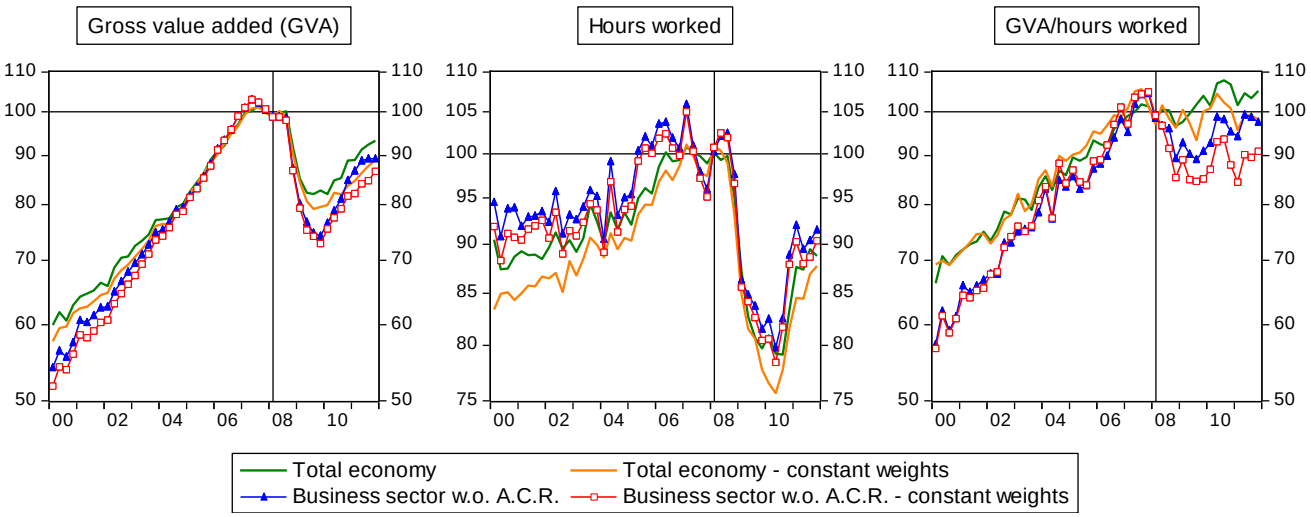


Exports
Foreign imports
REER-ULC: Business sector w.o. A.C.R. - constant weights
REER-ULC: Manufacturing - constant weights

6.6. Estonia

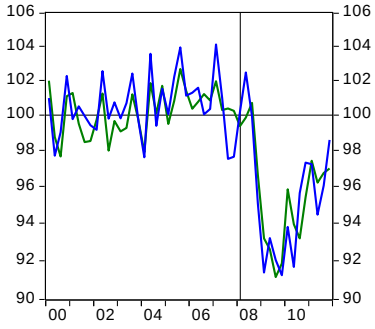

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

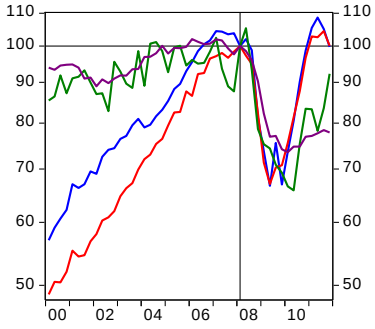

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Estonia, continued

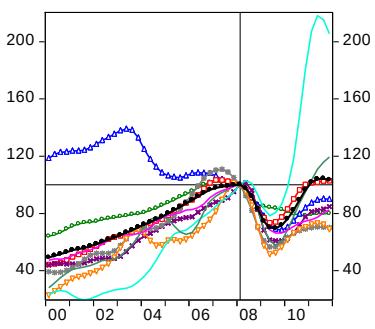
Hours worked/employee (2008Q1=100)



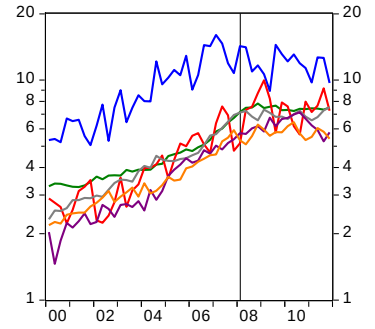
Manufacturing data from different databases (2008Q1=100)



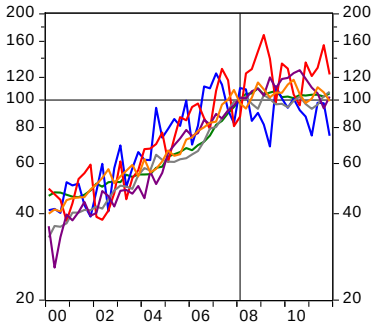
Gross production in manufacturing sub-sectors (2008Q1=100)



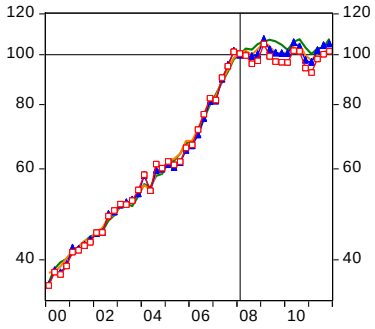
Hourly labour compensation (local currency)



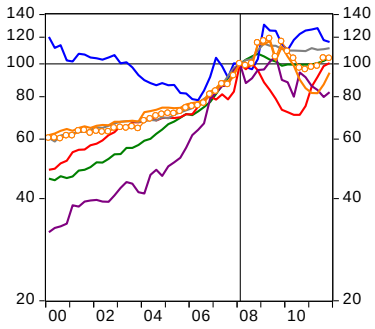
Hourly labour compensation (2008Q1=100)



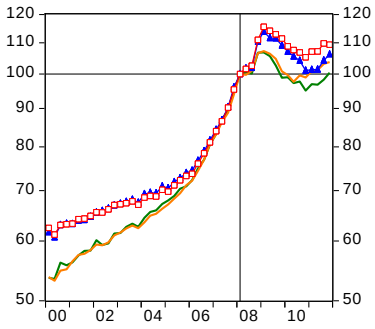
Hourly labour compensation (2008Q1=100)



Unit labour costs (2008Q1=100)



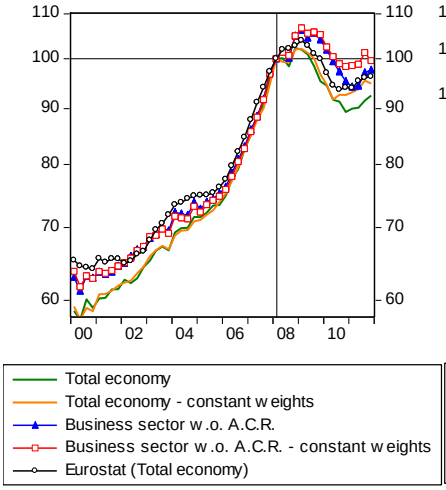
Unit labour costs (2008Q1=100)



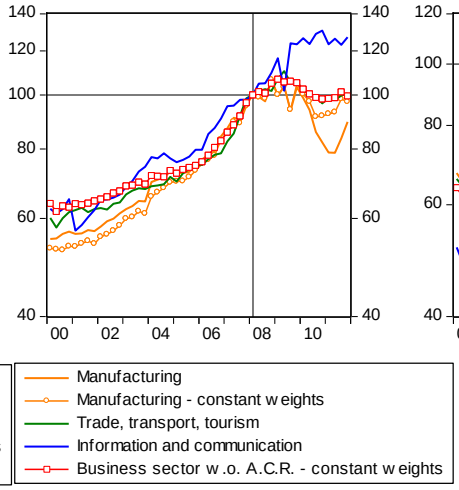
ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

Estonia, continued 2

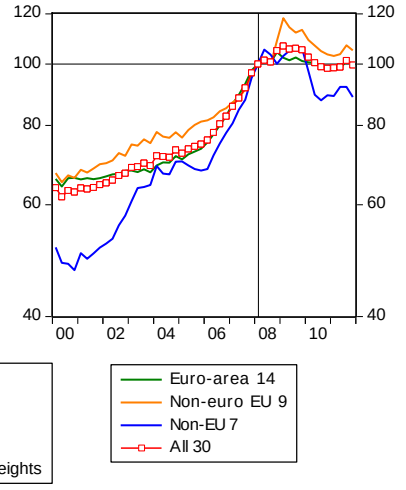
REER-ULC - aggregates (2008Q1=100)



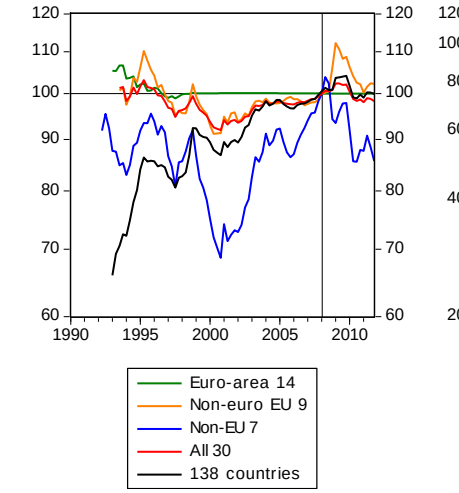
REER-ULC - sectors (2008Q1=100)



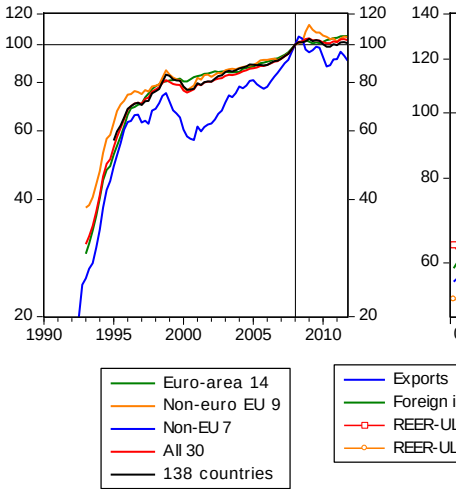
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



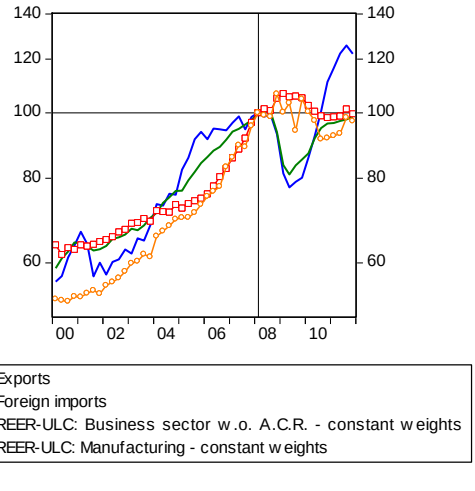
NEER (2008Q1=100)



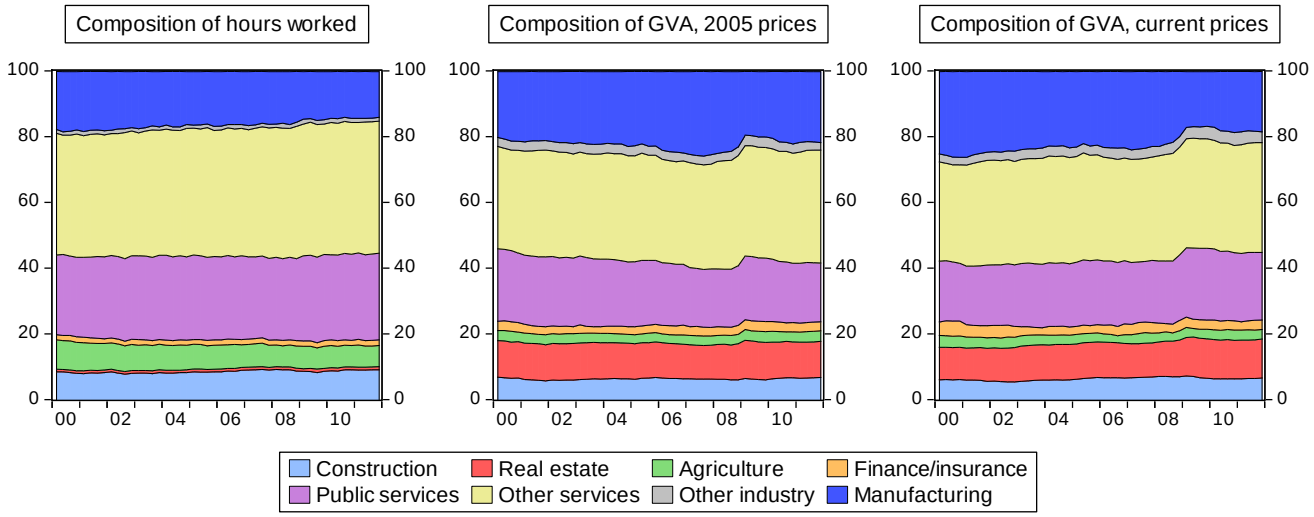
REER-CPI (2008Q1=100)

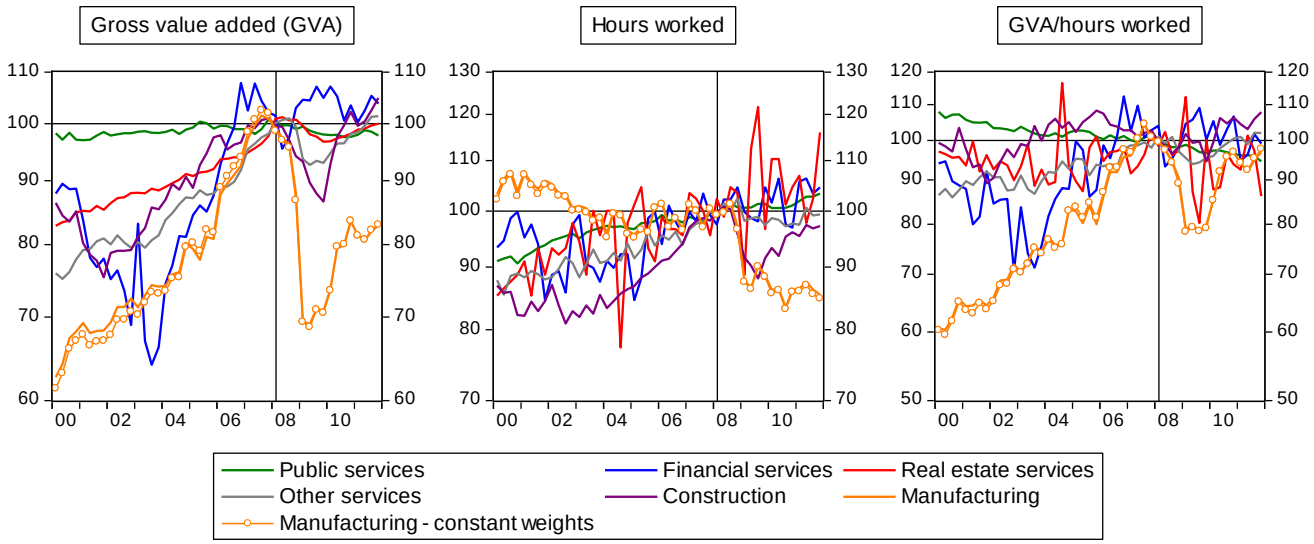


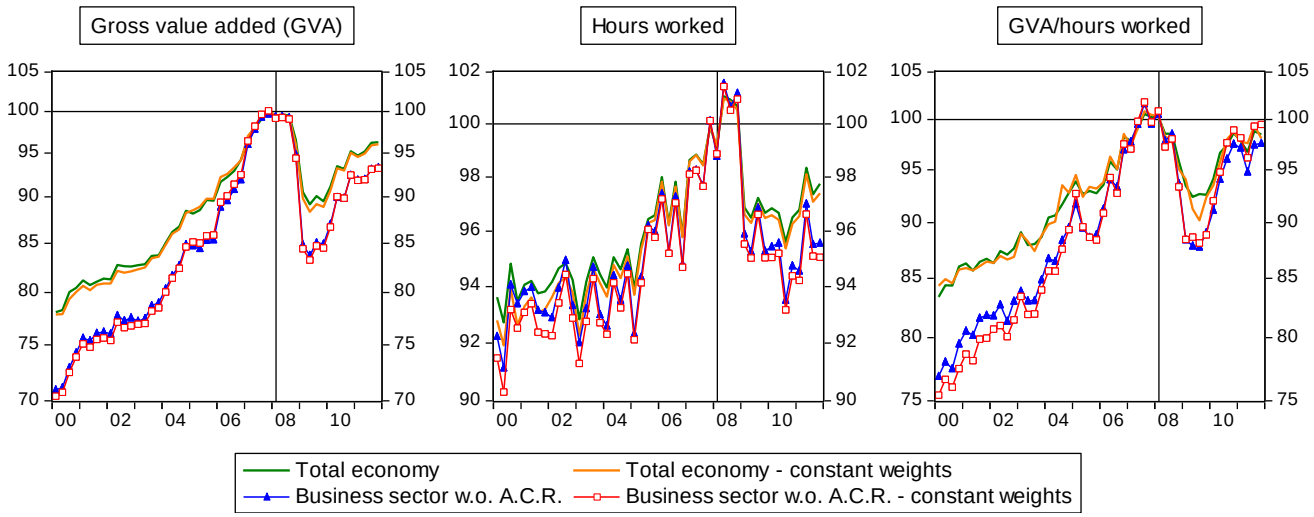
Export, export demand and REER



6.7. Finland

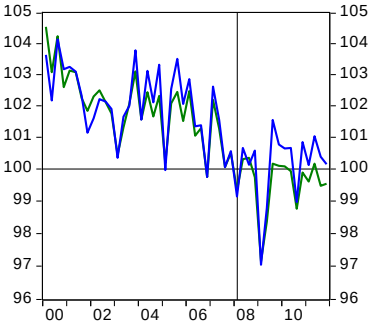

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

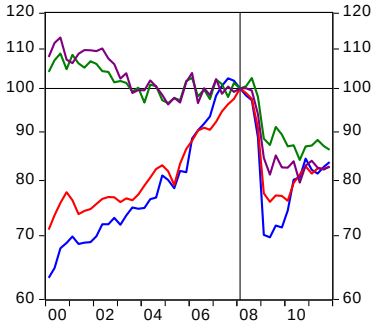

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Finland, continued

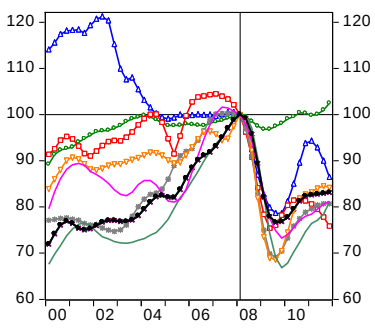
Hours worked/employee (2008Q1=100)



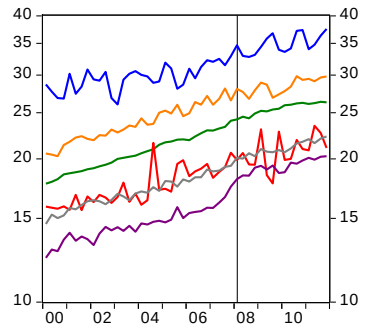
Manufacturing data from different databases (2008Q1=100)



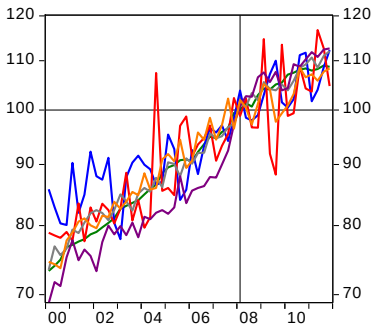
Gross production in manufacturing sub-sectors (2008Q1=100)



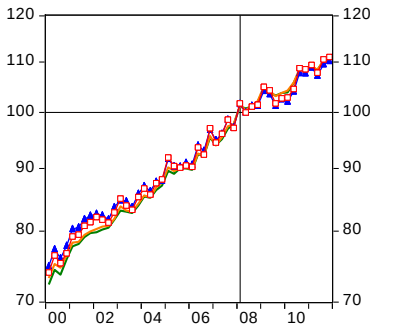
Hourly labour compensation (local currency)



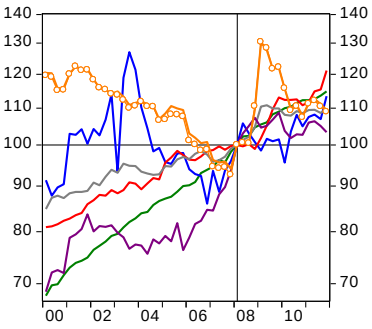
Hourly labour compensation (2008Q1=100)



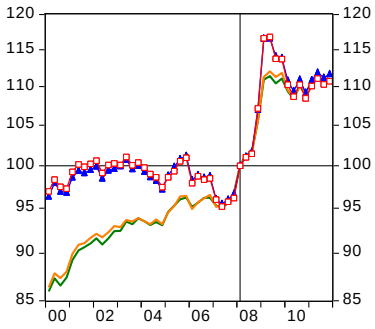
Hourly labour compensation (2008Q1=100)



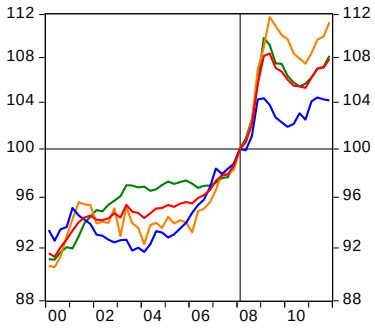
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

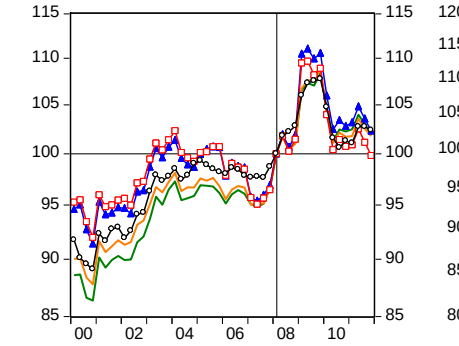


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

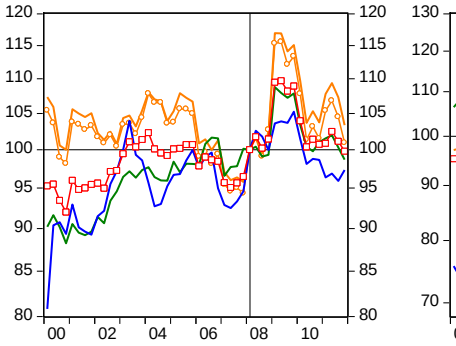


Finland, continued 2

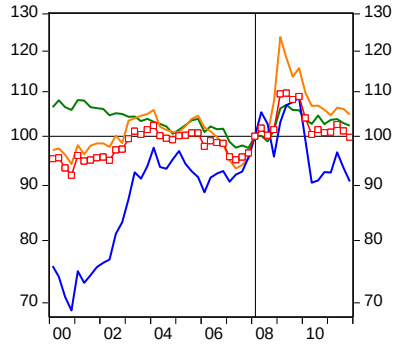
REER-ULC - aggregates (2008Q1=100)



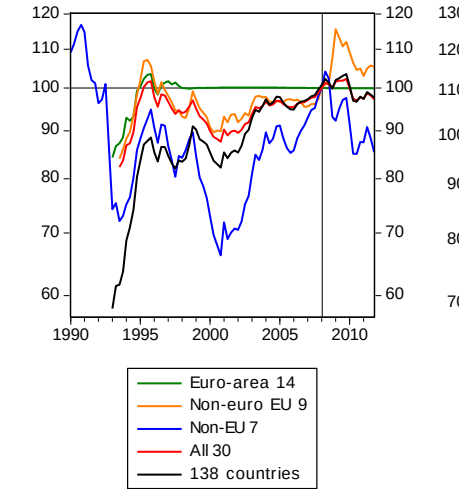
REER-ULC - sectors (2008Q1=100)



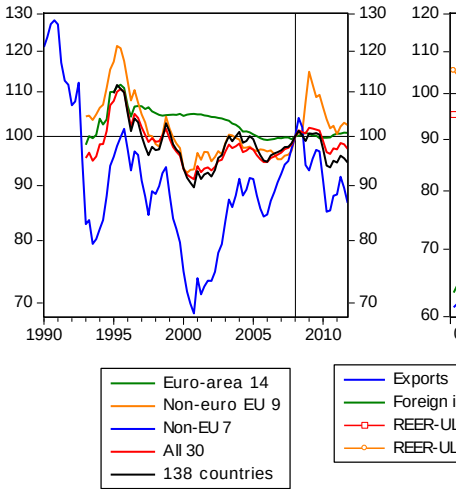
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



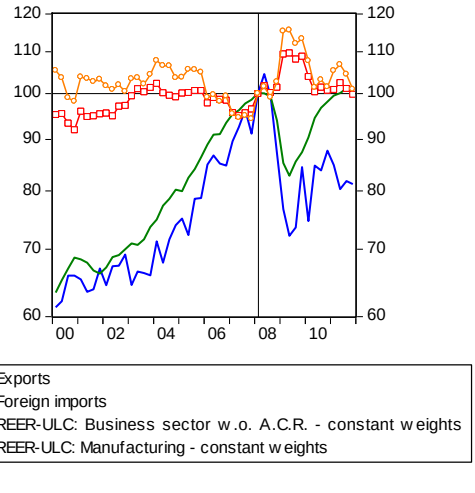
NEER (2008Q1=100)



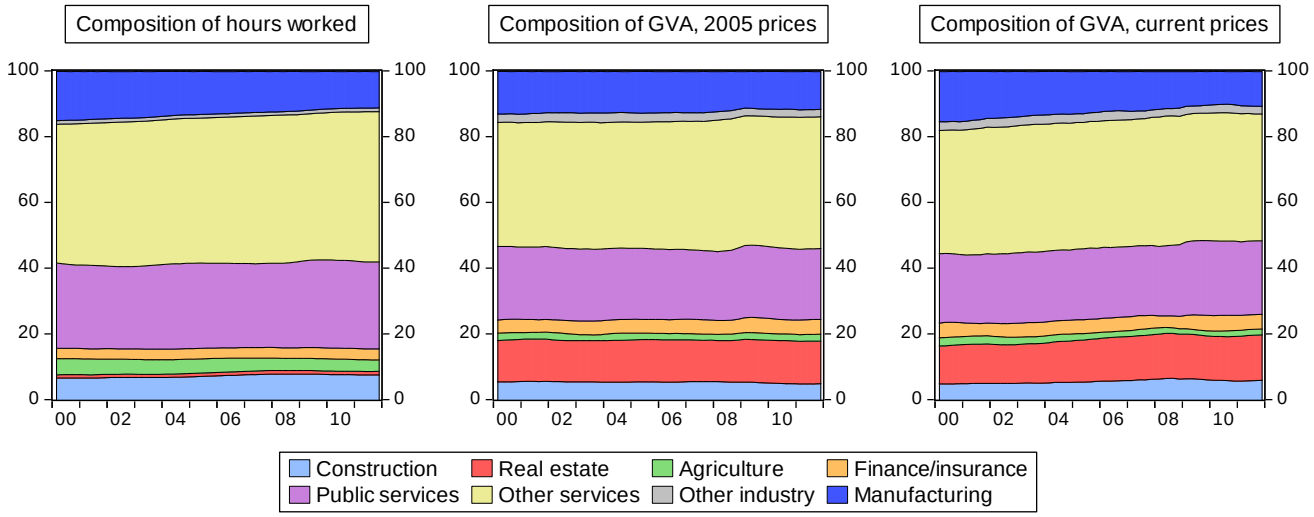
REER-CPI (2008Q1=100)

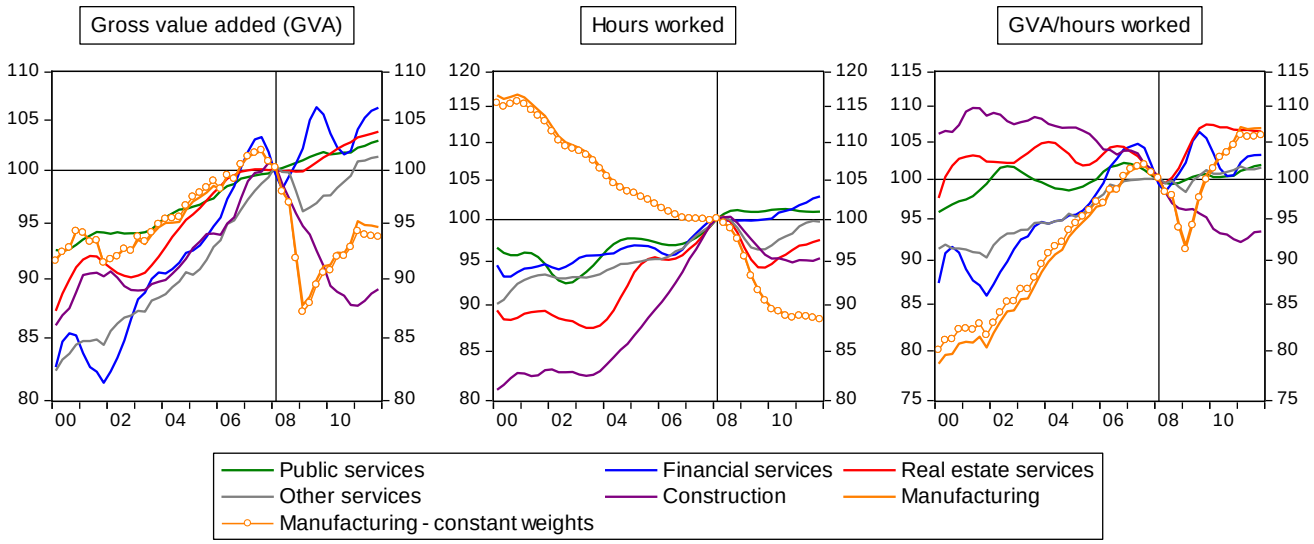


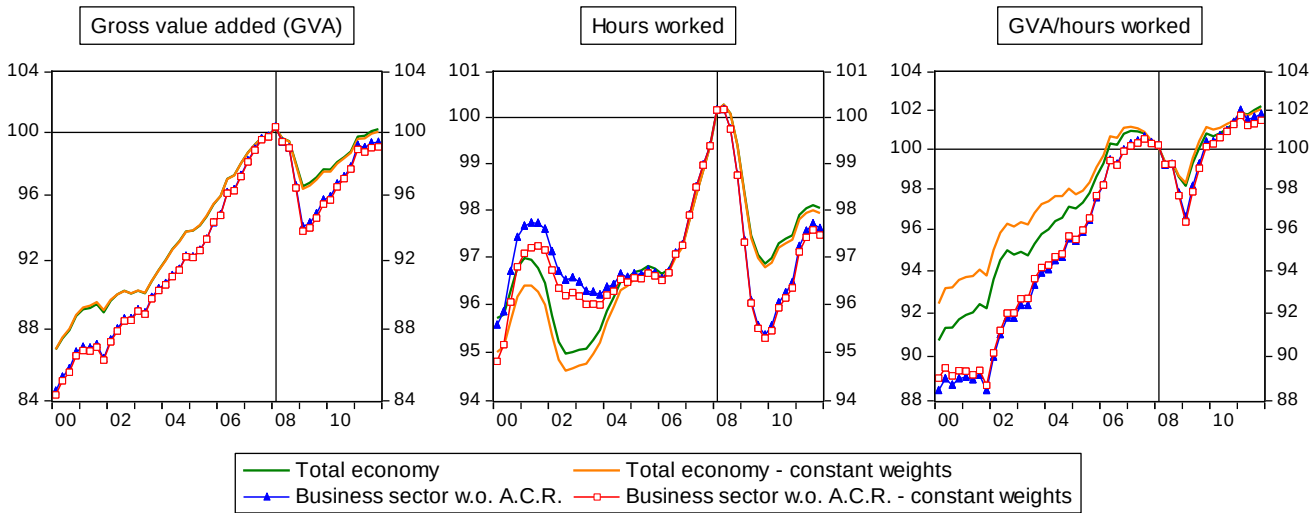
Export, export demand and REER



6.8. France

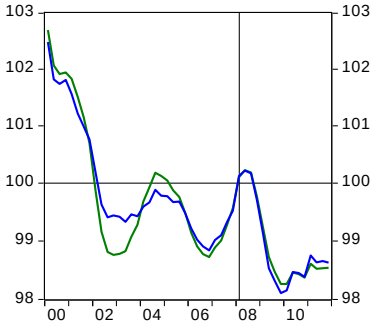

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

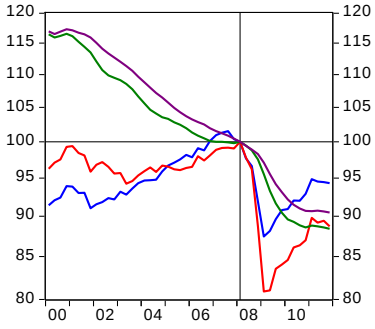

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

France, continued

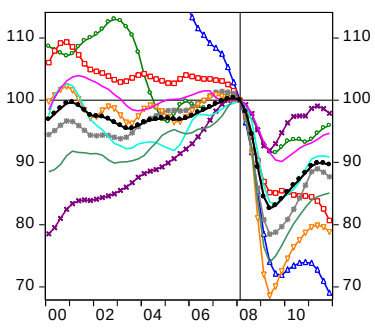
Hours worked/employee (2008Q1=100)



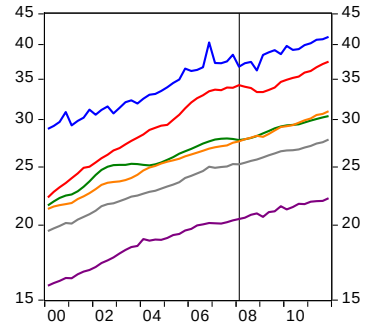
Manufacturing data from different databases (2008Q1=100)



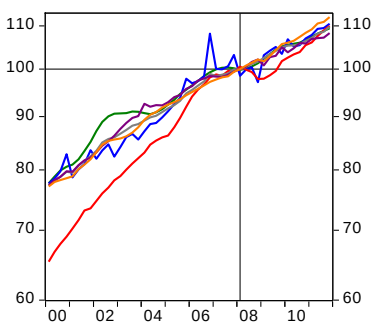
Gross production in manufacturing sub-sectors (2008Q1=100)



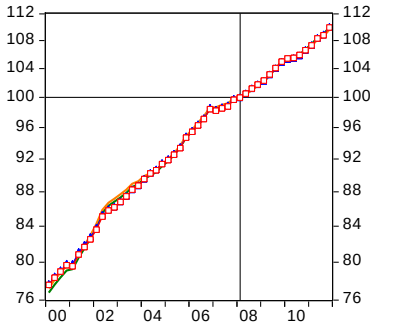
Hourly labour compensation (local currency)



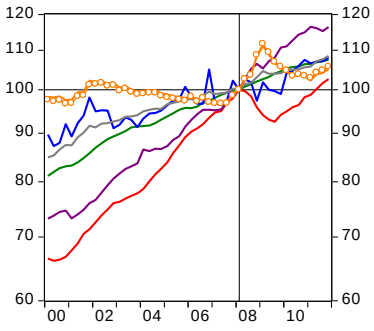
Hourly labour compensation (2008Q1=100)



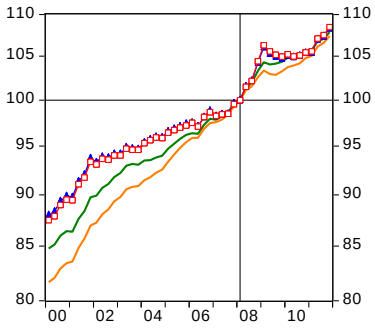
Hourly labour compensation (2008Q1=100)



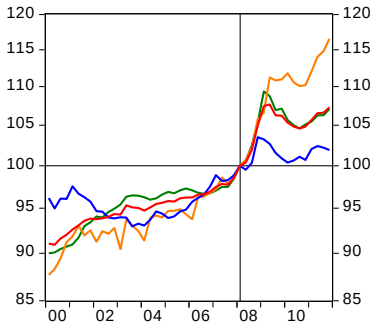
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

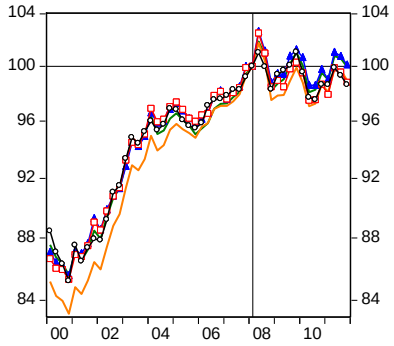


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)



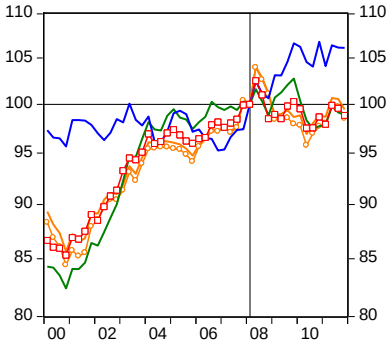
France, continued 2

REER-ULC - aggregates (2008Q1=100)



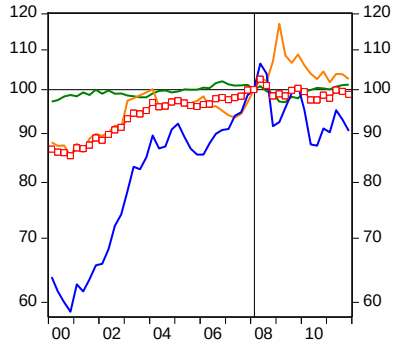
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights
Eurostat (Total economy)

REER-ULC - sectors (2008Q1=100)



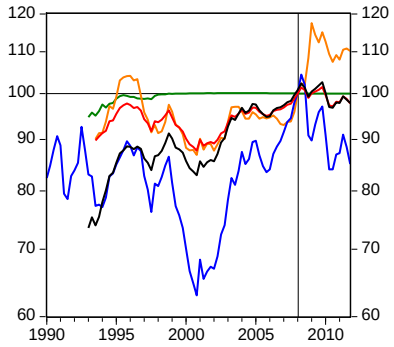
Manufacturing
Manufacturing - constant weights
Trade, transport, tourism
Information and communication
Business sector w.o. A.C.R. - constant weights

REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



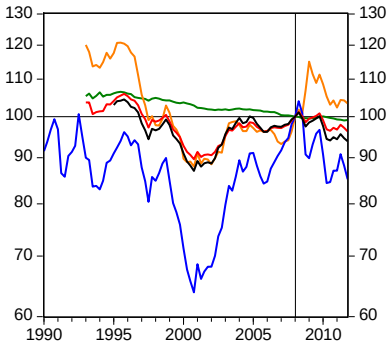
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

NEER (2008Q1=100)



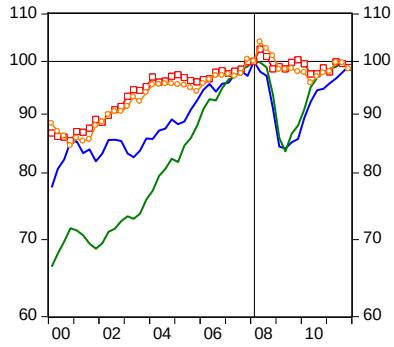
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

REER-CPI (2008Q1=100)



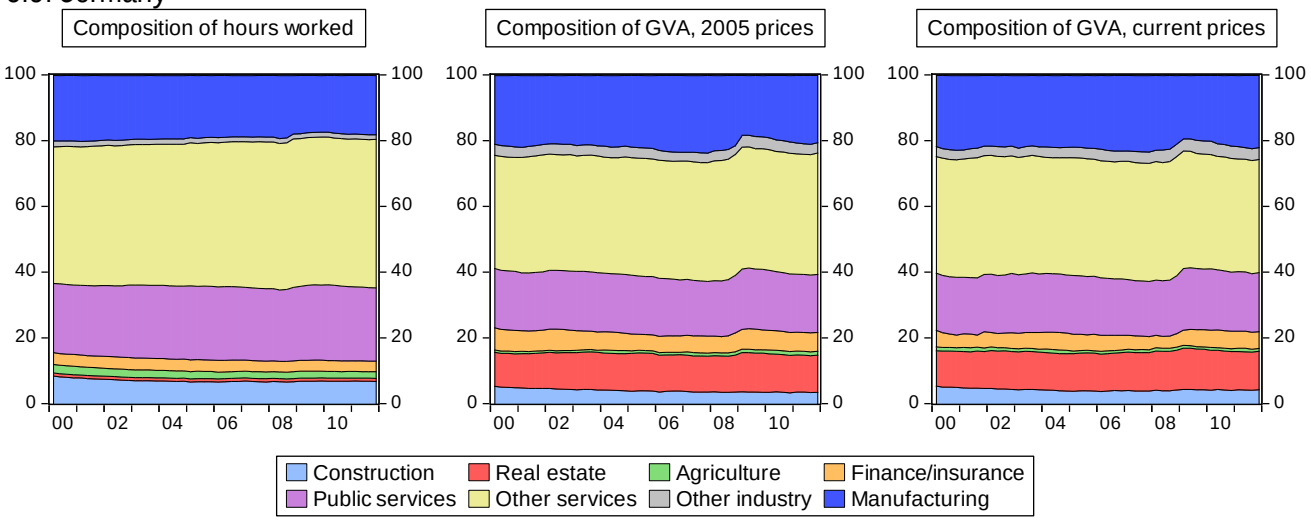
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

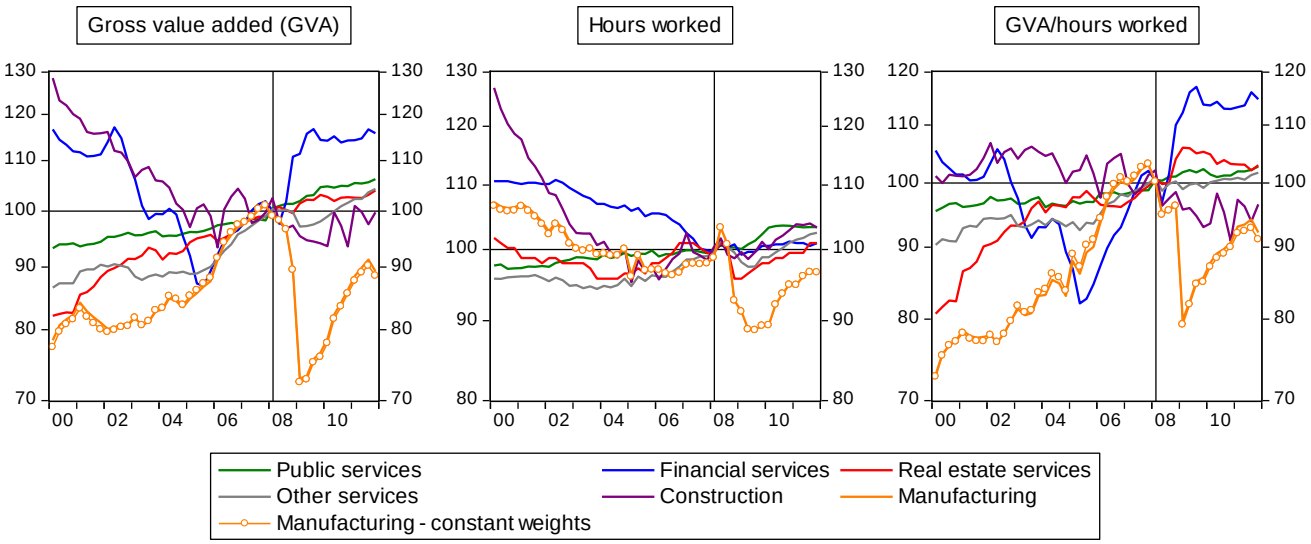
Export, export demand and REER

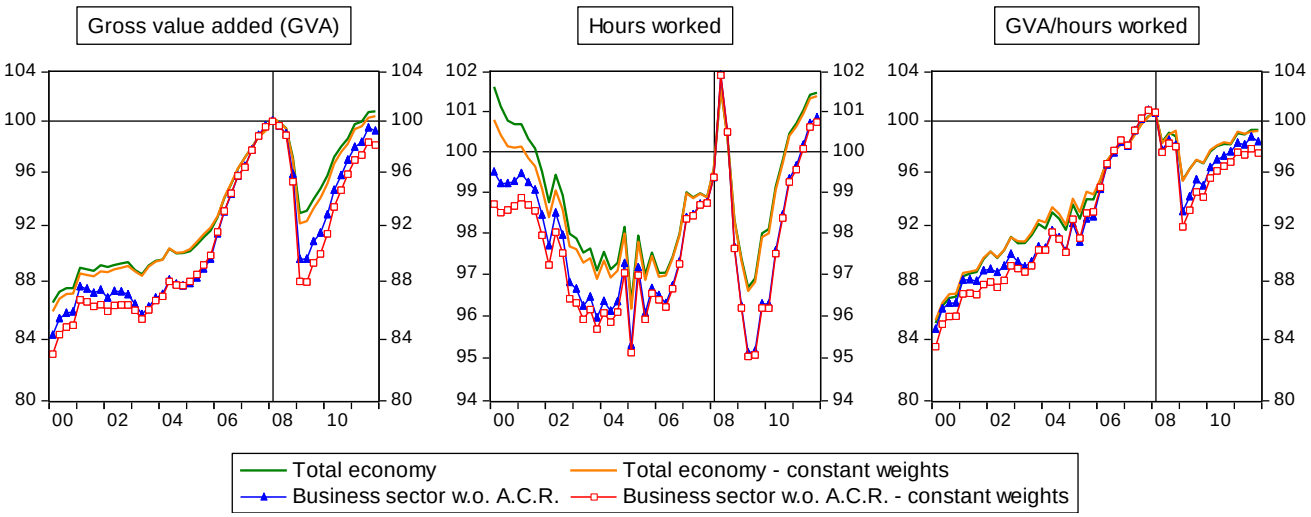


Exports
Foreign imports
REER-ULC: Business sector w.o. A.C.R. - constant weights
REER-ULC: Manufacturing - constant weights

6.9. Germany

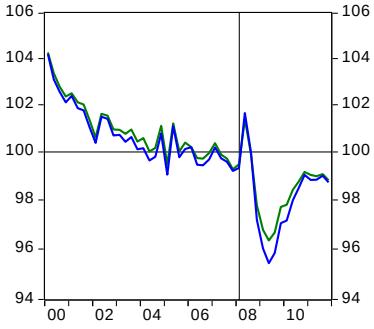

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

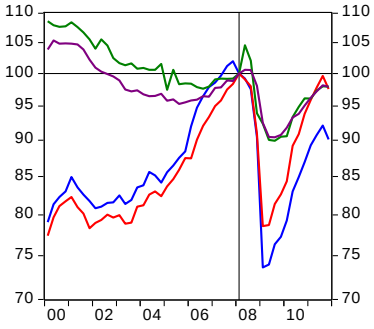

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Germany, continued

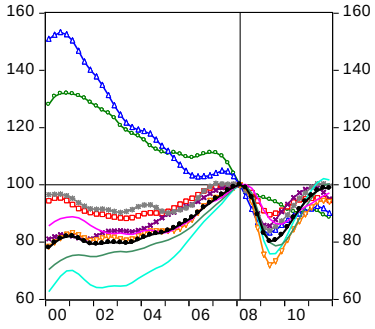
Hours worked/employee (2008Q1=100)



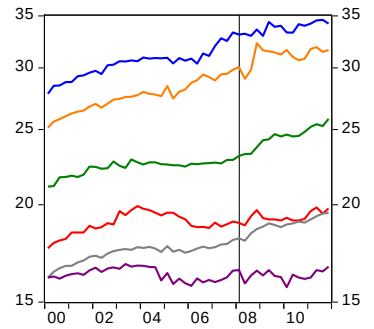
Manufacturing data from different databases (2008Q1=100)



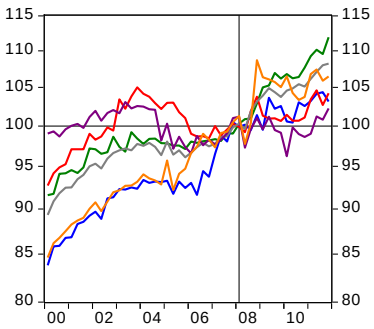
Gross production in manufacturing sub-sectors (2008Q1=100)



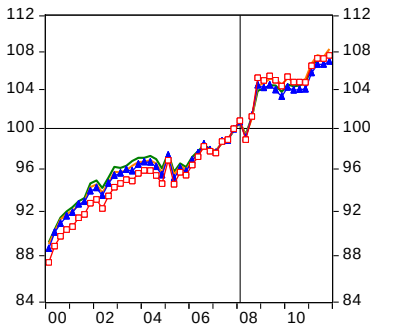
Hourly labour compensation (local currency)



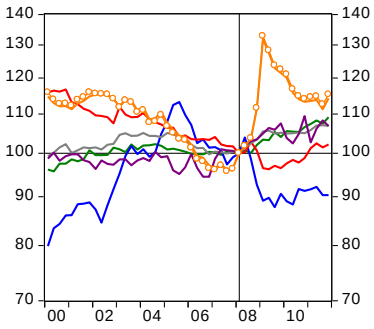
Hourly labour compensation (2008Q1=100)



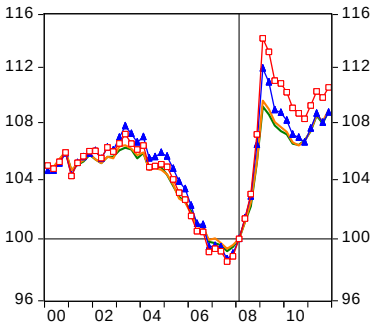
Hourly labour compensation (2008Q1=100)



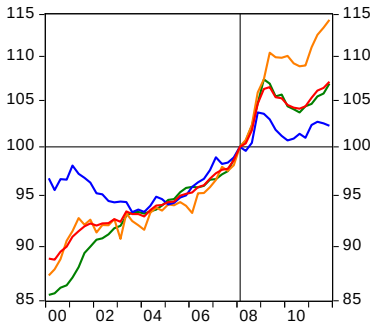
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

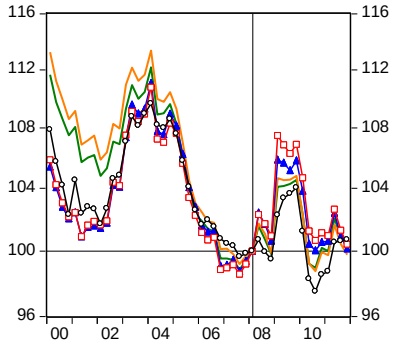


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)



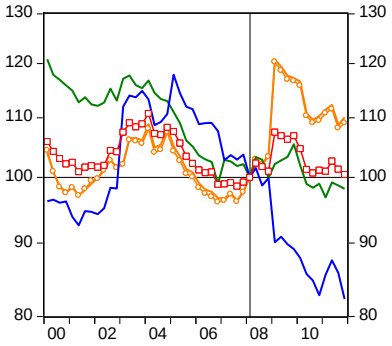
Germany, continued 2

REER-ULC - aggregates (2008Q1=100)



Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights
Eurostat (Total economy)

REER-ULC - sectors (2008Q1=100)

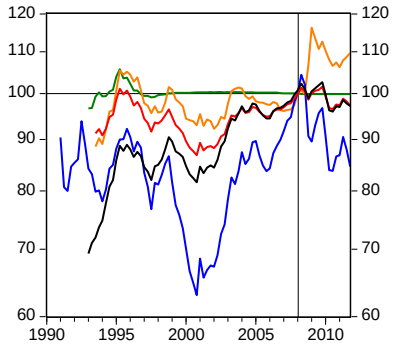


Manufacturing
Manufacturing - constant weights
Trade, transport, tourism
Information and communication
Business sector w.o. A.C.R. - constant weights

REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights

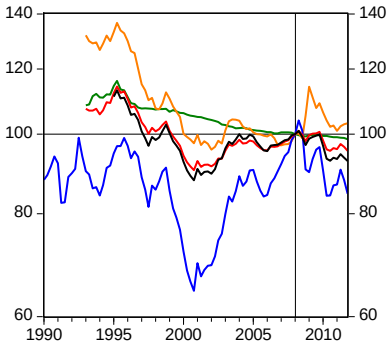
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

NEER (2008Q1=100)



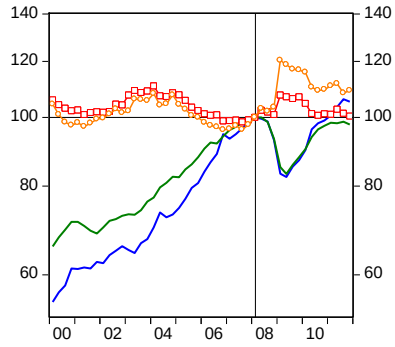
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

REER-CPI (2008Q1=100)



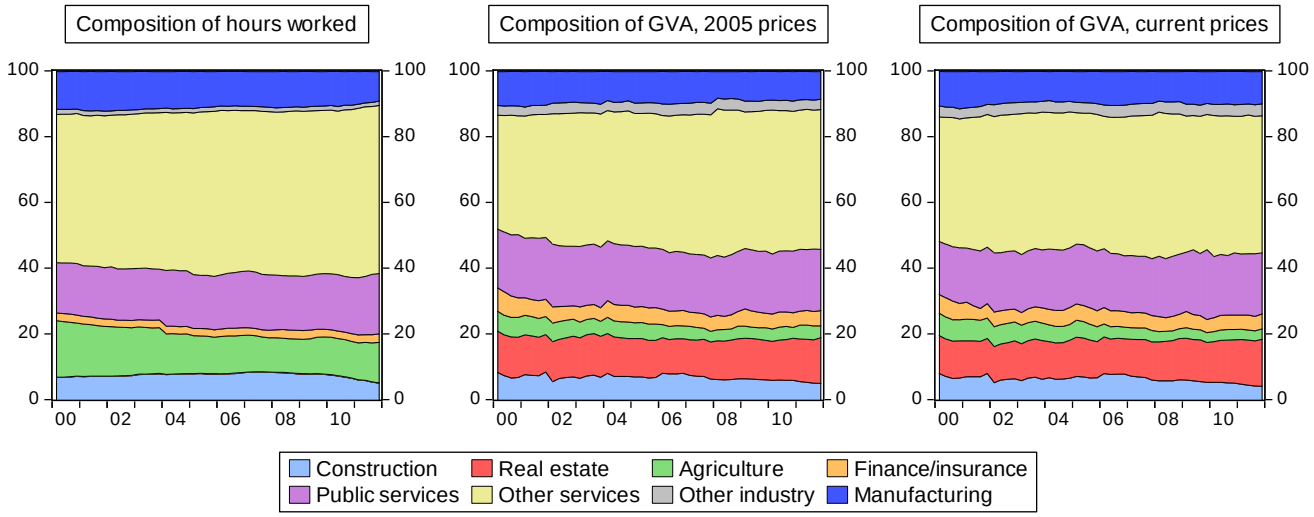
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

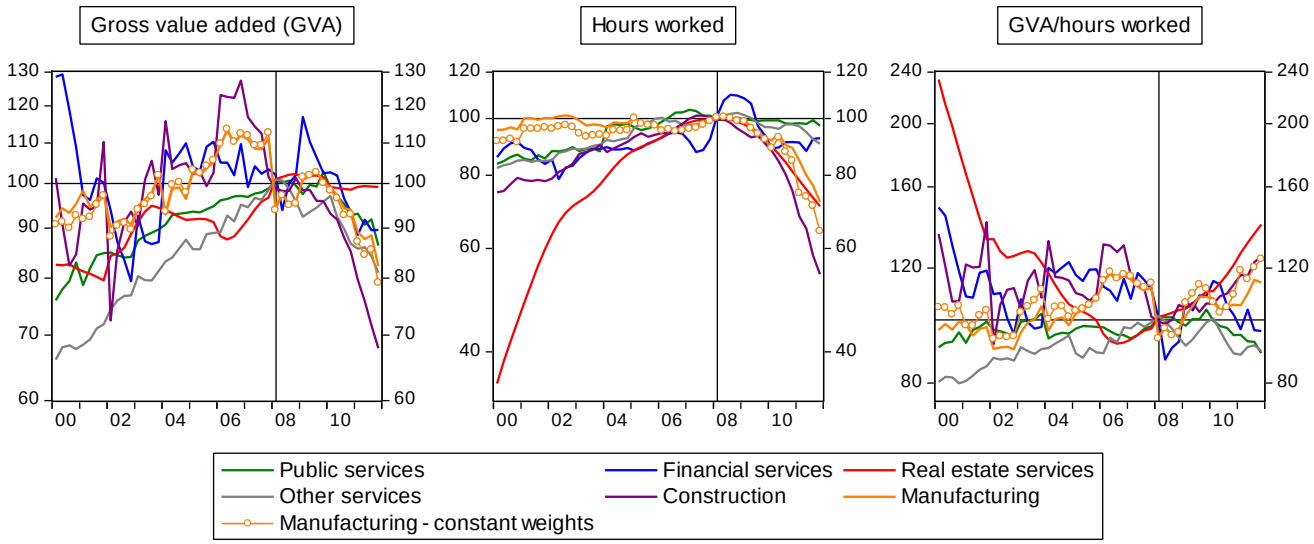
Export, export demand and REER

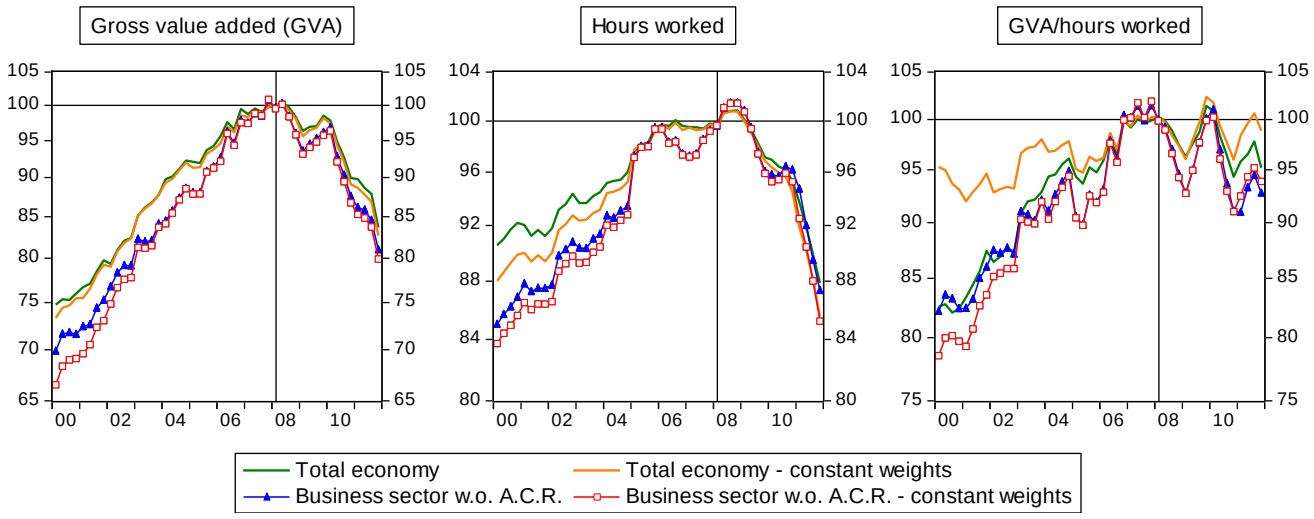


Exports
Foreign imports
REER-ULC: Business sector w.o. A.C.R. - constant weights
REER-ULC: Manufacturing - constant weights

6.10. Greece

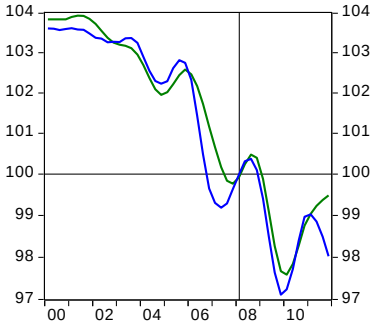

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

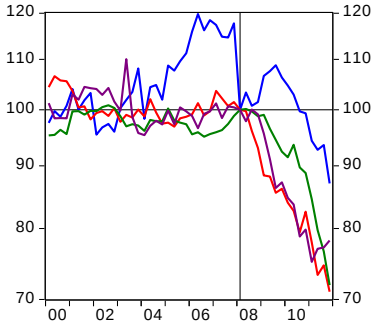

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Greece, continued

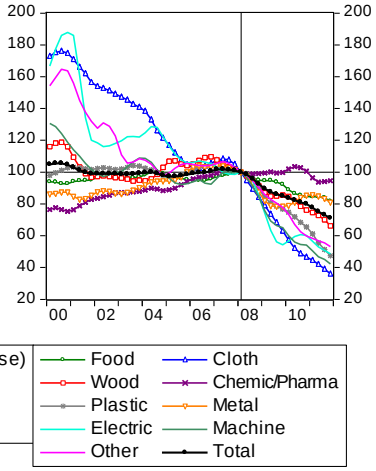
Hours worked/employee (2008Q1=100)



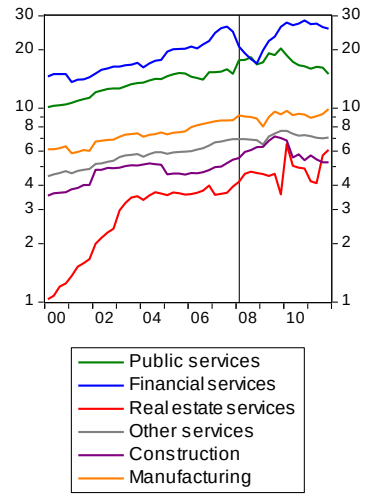
Manufacturing data from different databases (2008Q1=100)



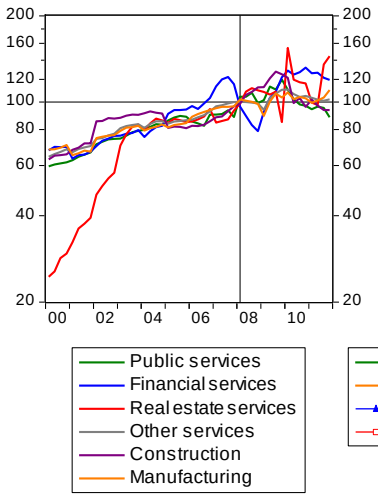
Gross production in manufacturing sub-sectors (2008Q1=100)



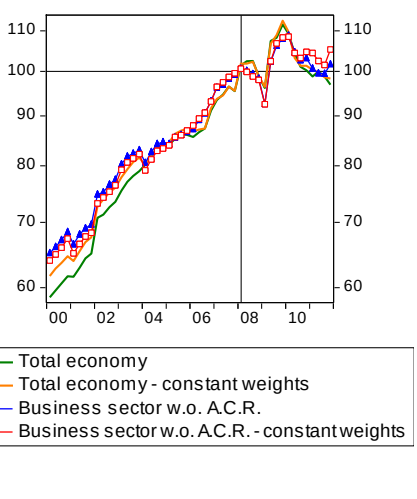
Hourly labour compensation (local currency)



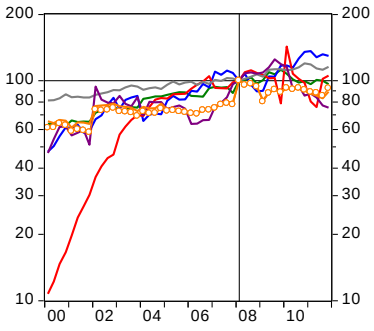
Hourly labour compensation (2008Q1=100)



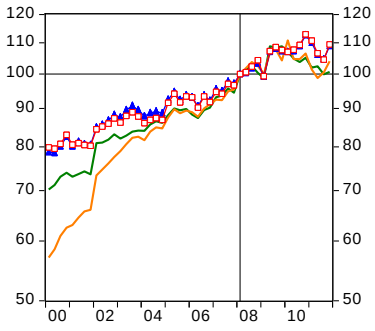
Hourly labour compensation (2008Q1=100)



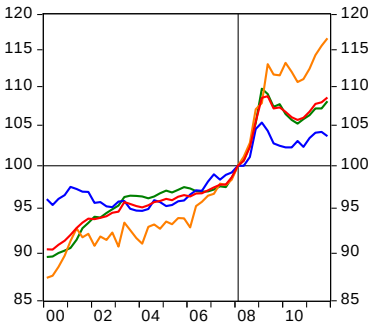
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

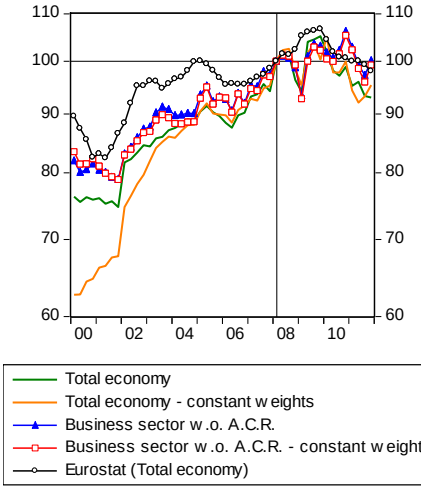


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

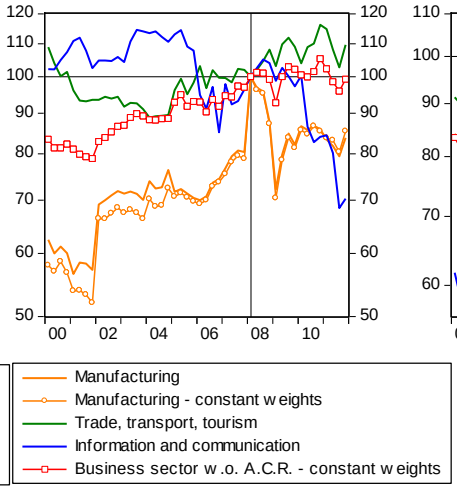


Greece, continued 2

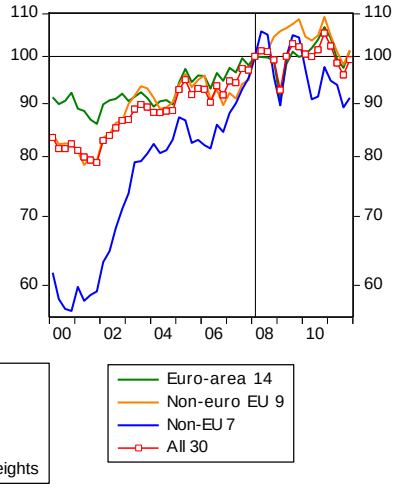
REER-ULC - aggregates (2008Q1=100)



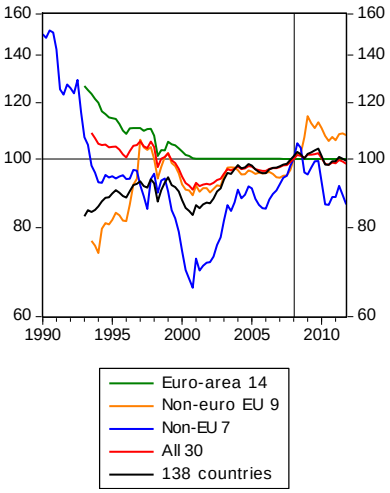
REER-ULC - sectors (2008Q1=100)



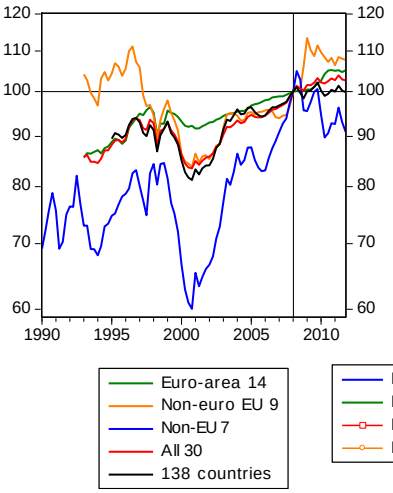
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



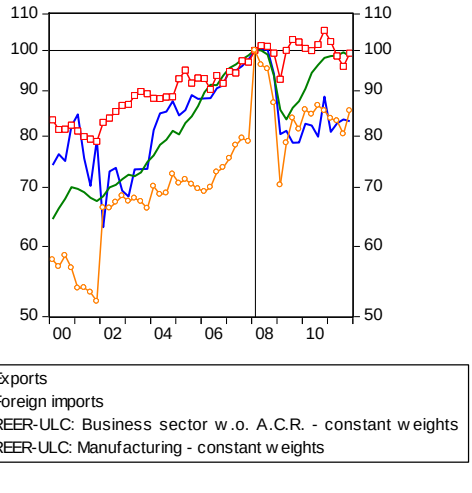
NEER (2008Q1=100)



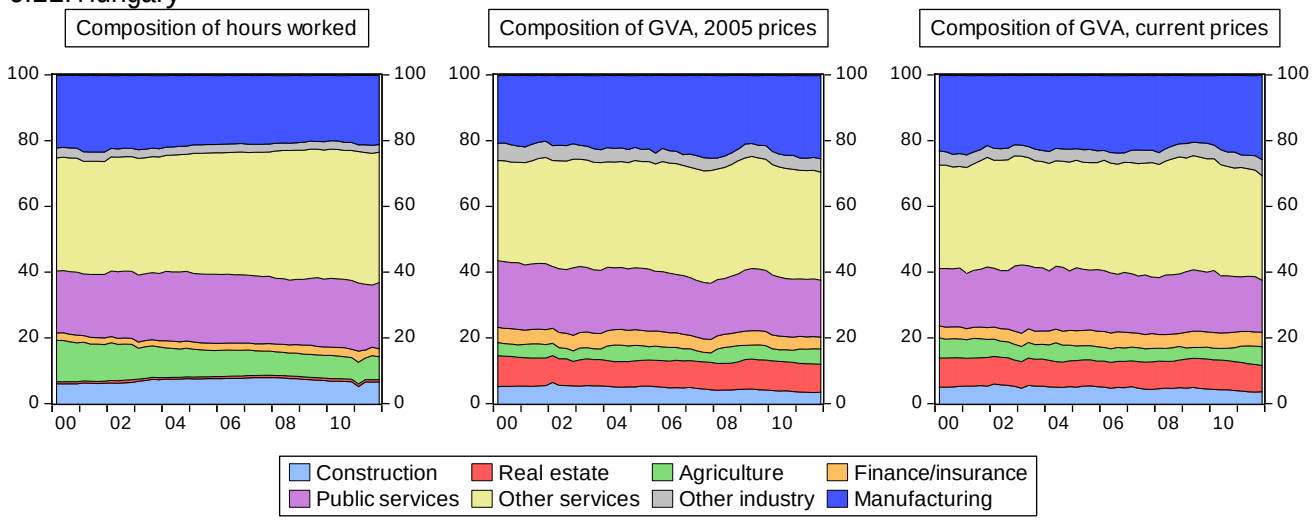
REER-CPI (2008Q1=100)

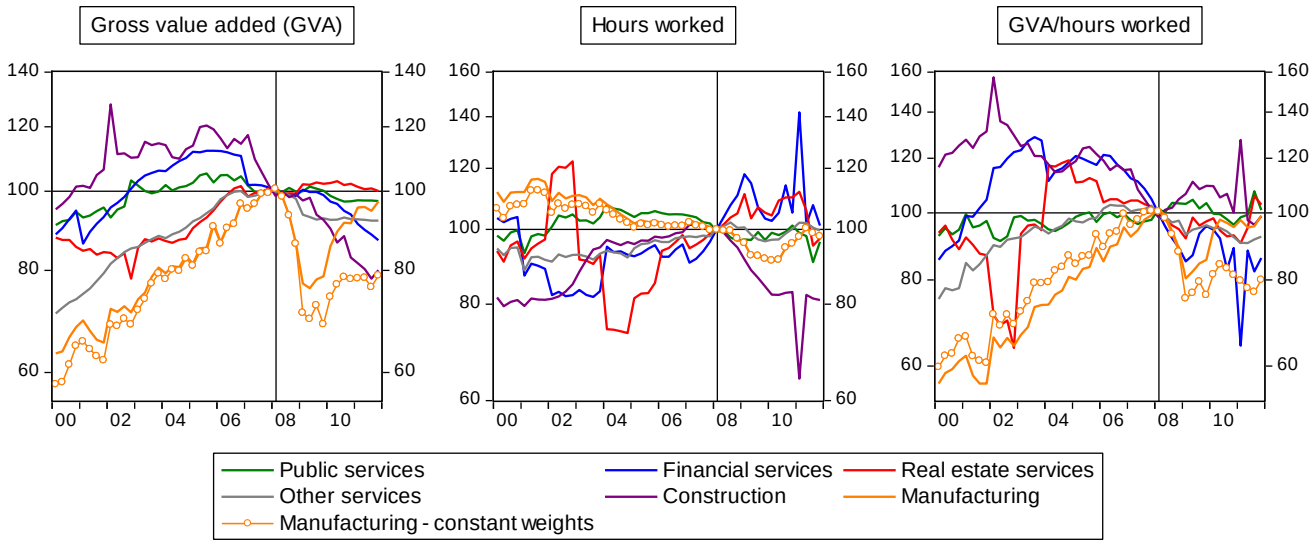


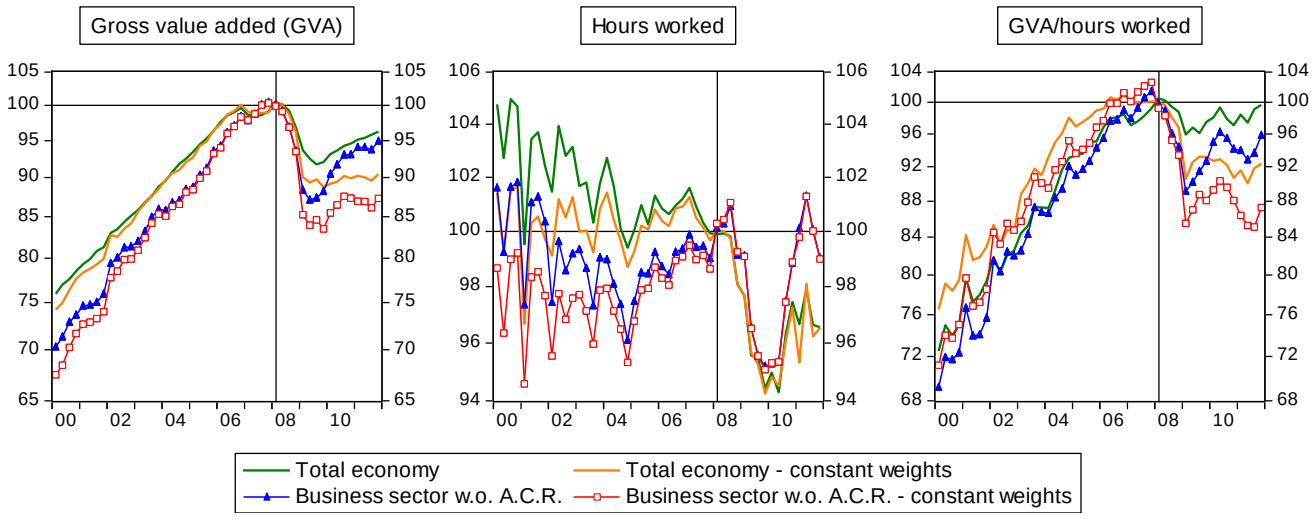
Export, export demand and REER



6.11. Hungary

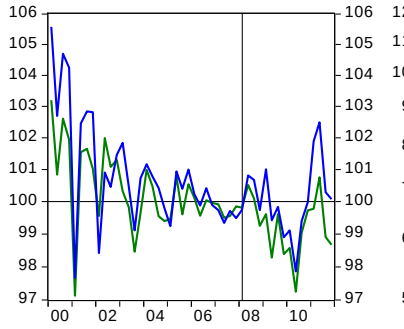

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

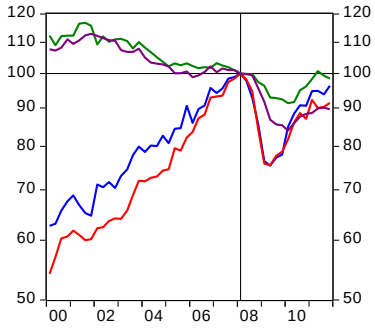

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Hungary, continued

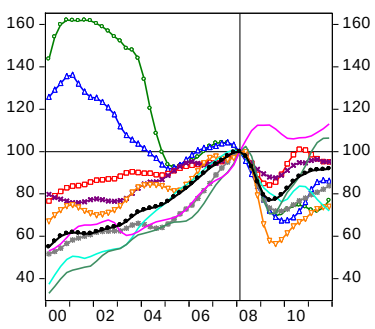
Hours worked/employee (2008Q1=100)



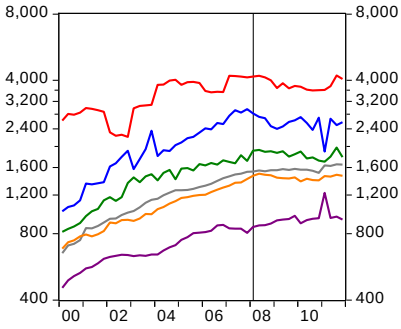
Manufacturing data from different databases (2008Q1=100)



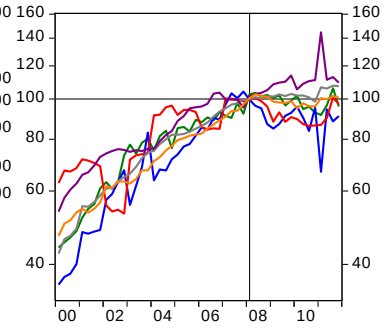
Gross production in manufacturing sub-sectors (2008Q1=100)



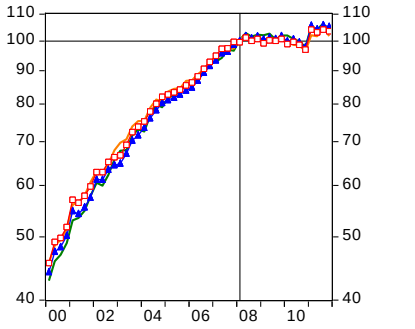
Hourly labour compensation (local currency)



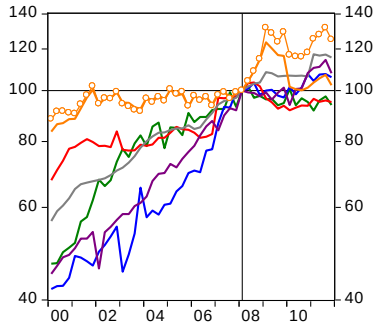
Hourly labour compensation (2008Q1=100)



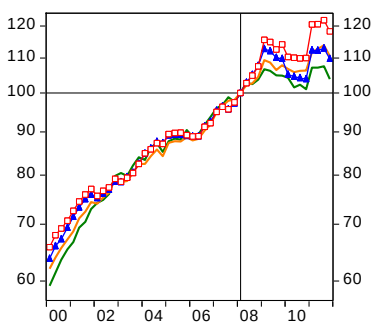
Hourly labour compensation (2008Q1=100)



Unit labour costs (2008Q1=100)



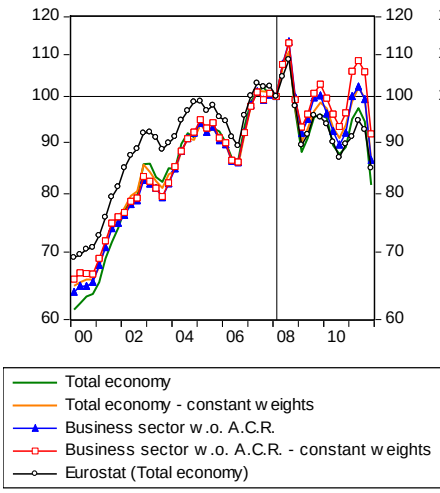
Unit labour costs (2008Q1=100)



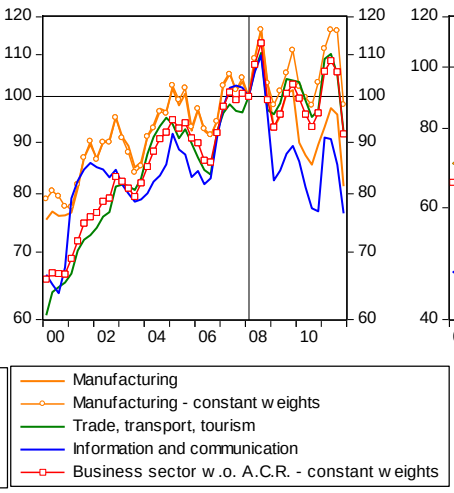
ULC of trading partners Bus.sec. w.o. A.C.R. - const.w. (2008Q1=100)

Hungary, continued 2

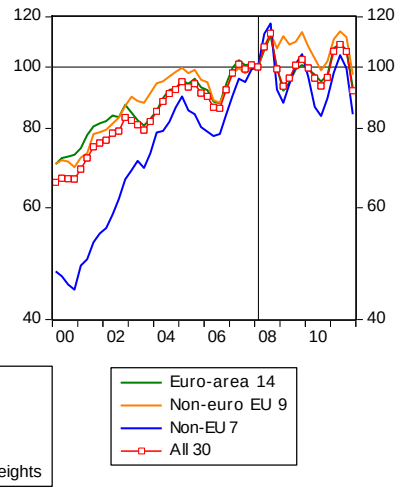
REER-ULC - aggregates (2008Q1=100)



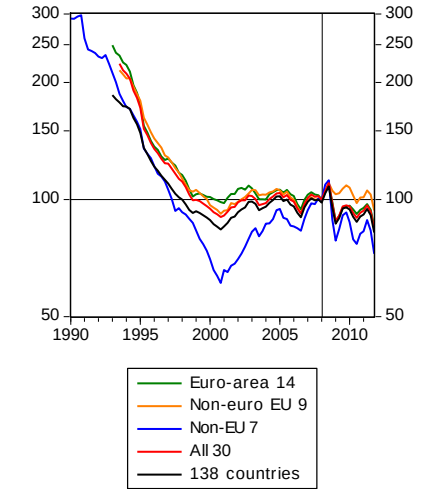
REER-ULC - sectors (2008Q1=100)



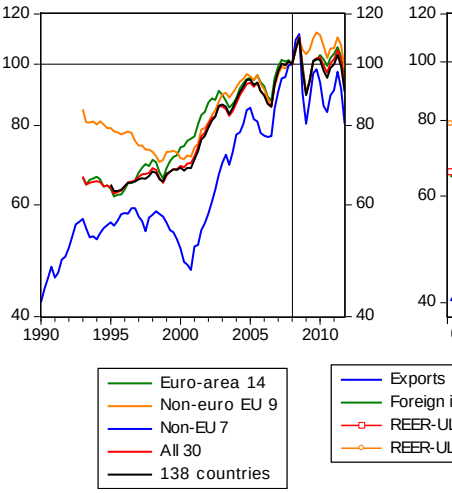
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



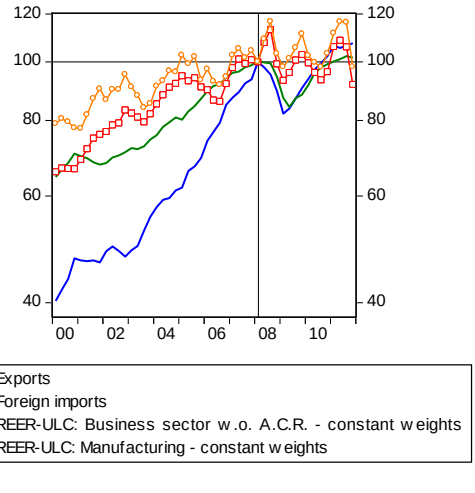
NEER (2008Q1=100)



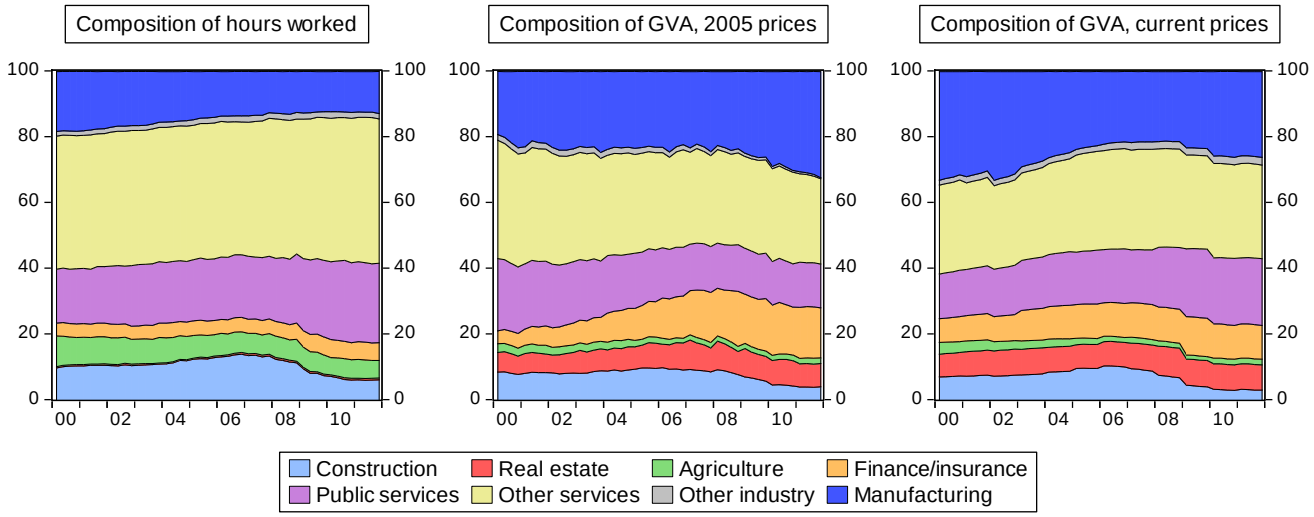
REER-CPI (2008Q1=100)

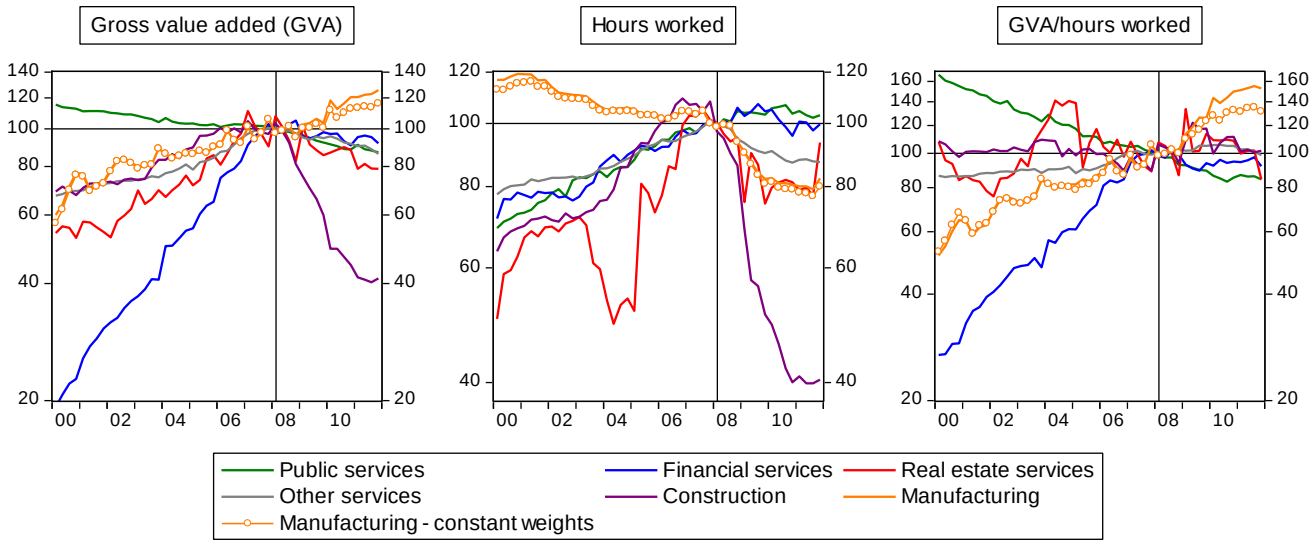


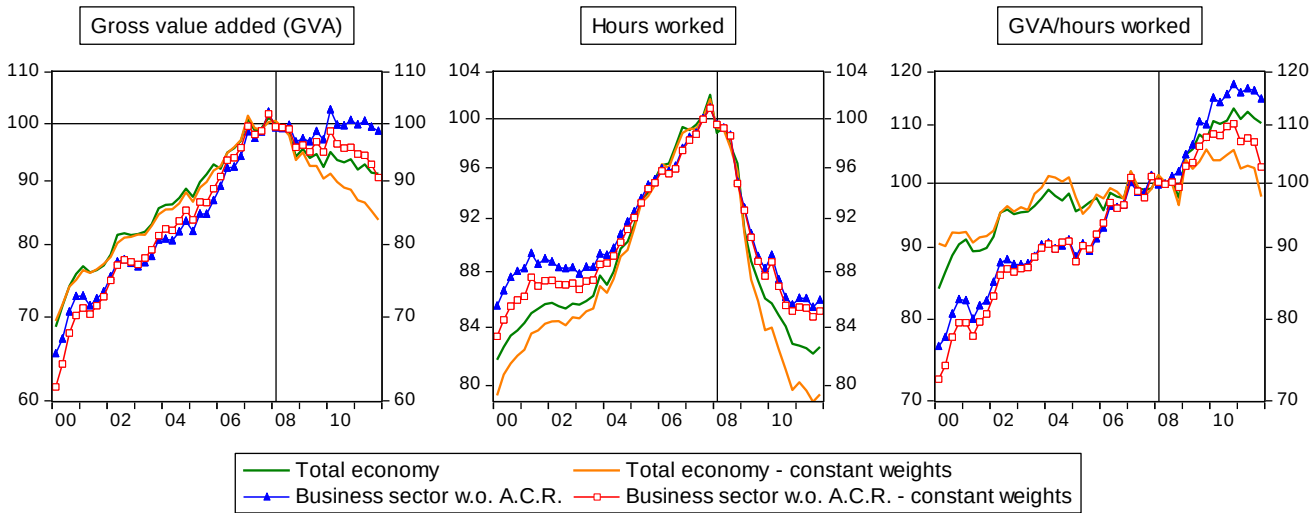
Export, export demand and REER



6.12. Ireland

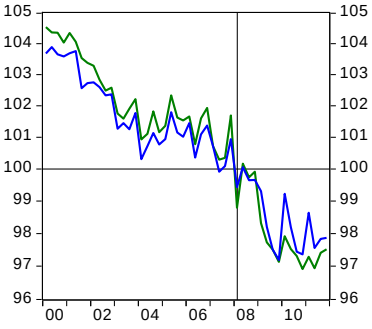

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

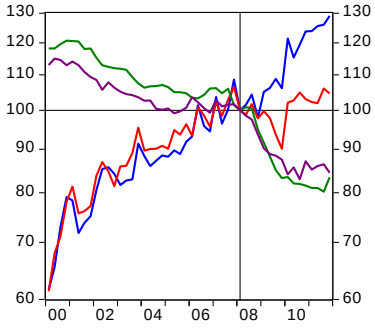

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Ireland, continued

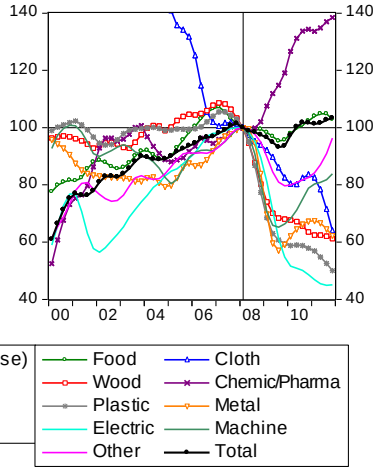
Hours worked/employee (2008Q1=100)



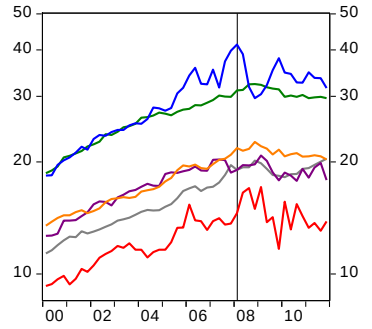
Manufacturing data from different databases (2008Q1=100)



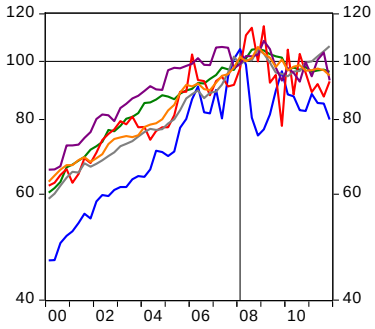
Gross production in manufacturing sub-sectors (2008Q1=100)



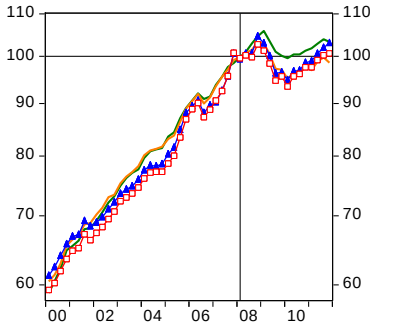
Hourly labour compensation (local currency)



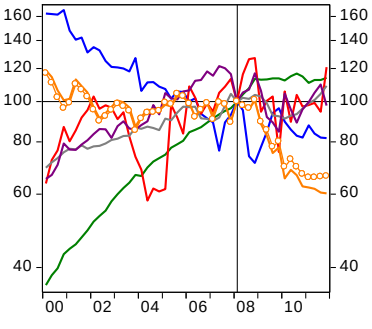
Hourly labour compensation (2008Q1=100)



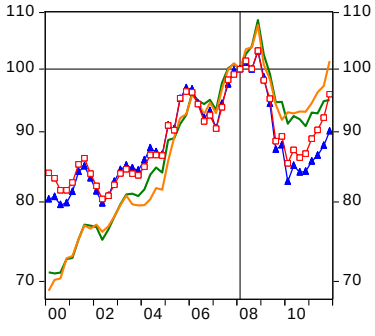
Hourly labour compensation (2008Q1=100)



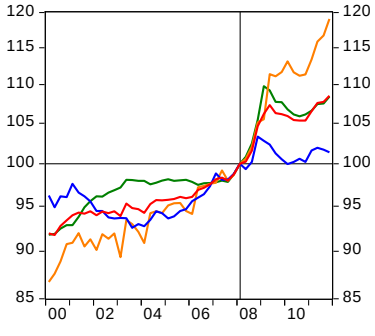
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

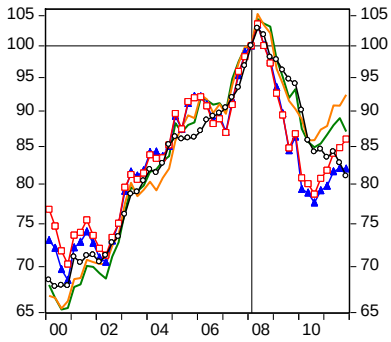


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)



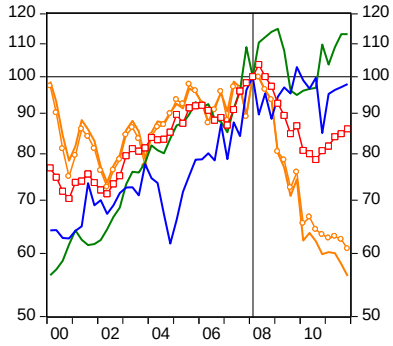
Ireland, continued 2

REER-ULC - aggregates (2008Q1=100)



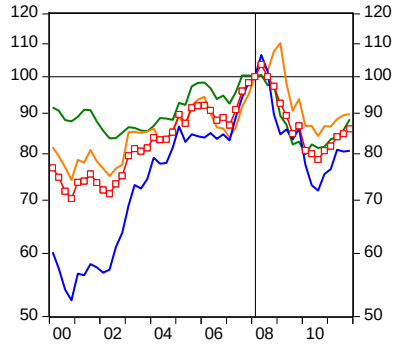
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights
Eurostat (Total economy)

REER-ULC - sectors (2008Q1=100)



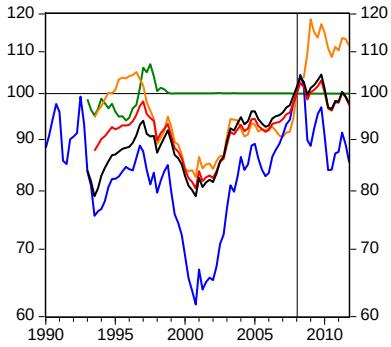
Manufacturing
Manufacturing - constant weights
Trade, transport, tourism
Information and communication
Business sector w.o. A.C.R. - constant weights

REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



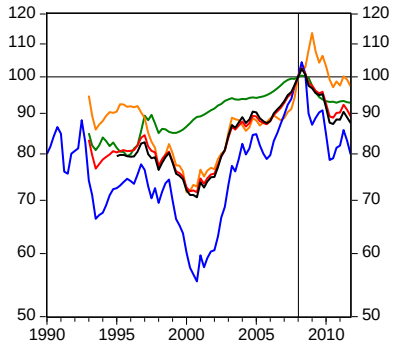
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

NEER (2008Q1=100)



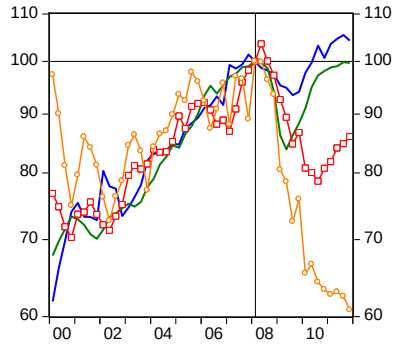
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

REER-CPI (2008Q1=100)



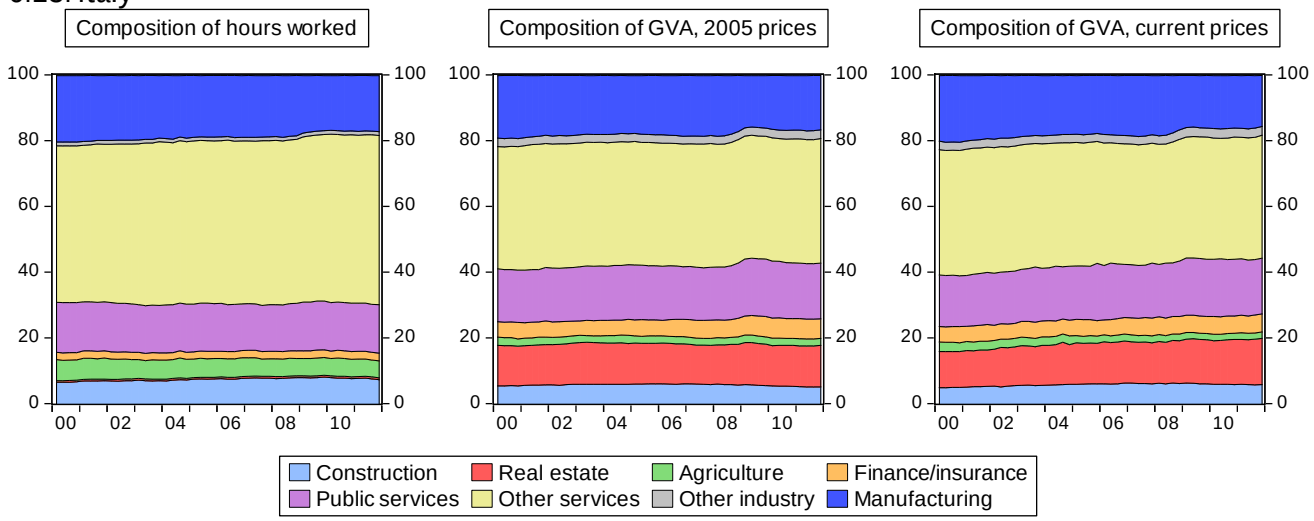
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

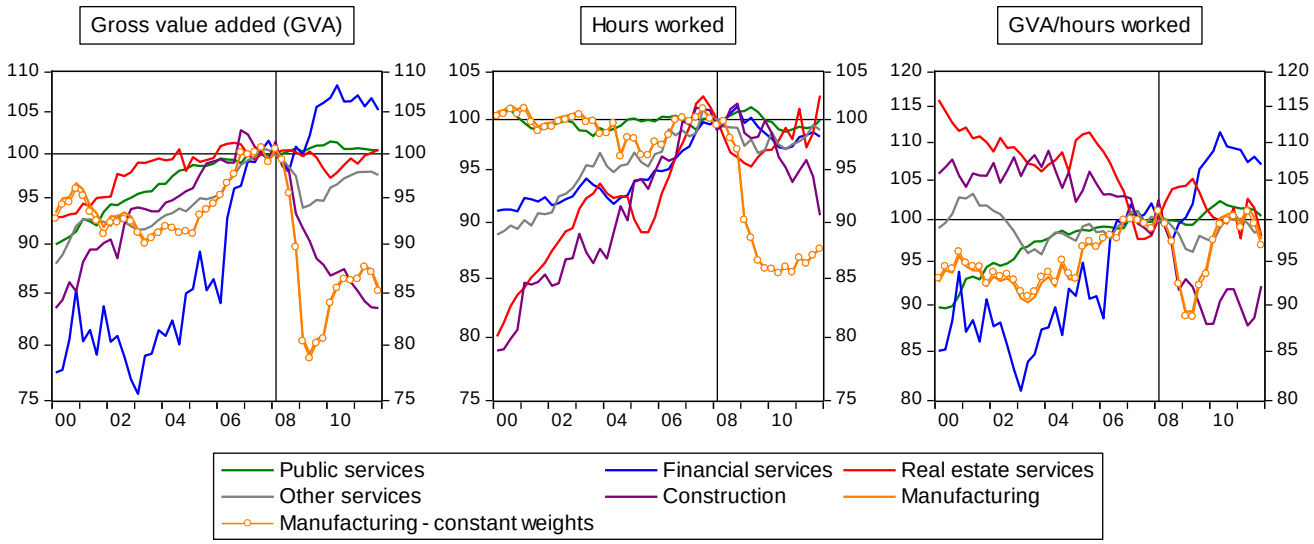
Export, export demand and REER

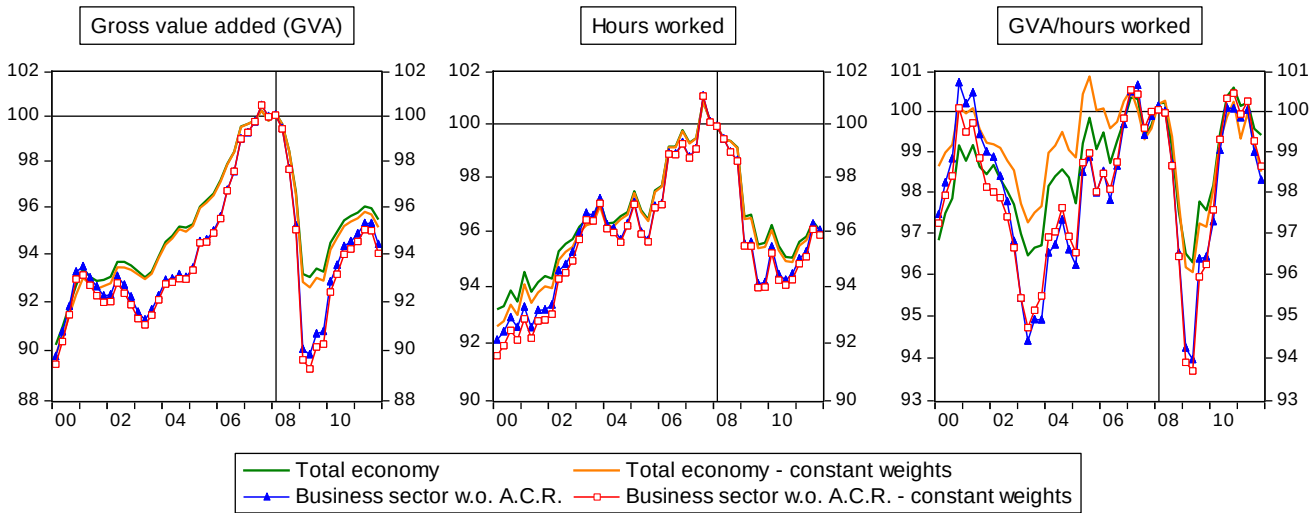


Exports
Foreign imports
REER-ULC: Business sector w.o. A.C.R. - constant weights
REER-ULC: Manufacturing - constant weights

6.13. Italy

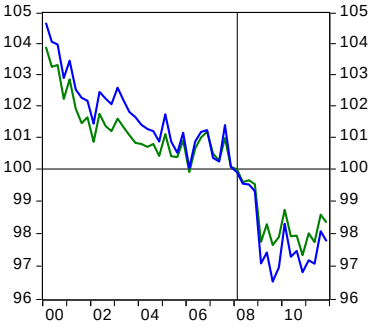

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

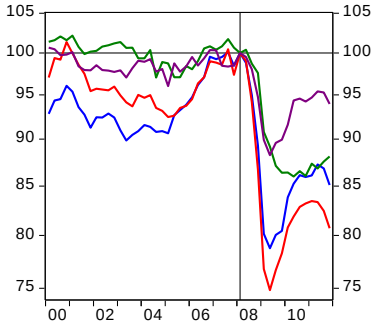

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Italy, continued

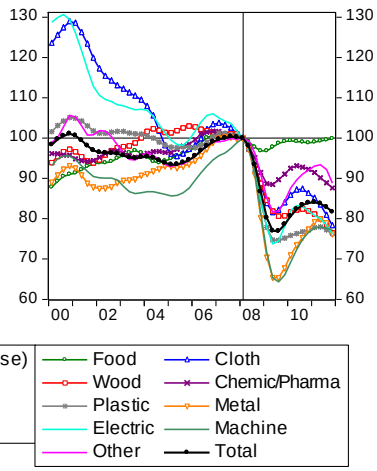
Hours worked/employee (2008Q1=100)



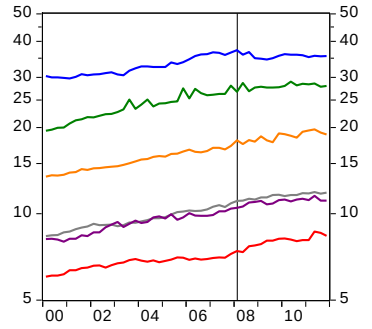
Manufacturing data from different databases (2008Q1=100)



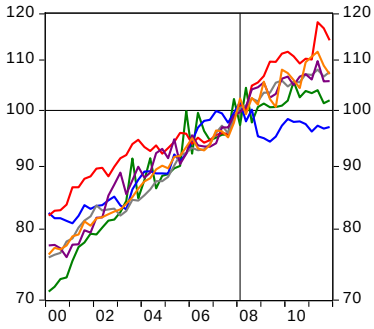
Gross production in manufacturing sub-sectors (2008Q1=100)



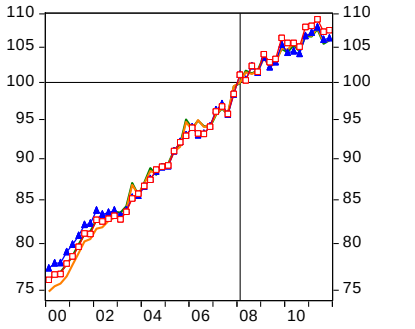
Hourly labour compensation (local currency)



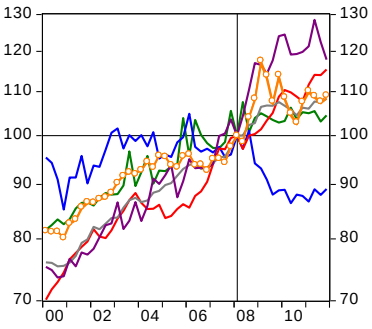
Hourly labour compensation (2008Q1=100)



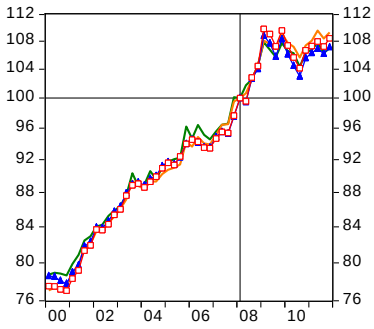
Hourly labour compensation (2008Q1=100)



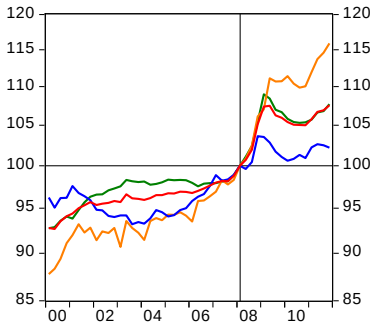
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

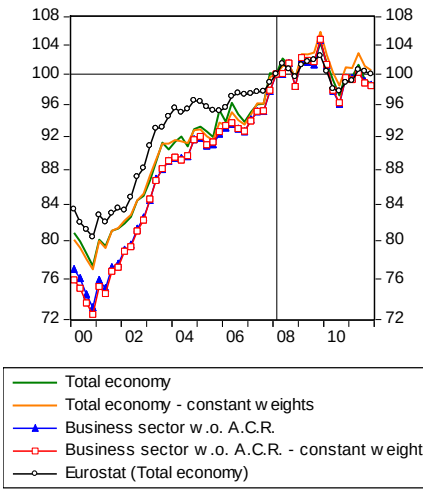


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

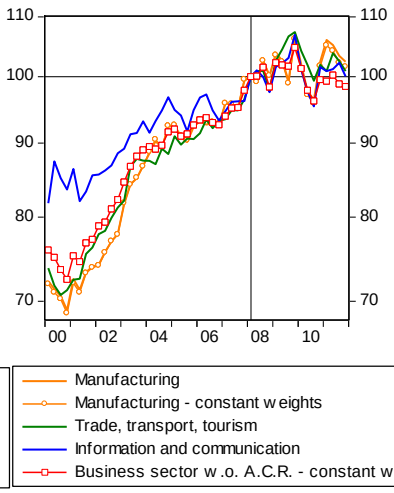


Italy, continued 2

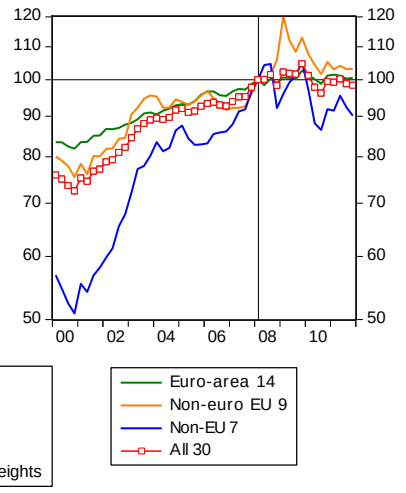
REER-ULC - aggregates (2008Q1=100)



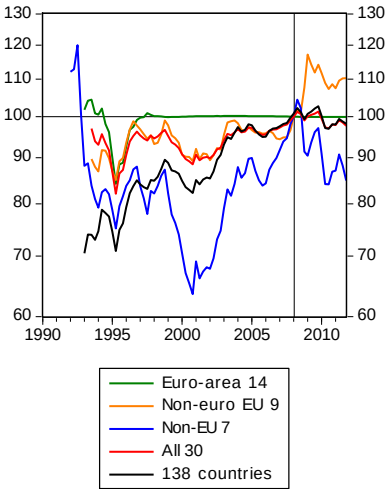
REER-ULC - sectors (2008Q1=100)



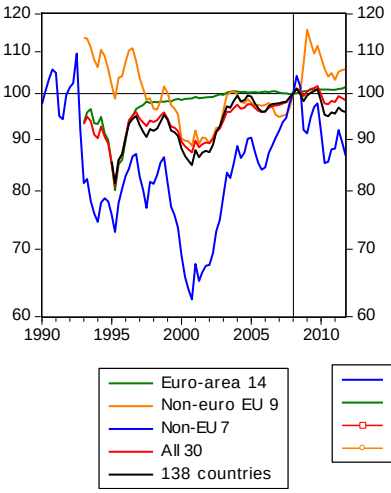
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



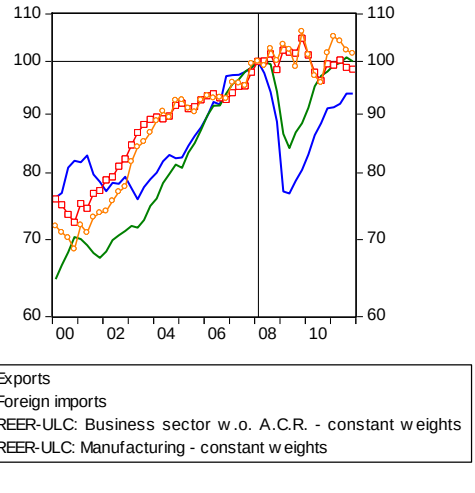
NEER (2008Q1=100)



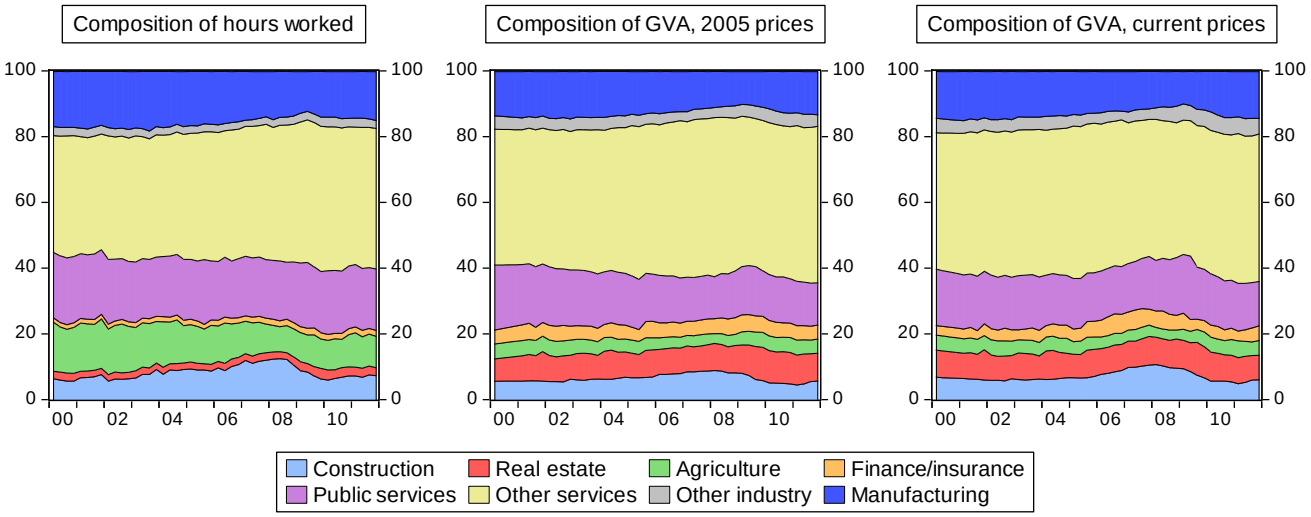
REER-CPI (2008Q1=100)



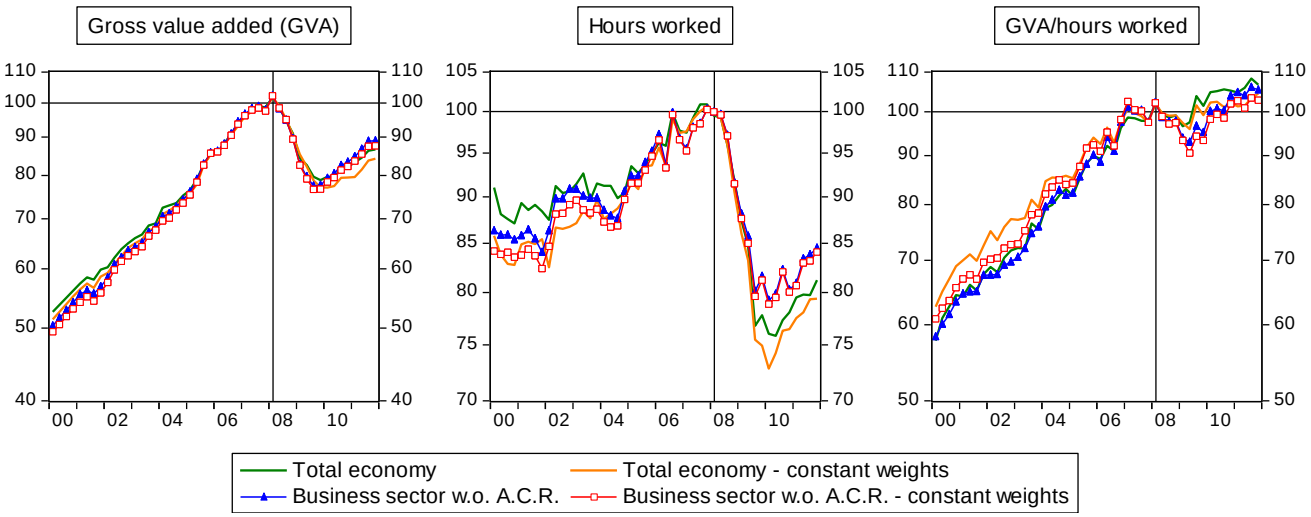
Export, export demand and REER



6.14. Latvia

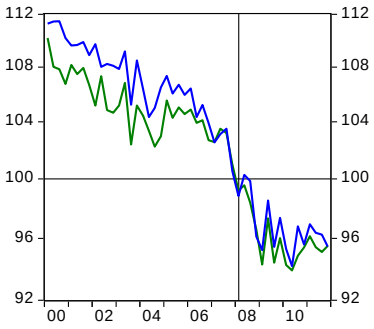

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

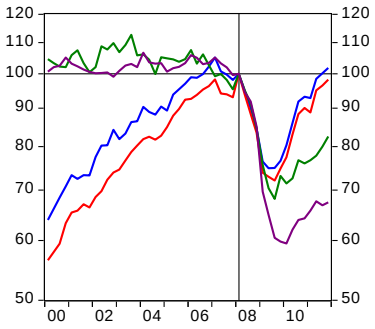

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Latvia, continued

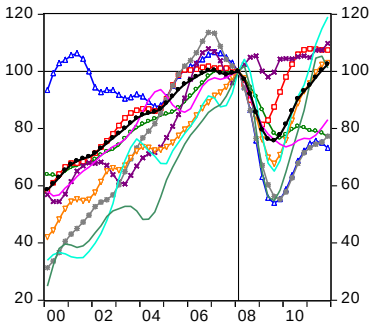
Hours worked/employee (2008Q1=100)



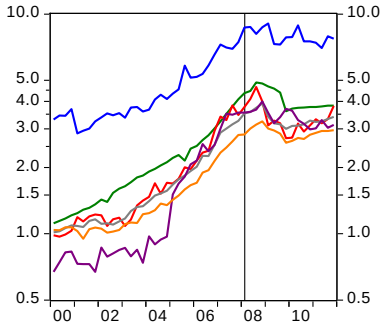
Manufacturing data from different databases (2008Q1=100)



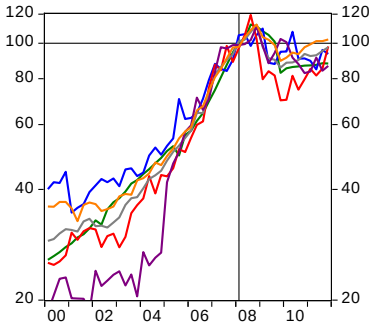
Gross production in manufacturing sub-sectors (2008Q1=100)



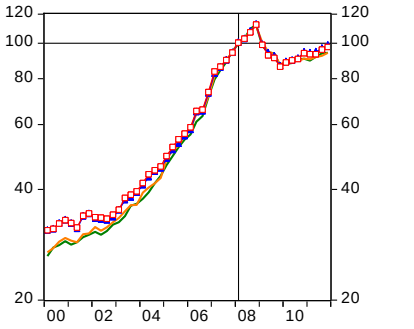
Hourly labour compensation (local currency)



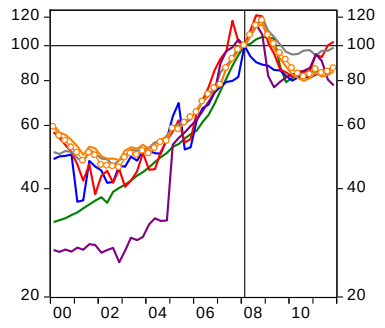
Hourly labour compensation (2008Q1=100)



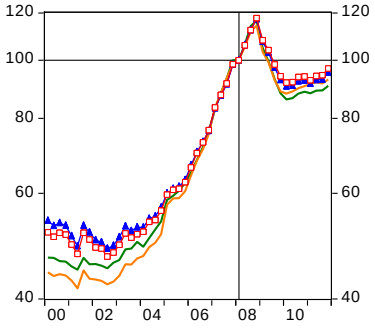
Hourly labour compensation (2008Q1=100)



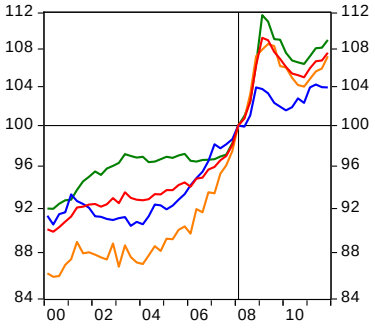
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

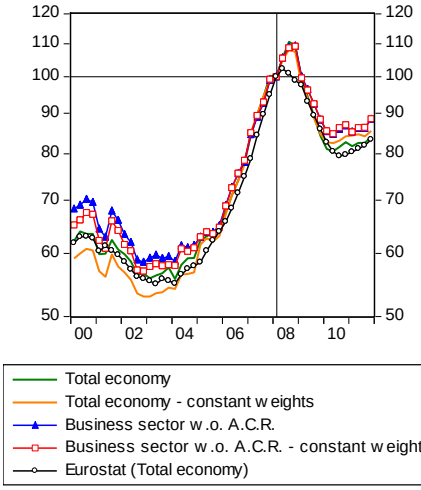


ULC of trading partners Bus.sec.w.o.A.C.R.-const.w.(2008Q1=100)

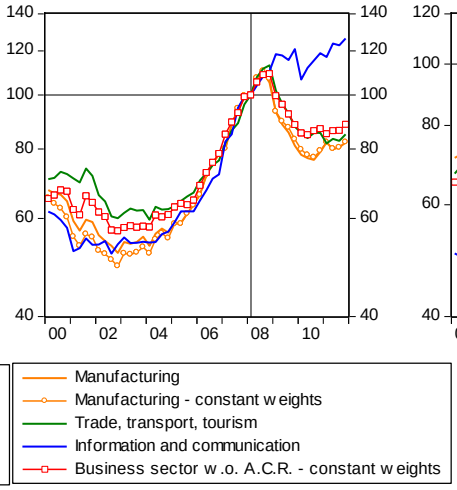


Latvia, continued 2

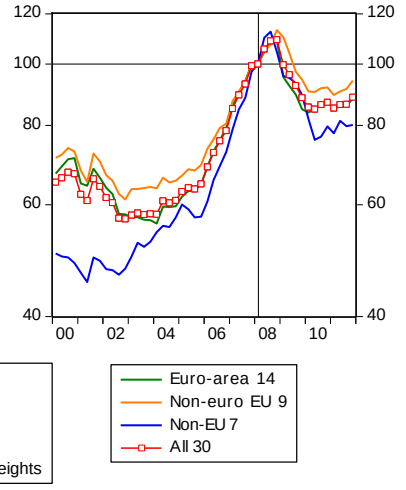
REER-ULC - aggregates (2008Q1=100)



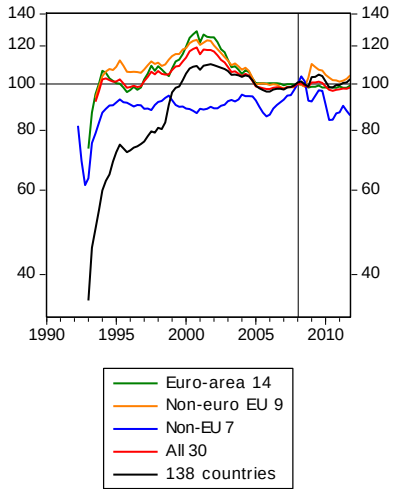
REER-ULC - sectors (2008Q1=100)



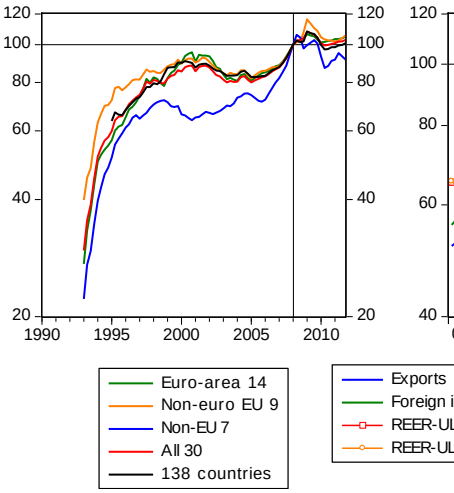
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



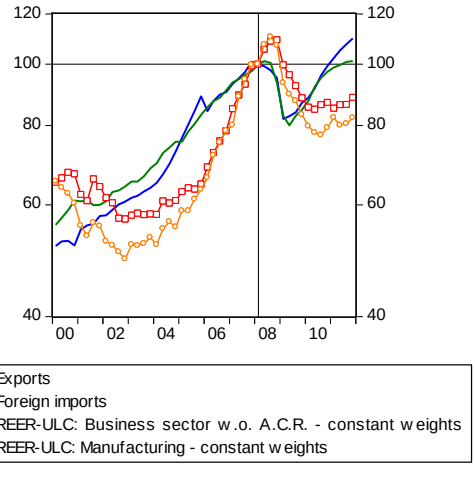
NEER (2008Q1=100)



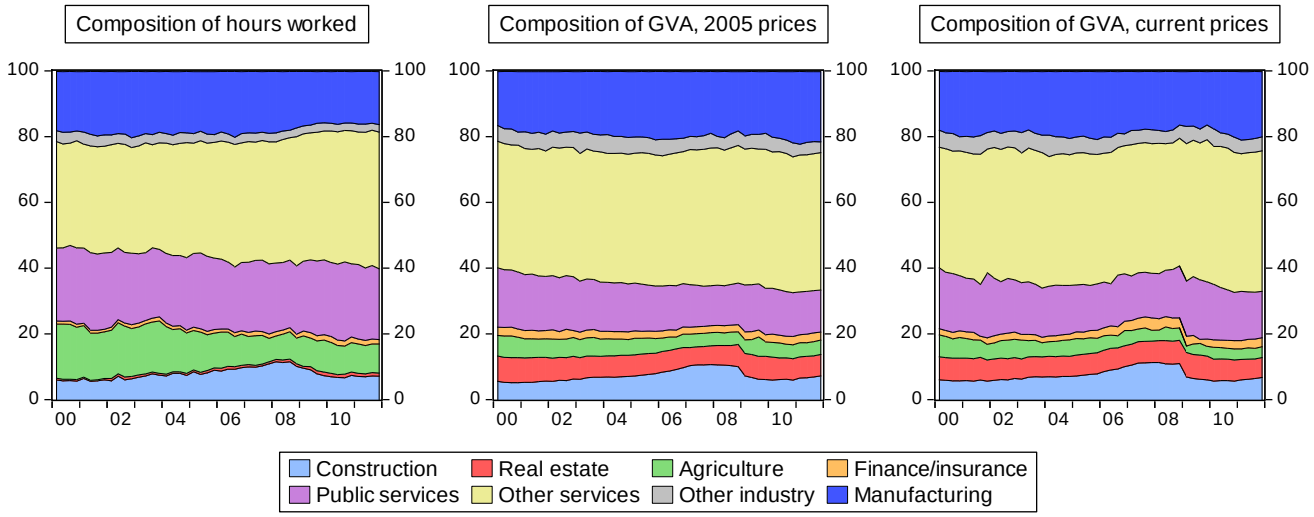
REER-CPI (2008Q1=100)

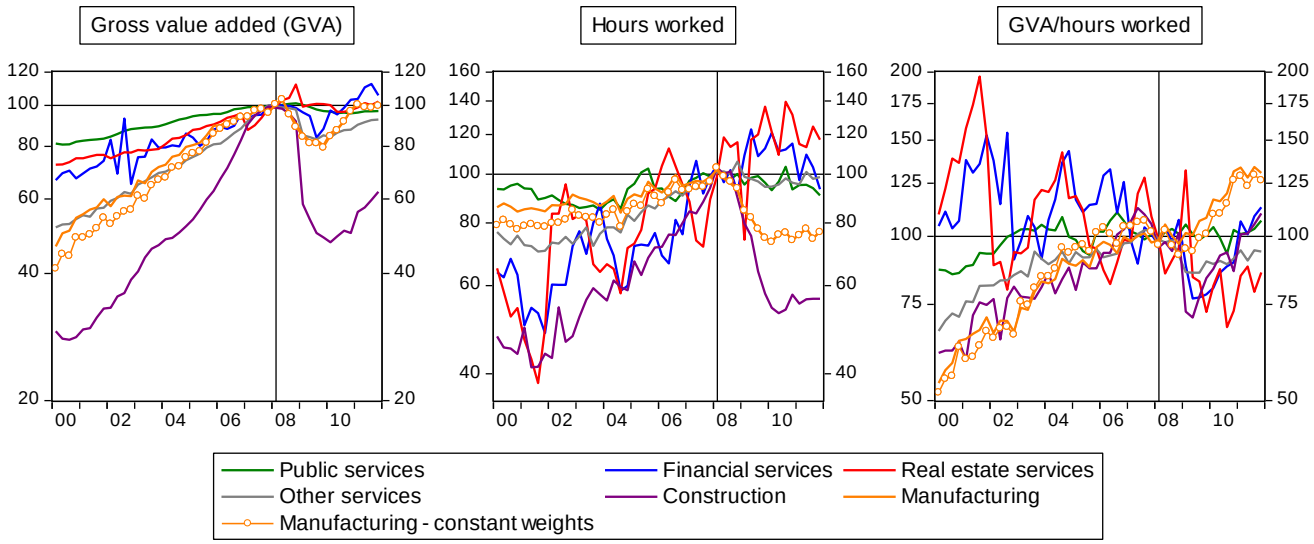


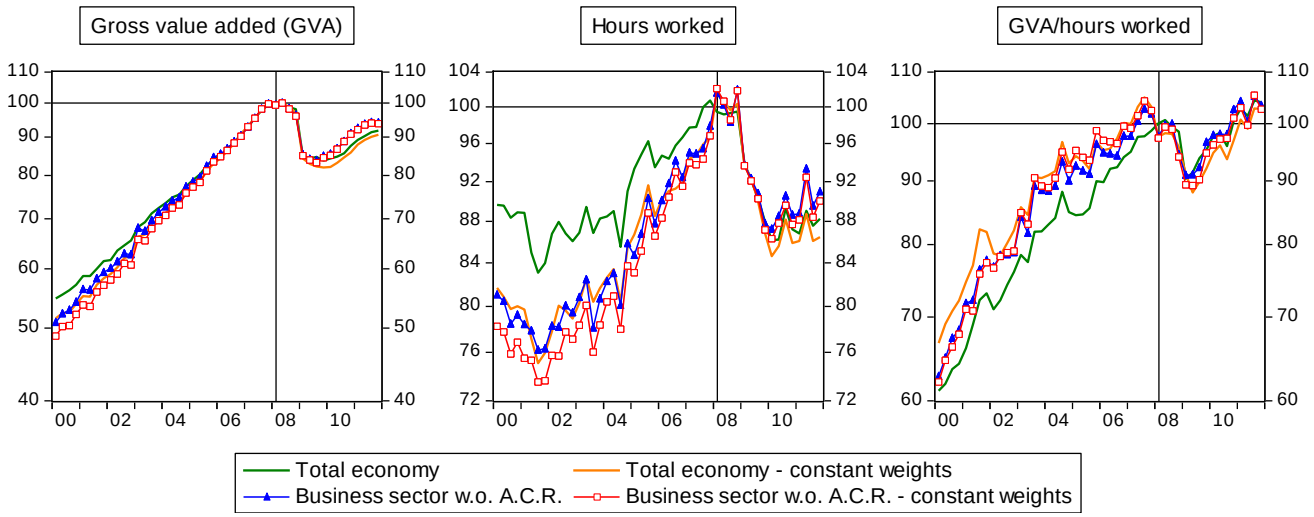
Export, export demand and REER



6.15. Lithuania

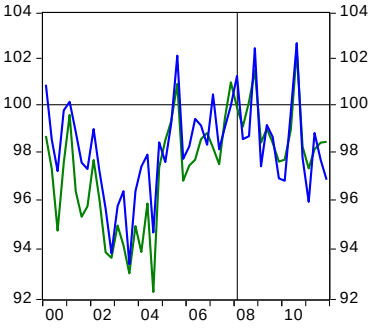




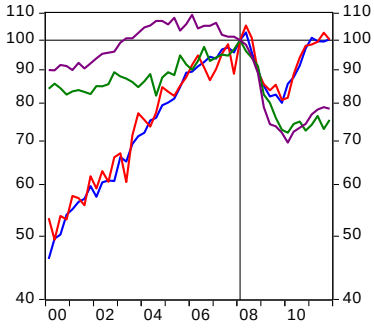


Lithuania, continued

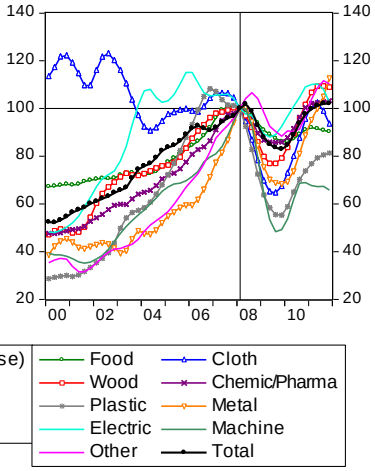
Hours worked/employee (2008Q1=100)



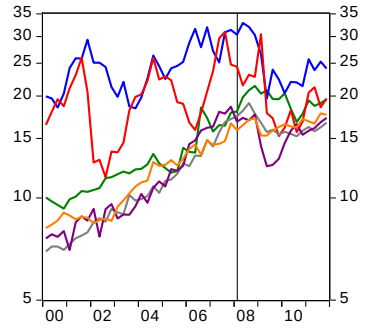
Manufacturing data from different databases (2008Q1=100)



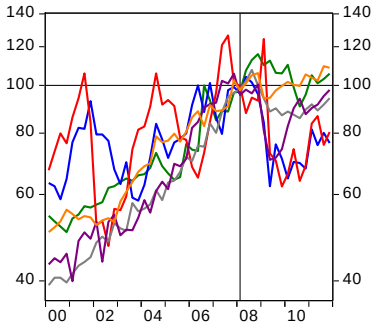
Gross production in manufacturing sub-sectors (2008Q1=100)



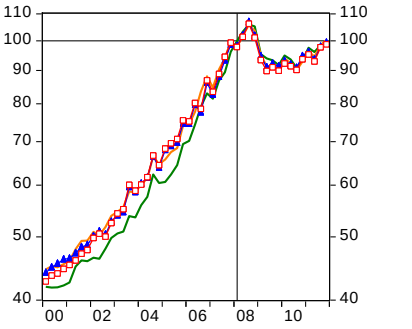
Hourly labour compensation (local currency)



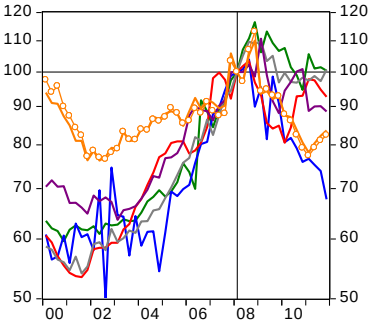
Hourly labour compensation (2008Q1=100)



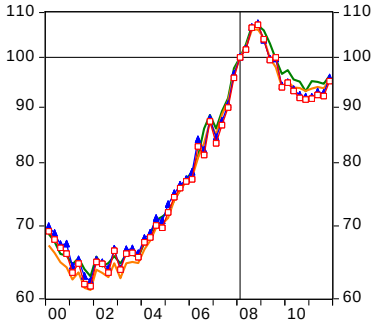
Hourly labour compensation (2008Q1=100)



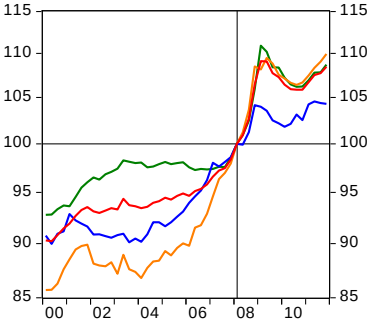
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

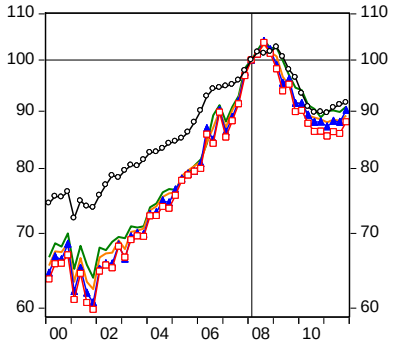


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

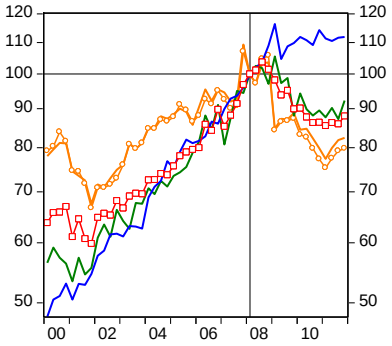


Lithuania, continued 2

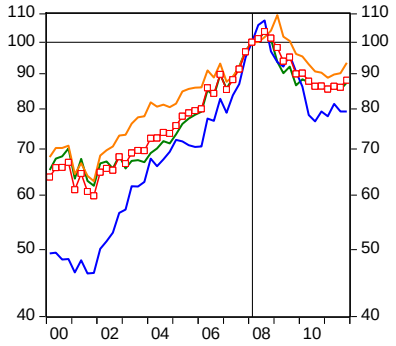
REER-ULC - aggregates (2008Q1=100)



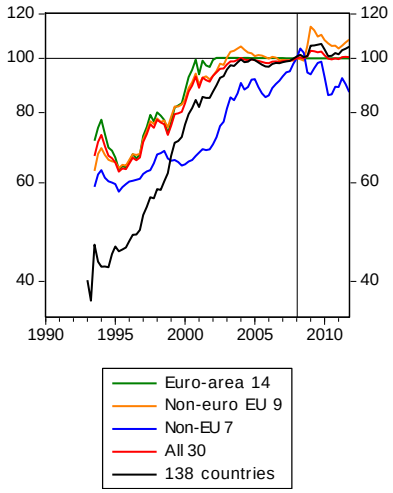
REER-ULC - sectors (2008Q1=100)



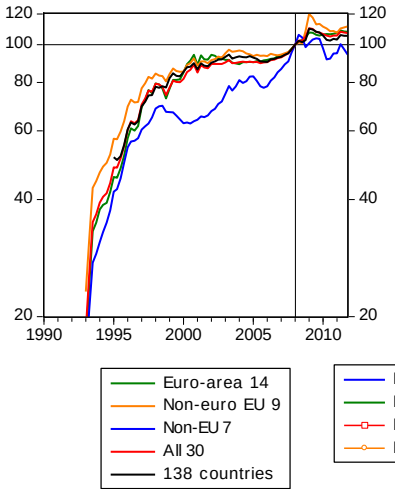
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



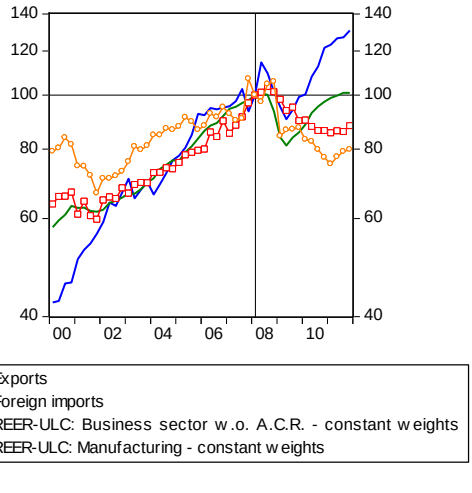
NEER (2008Q1=100)



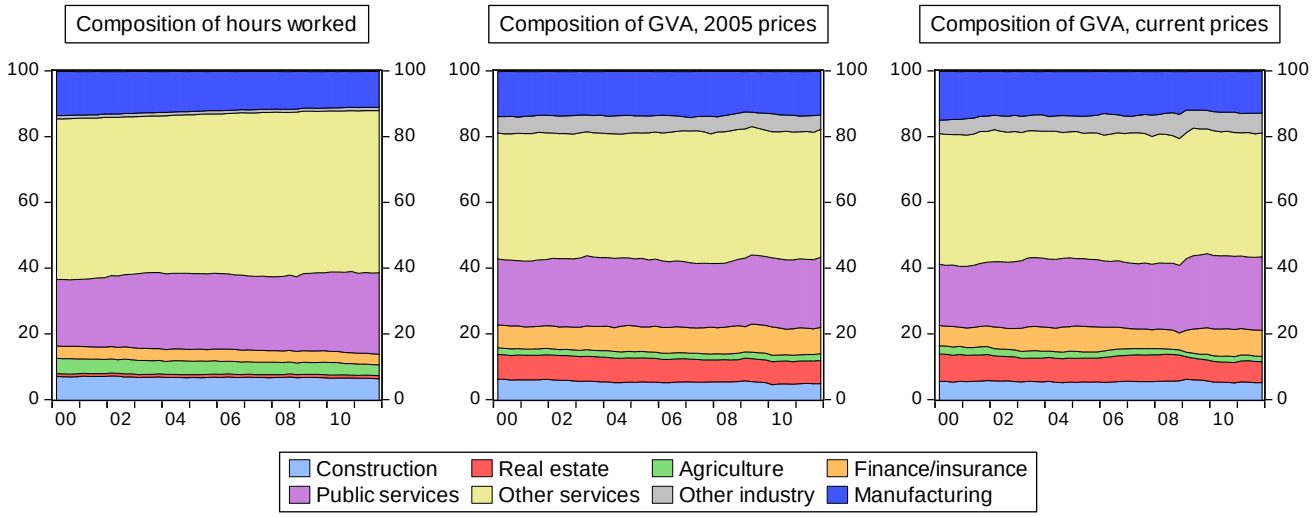
REER-CPI (2008Q1=100)

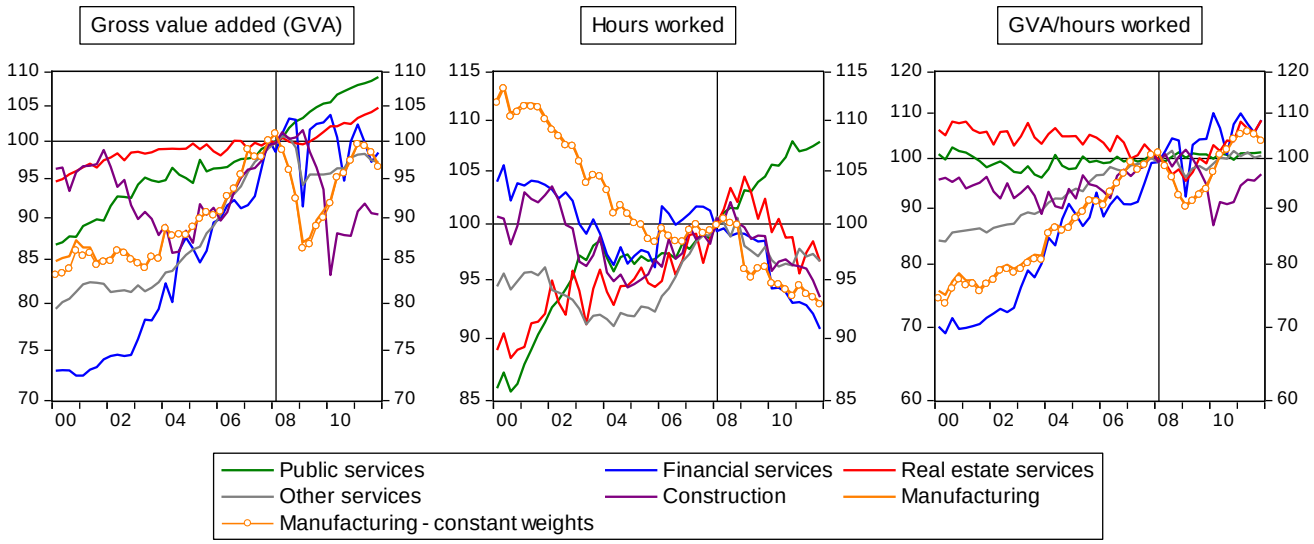


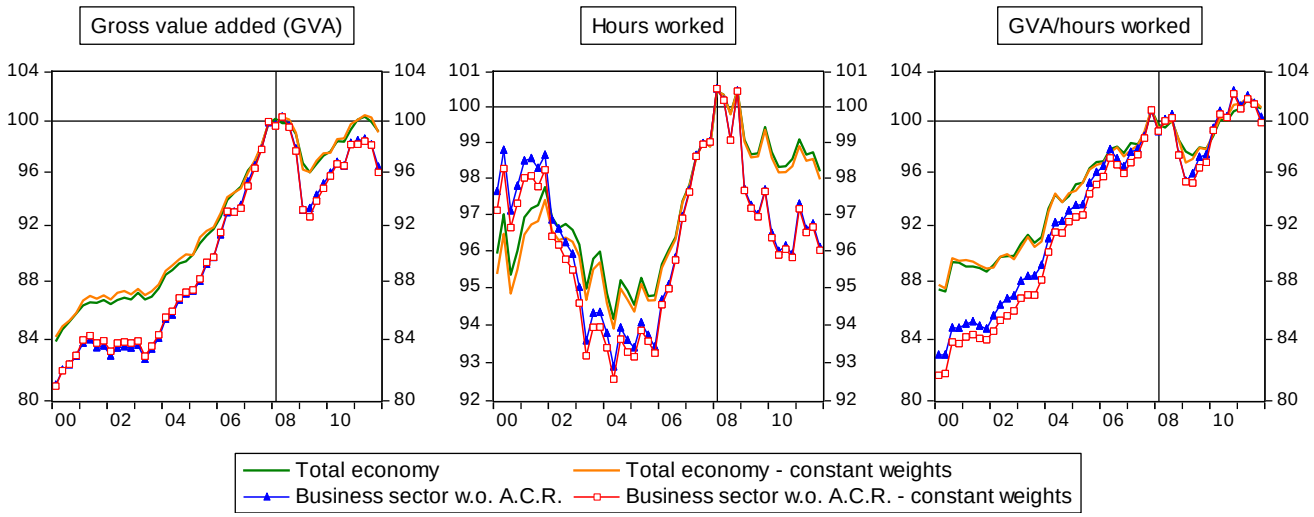
Export, export demand and REER



6.16. Netherlands

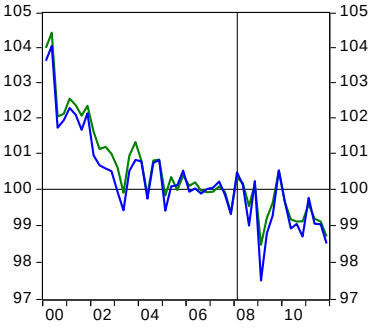






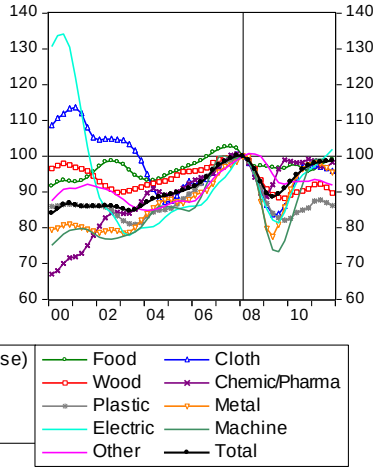
Netherlands, continued

Hours worked/employee (2008Q1=100)

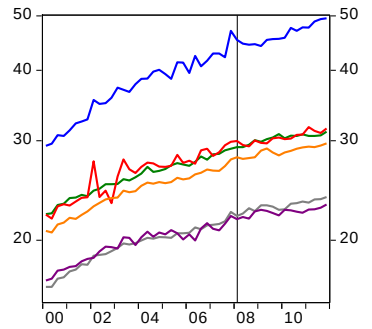


Manufacturing data from different databases (2008Q1=100)

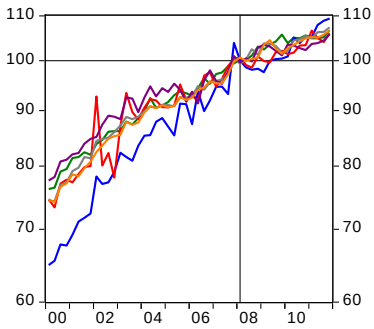
Gross production in manufacturing sub-sectors (2008Q1=100)



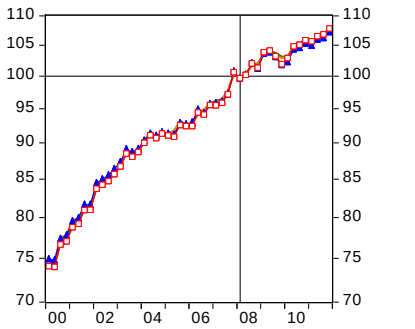
Hourly labour compensation (local currency)



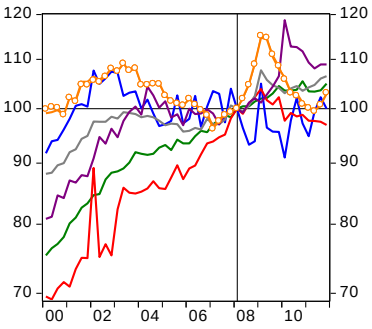
Hourly labour compensation (2008Q1=100)



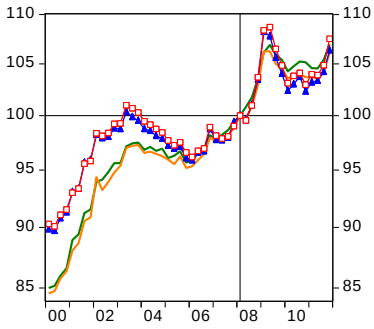
Hourly labour compensation (2008Q1=100)



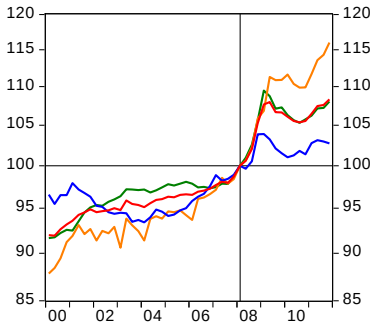
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

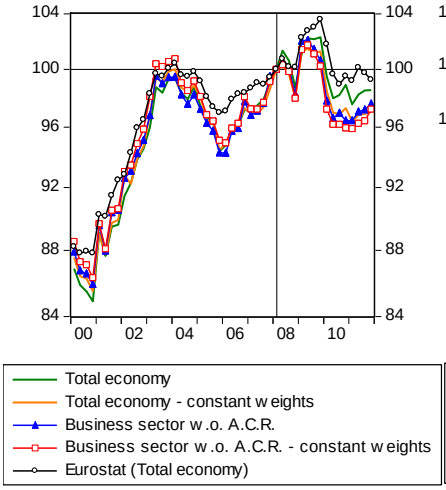


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

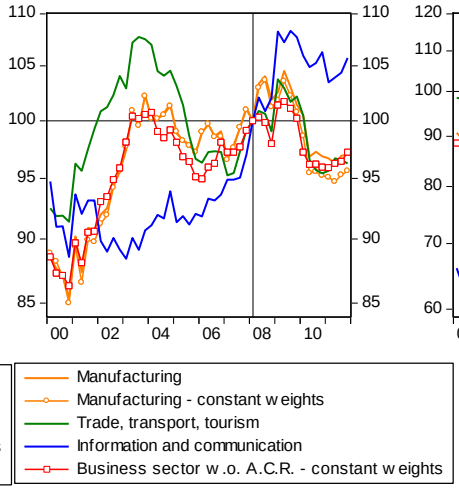


Netherlands, continued 2

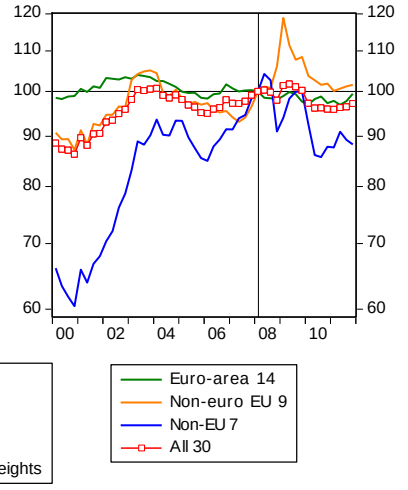
REER-ULC - aggregates (2008Q1=100)



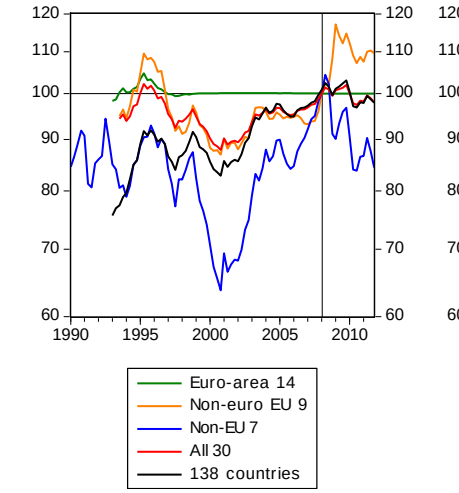
REER-ULC - sectors (2008Q1=100)



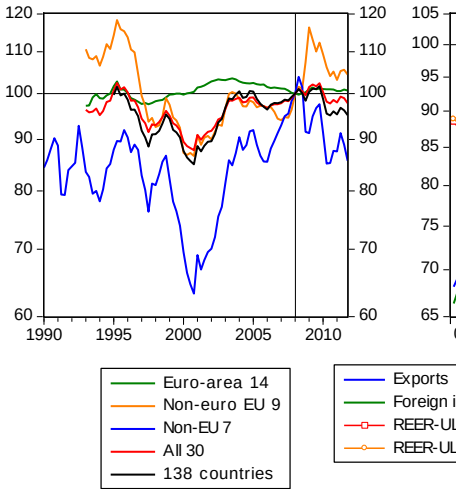
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



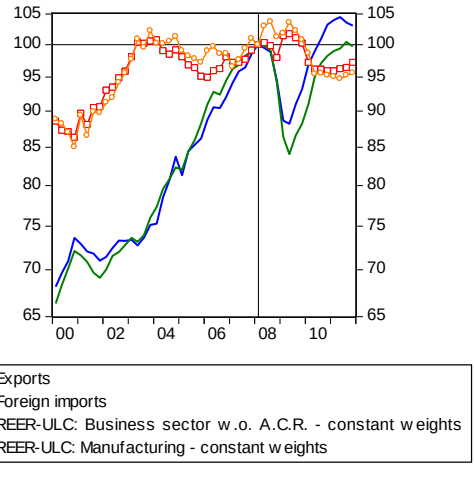
NEER (2008Q1=100)



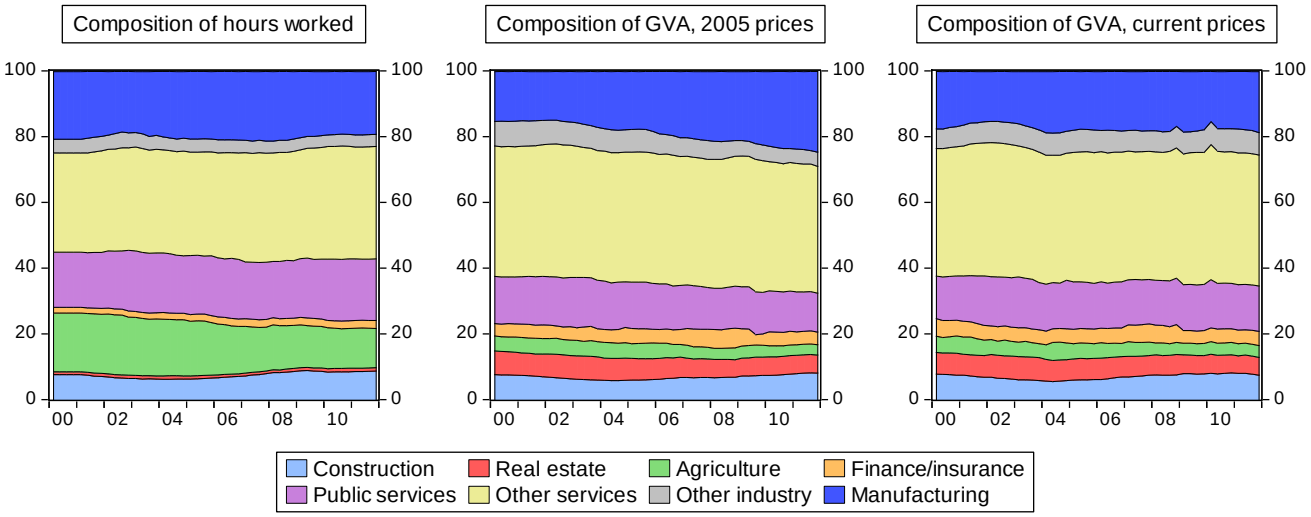
REER-CPI (2008Q1=100)

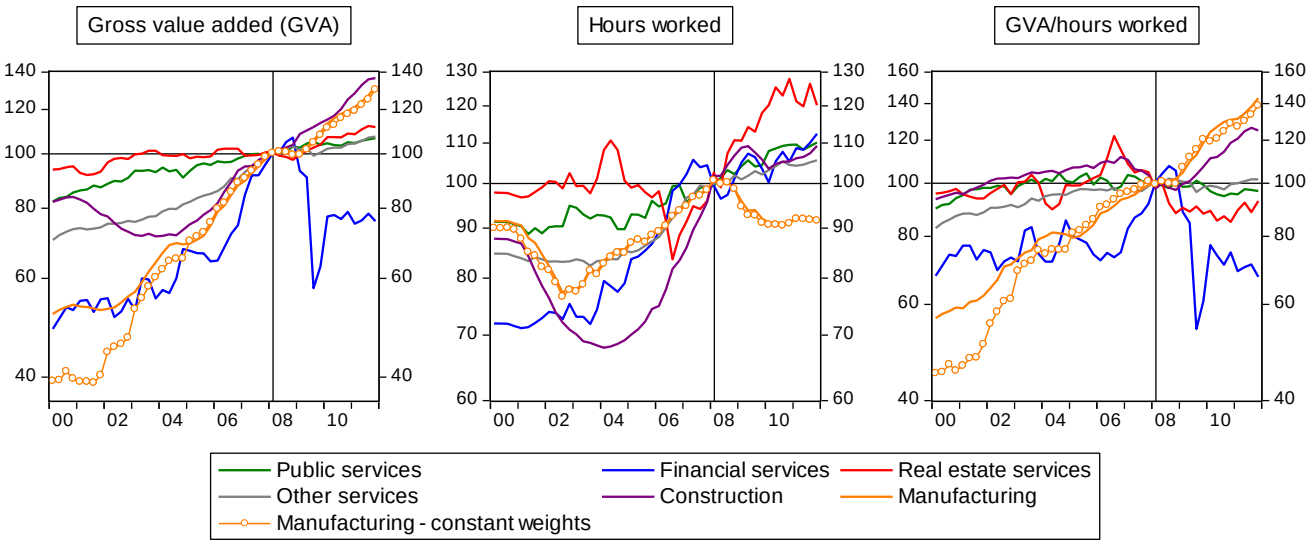


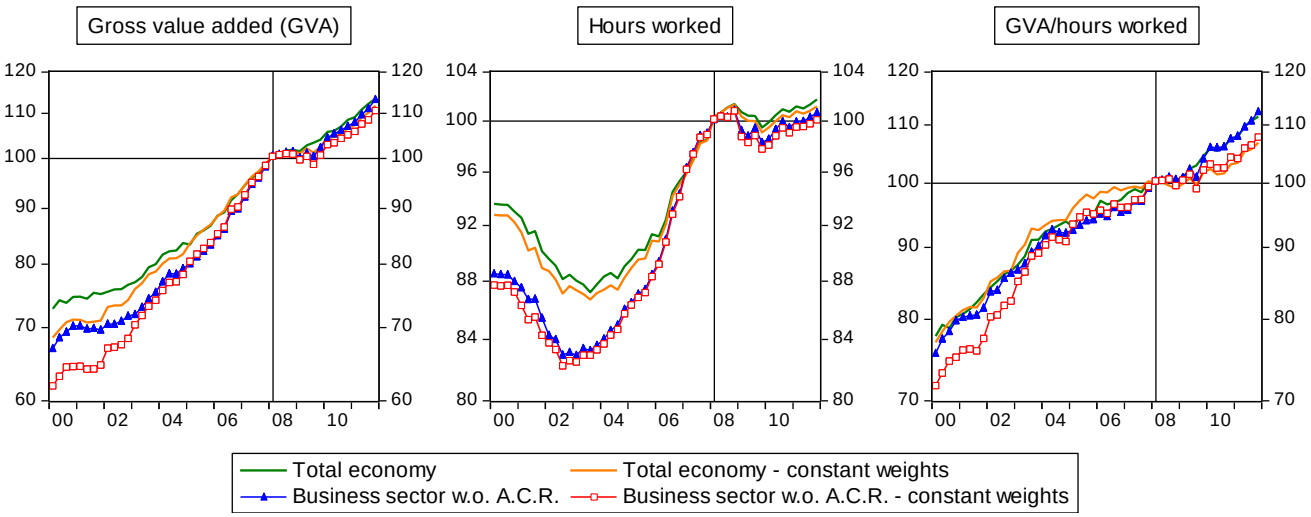
Export, export demand and REER



6.17. Poland

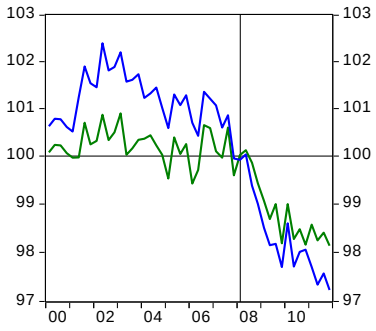

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

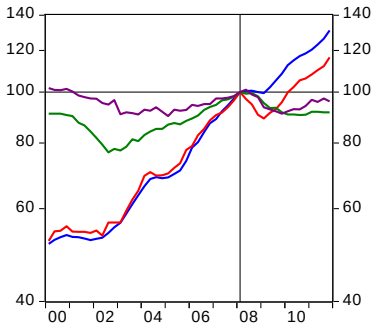

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Poland, continued

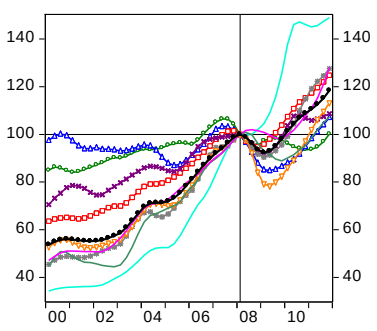
Hours worked/employee (2008Q1=100)



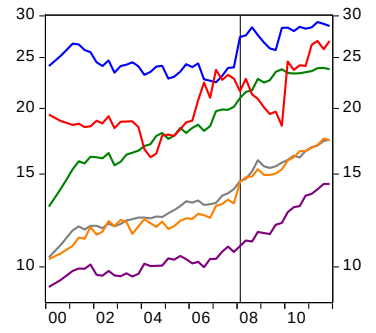
Manufacturing data from different databases (2008Q1=100)



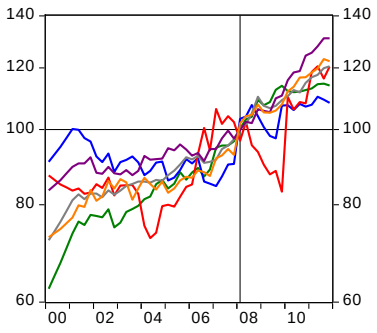
Gross production in manufacturing sub-sectors (2008Q1=100)



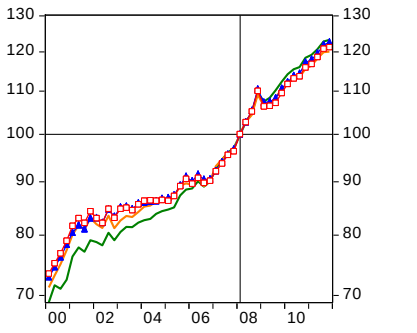
Hourly labour compensation (local currency)



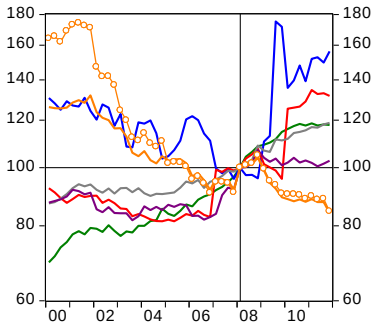
Hourly labour compensation (2008Q1=100)



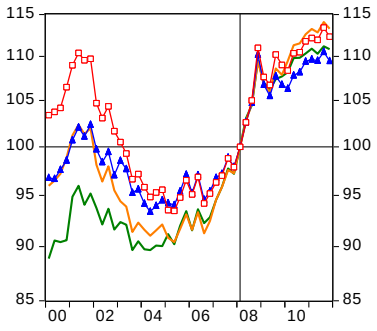
Hourly labour compensation (2008Q1=100)



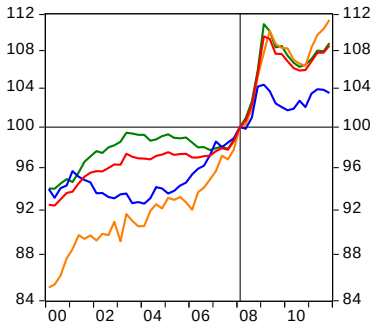
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

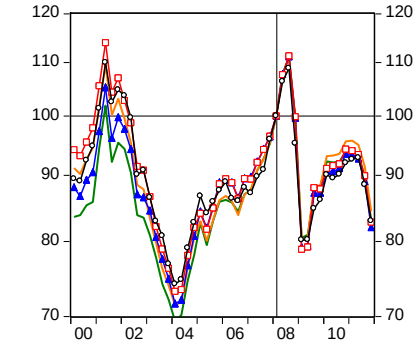


ULC of trading partners
Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)



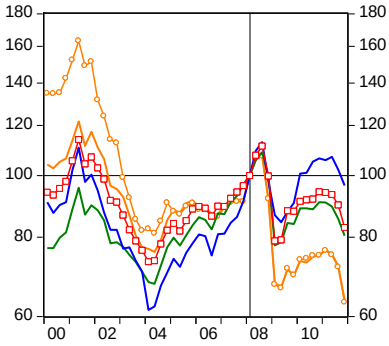
Poland, continued 2

REER-ULC - aggregates (2008Q1=100)



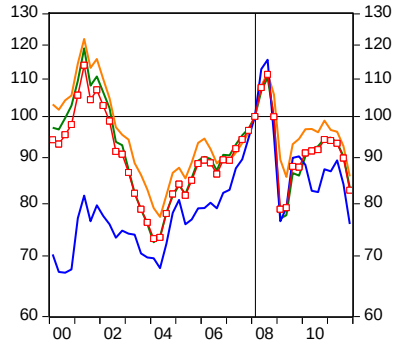
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights
Eurostat (Total economy)

REER-ULC - sectors (2008Q1=100)



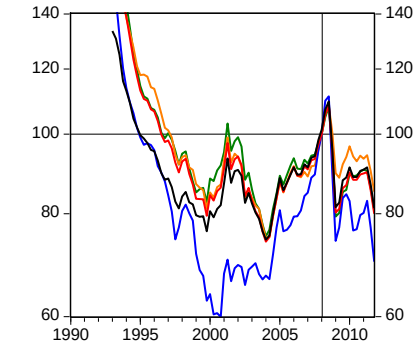
Manufacturing
Manufacturing - constant weights
Trade, transport, tourism
Information and communication
Business sector w.o. A.C.R. - constant weights

REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



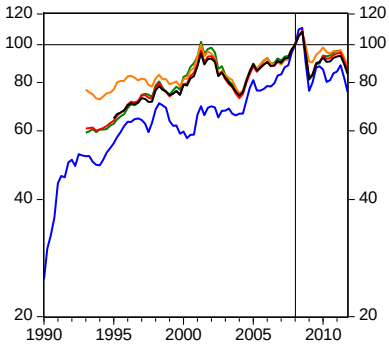
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

NEER (2008Q1=100)



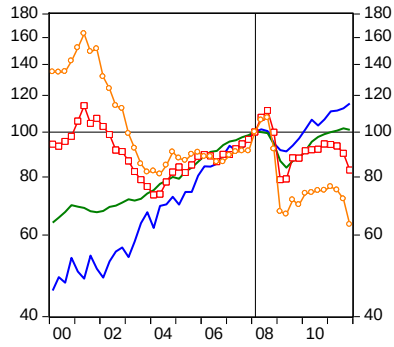
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

REER-CPI (2008Q1=100)



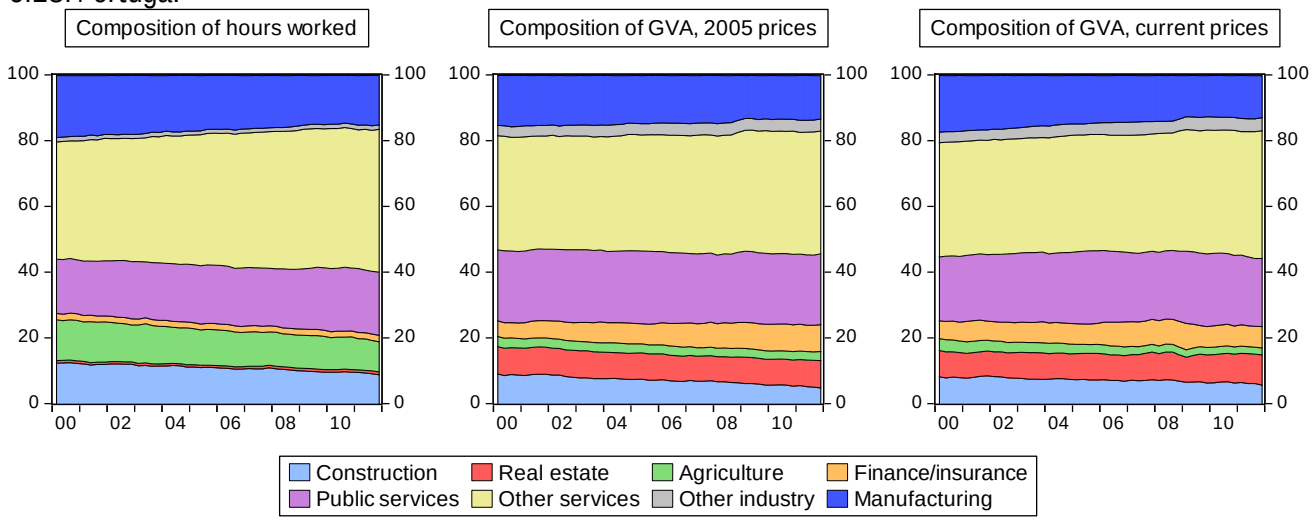
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

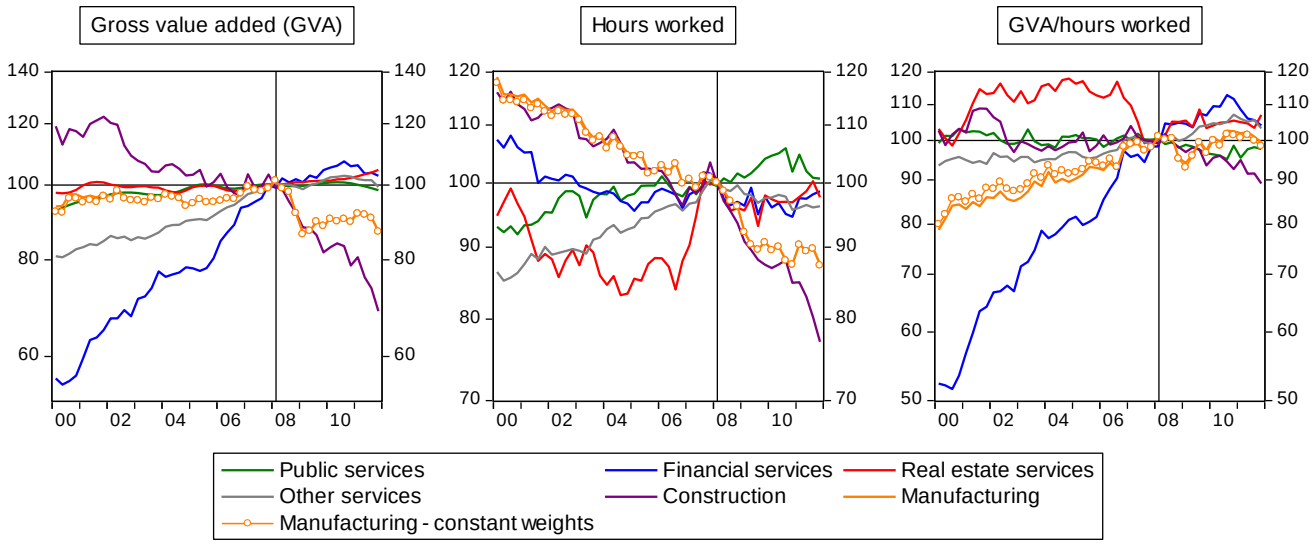
Export, export demand and REER

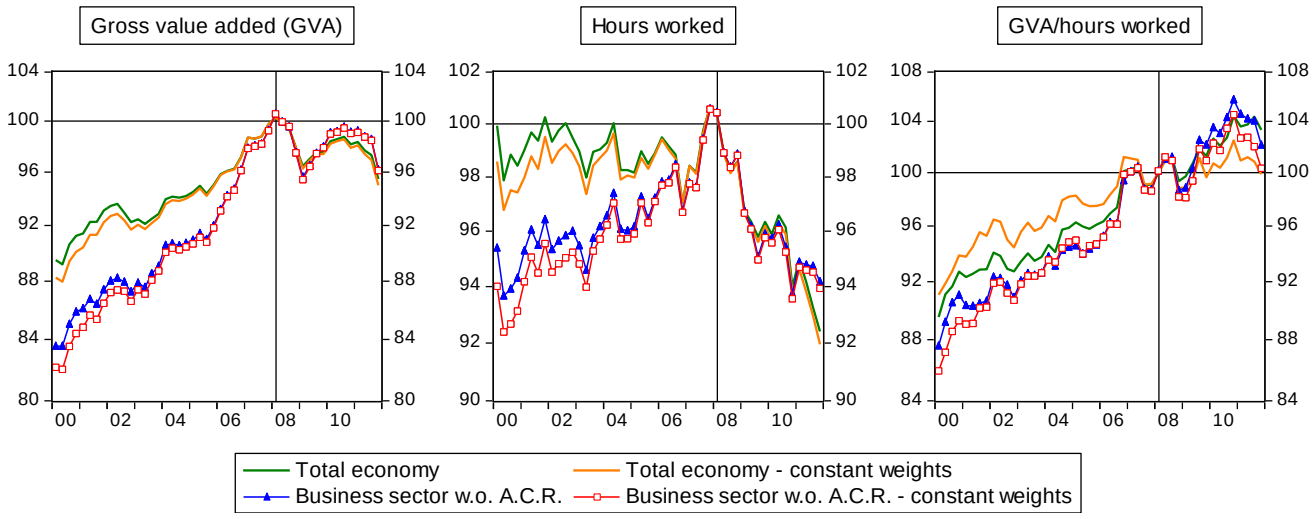


Exports
Foreign imports
REER-ULC: Business sector w.o. A.C.R. - constant weights
REER-ULC: Manufacturing - constant weights

6.18. Portugal

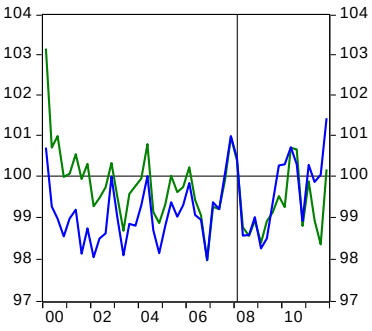




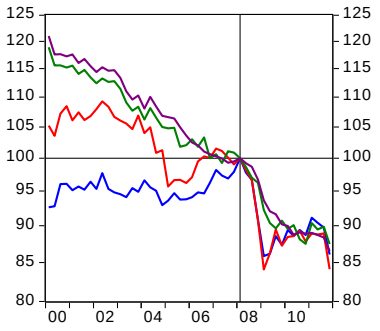


Portugal, continued

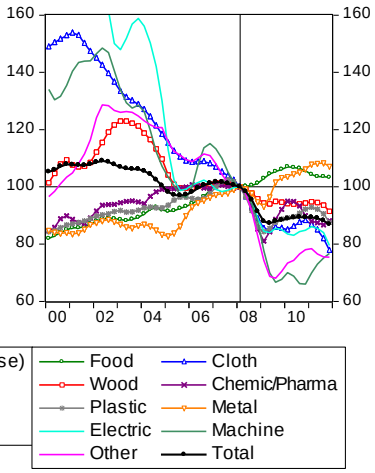
Hours worked/employee (2008Q1=100)



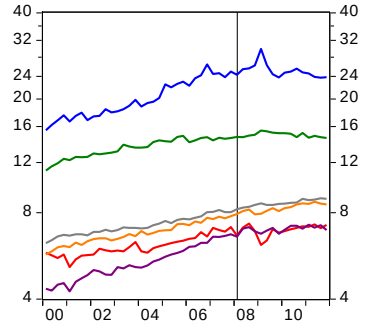
Manufacturing data from different databases (2008Q1=100)



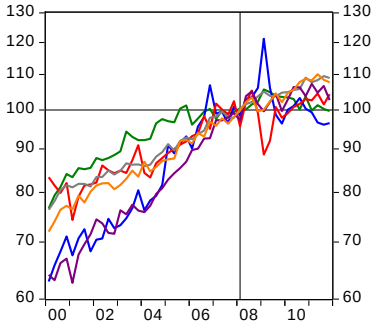
Gross production in manufacturing sub-sectors (2008Q1=100)



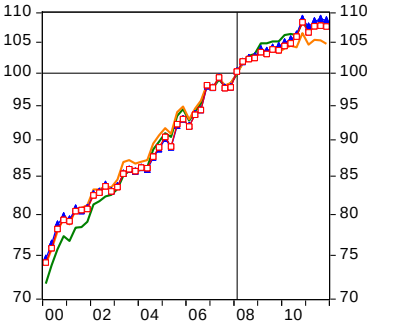
Hourly labour compensation (local currency)



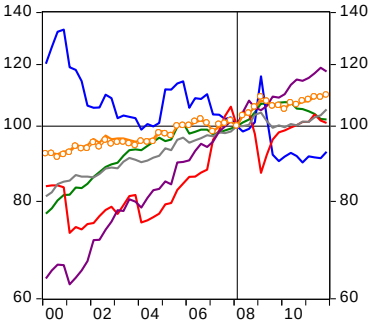
Hourly labour compensation (2008Q1=100)



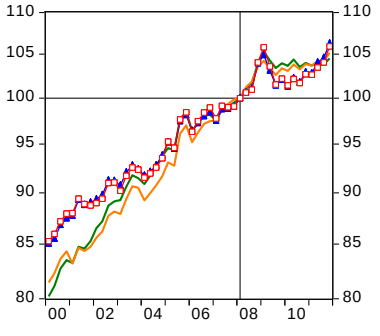
Hourly labour compensation (2008Q1=100)



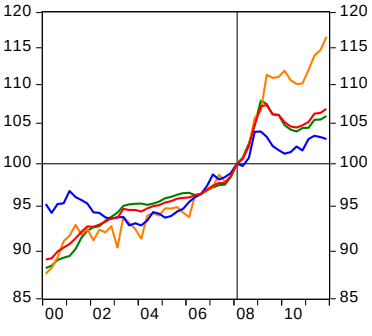
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

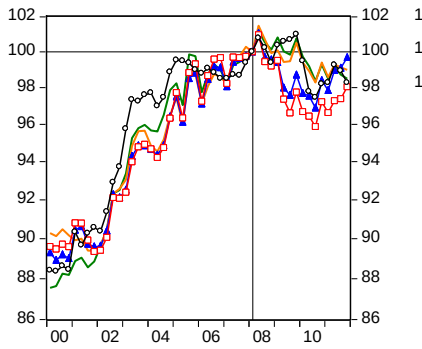


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)



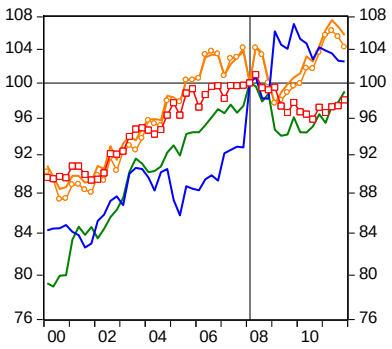
Portugal, continued 2

REER-ULC - aggregates (2008Q1=100)



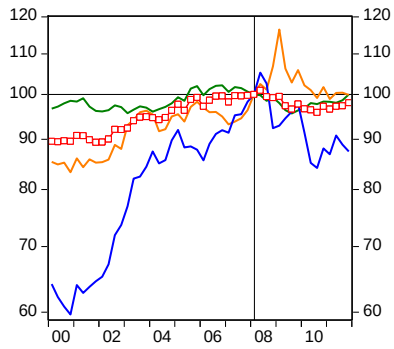
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights
Eurostat (Total economy)

REER-ULC - sectors (2008Q1=100)



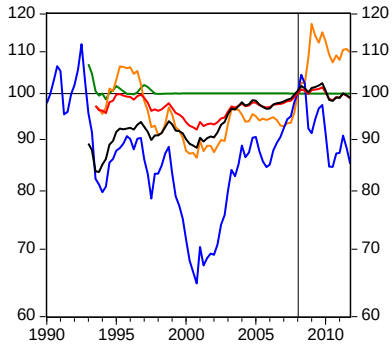
Manufacturing
Manufacturing - constant weights
Trade, transport, tourism
Information and communication
Business sector w.o. A.C.R. - constant weights

REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



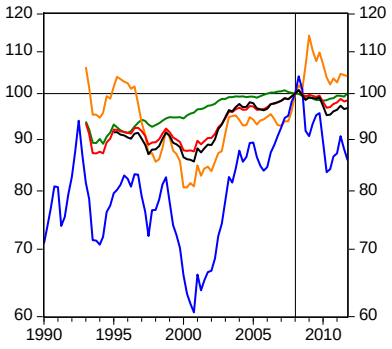
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

NEER (2008Q1=100)



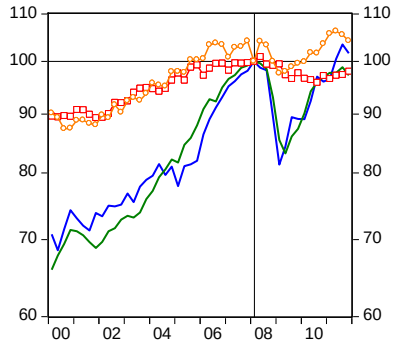
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

REER-CPI (2008Q1=100)



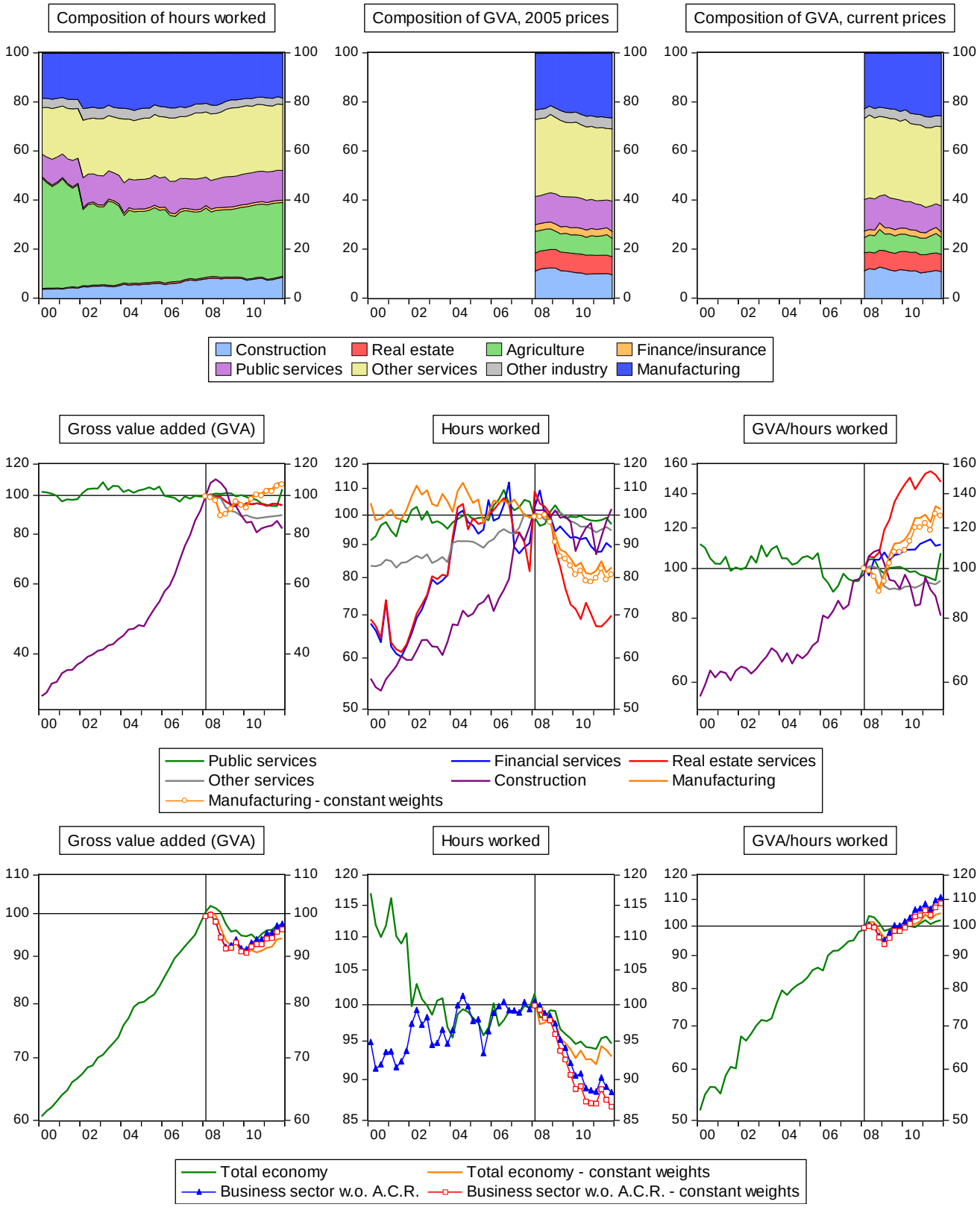
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

Export, export demand and REER



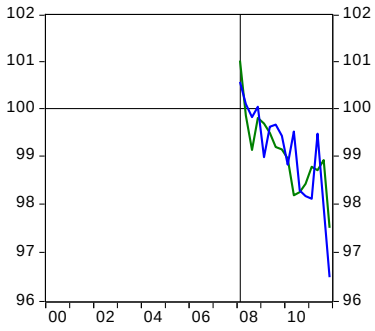
Exports
Foreign imports
REER-ULC: Business sector w.o. A.C.R. - constant weights
REER-ULC: Manufacturing - constant weights

6.19. Romania

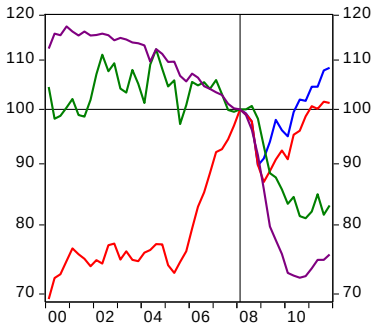

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing
Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights
Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Romania, continued

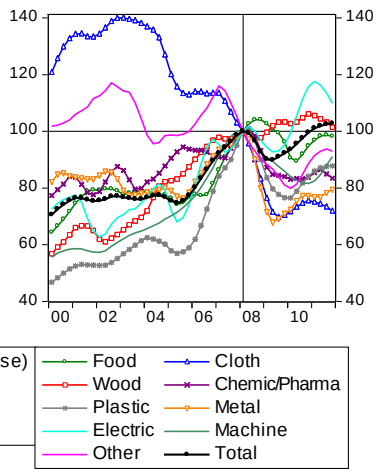
Hours worked/employee (2008Q1=100)



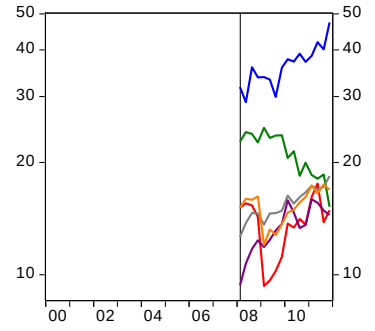
Manufacturing data from different databases (2008Q1=100)



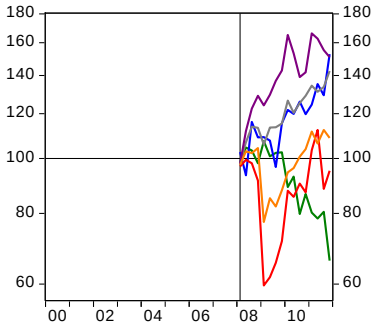
Gross production in manufacturing sub-sectors (2008Q1=100)



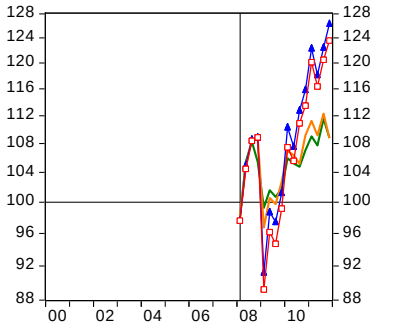
Hourly labour compensation (local currency)



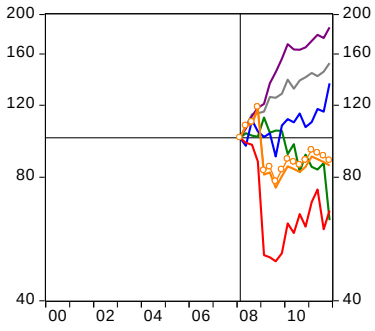
Hourly labour compensation (2008Q1=100)



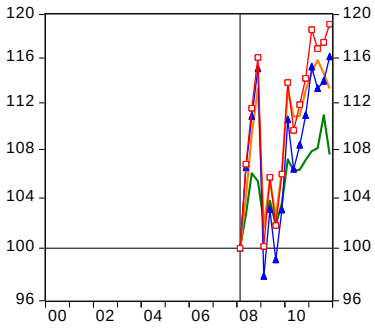
Hourly labour compensation (2008Q1=100)



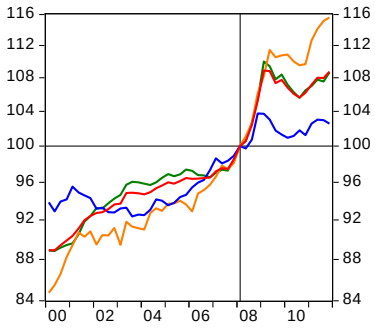
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)



ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

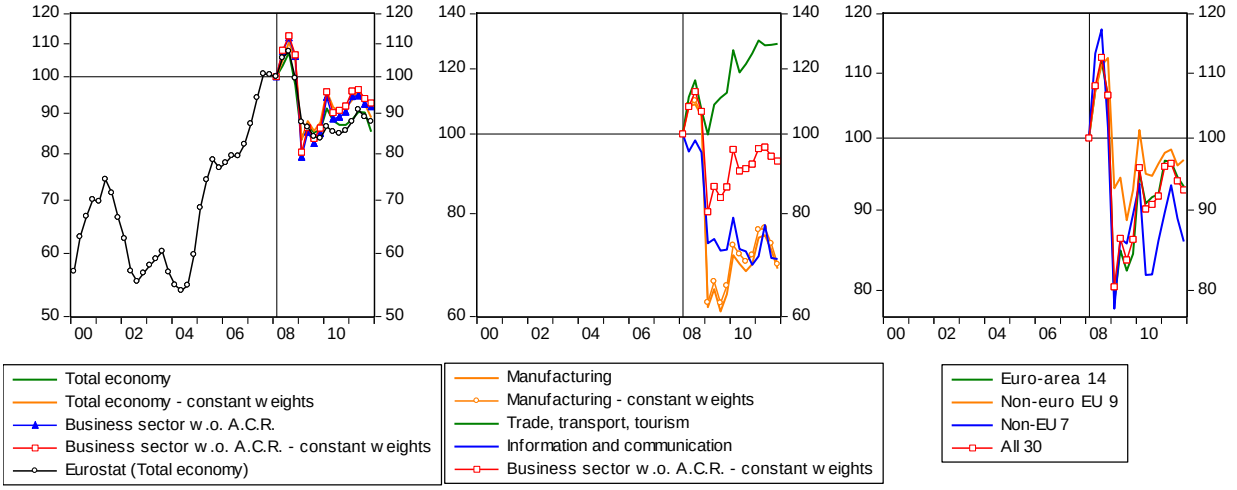


Romania, continued 2

REER-ULC - aggregates (2008Q1=100)

REER-ULC - sectors (2008Q1=100)

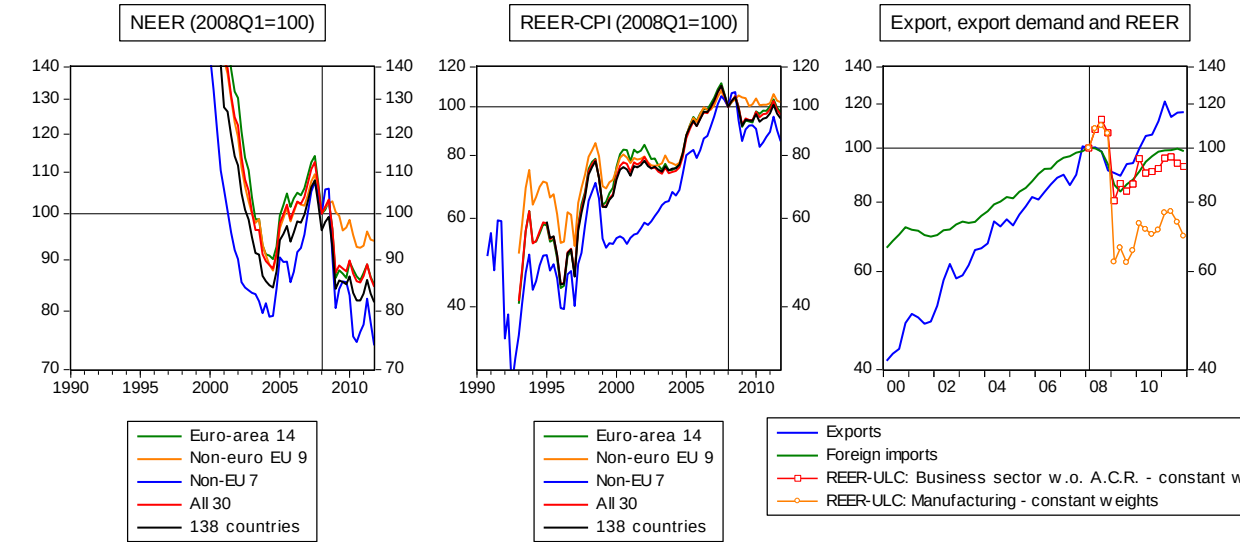
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



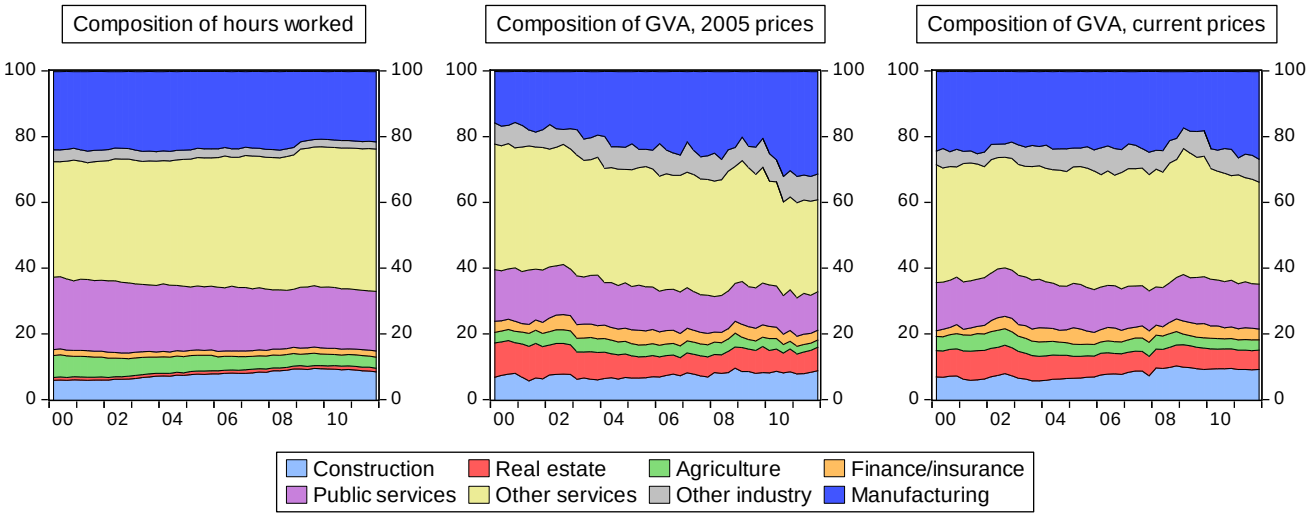
NEER (2008Q1=100)

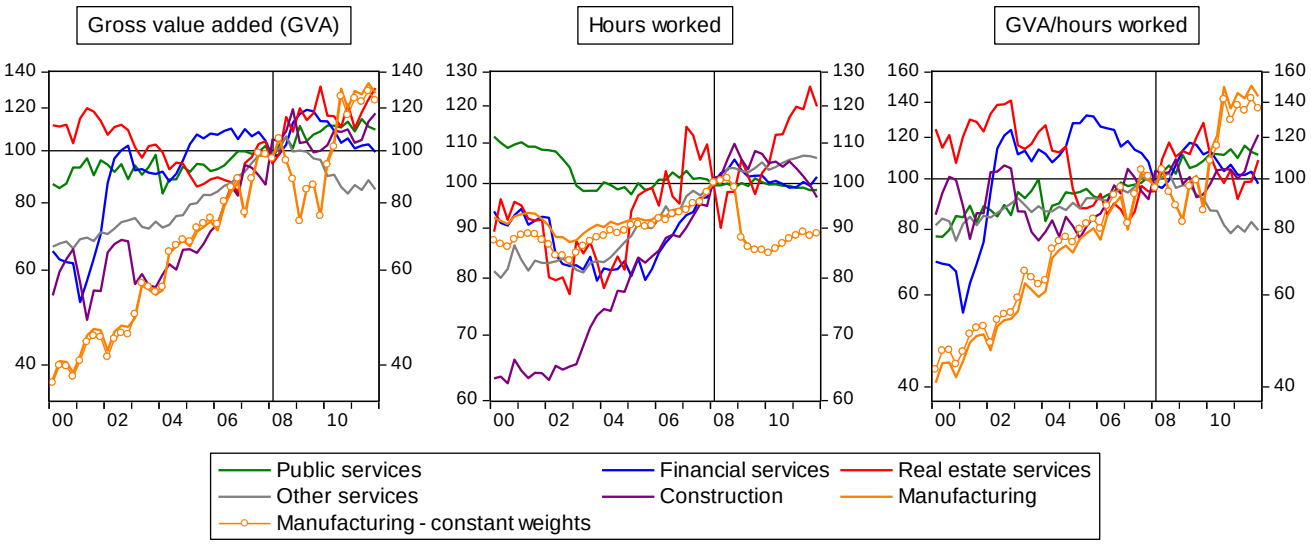
REER-CPI (2008Q1=100)

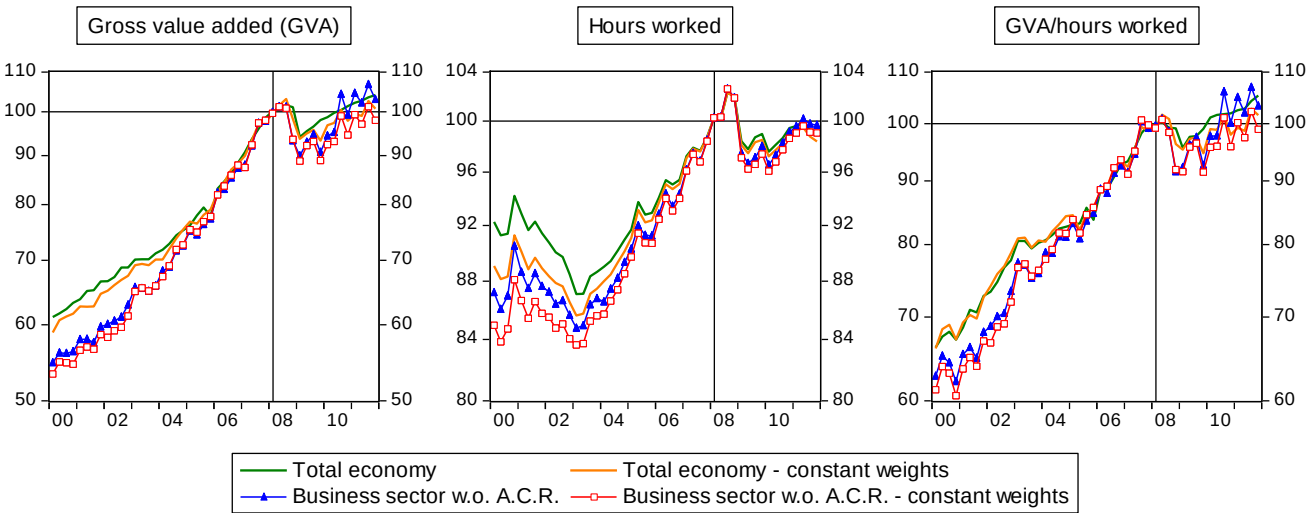
Export, export demand and REER



6.20. Slovakia

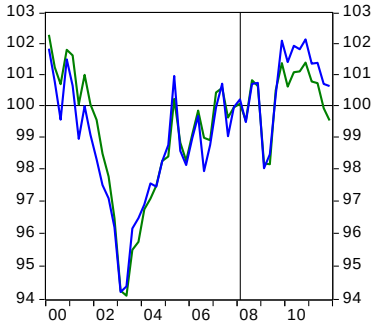




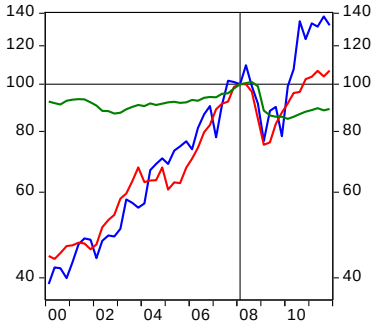


Slovakia, continued

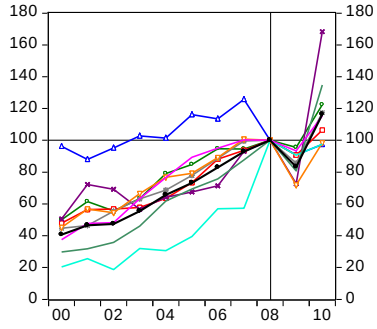
Hours worked/employee (2008Q1=100)



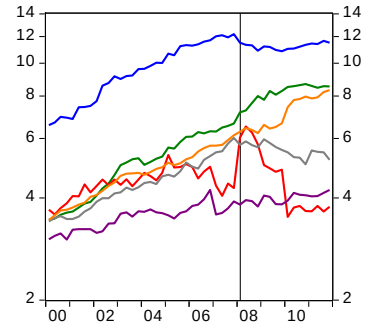
Manufacturing data from different databases (2008Q1=100)



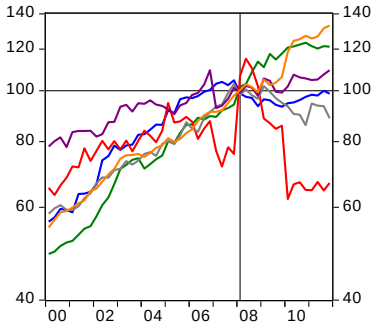
Gross value added in manufacturing sub-sectors



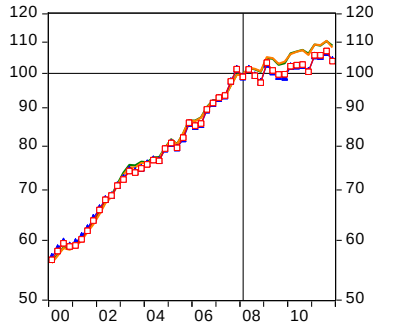
Hourly labour compensation (local currency)



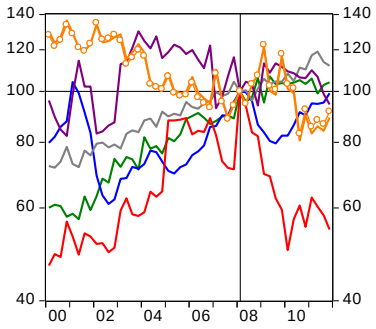
Hourly labour compensation (2008Q1=100)



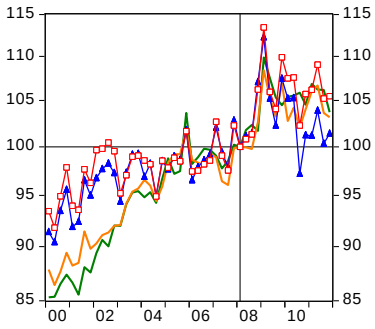
Hourly labour compensation (2008Q1=100)



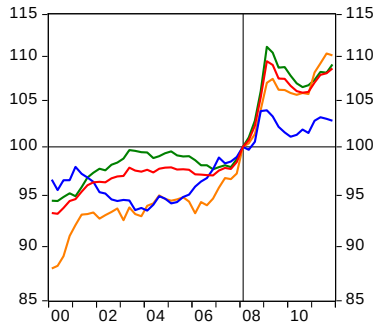
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

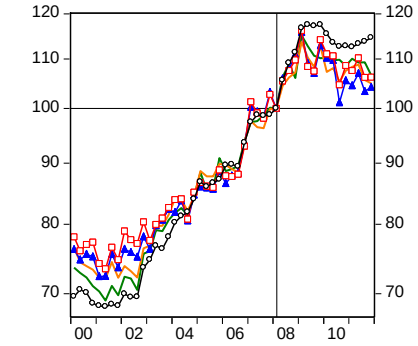


ULC of trading partners
Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

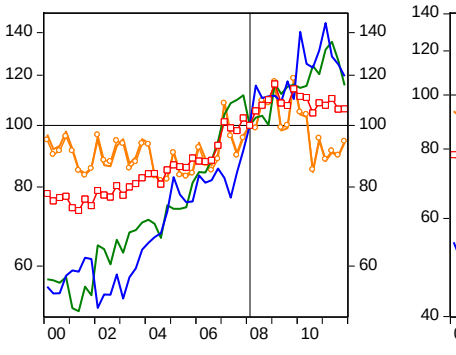


Slovakia, continued 2

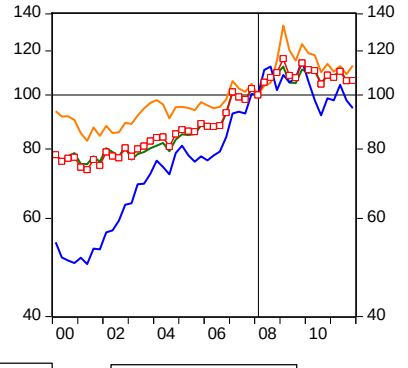
REER-ULC - aggregates (2008Q1=100)



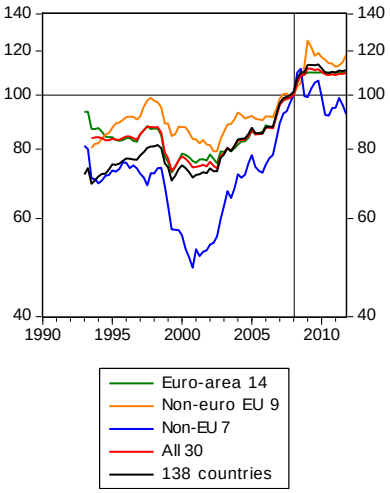
REER-ULC - sectors (2008Q1=100)



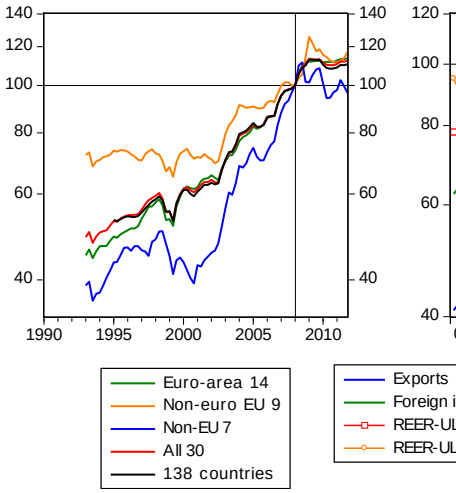
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



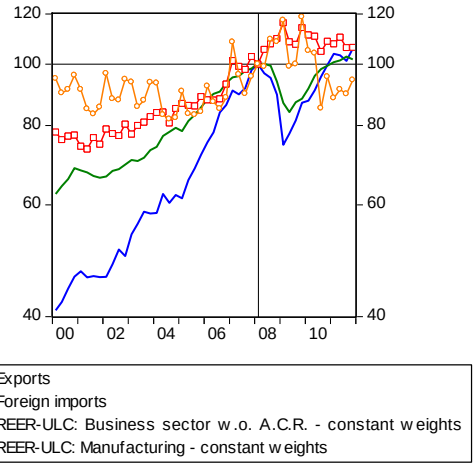
NEER (2008Q1=100)



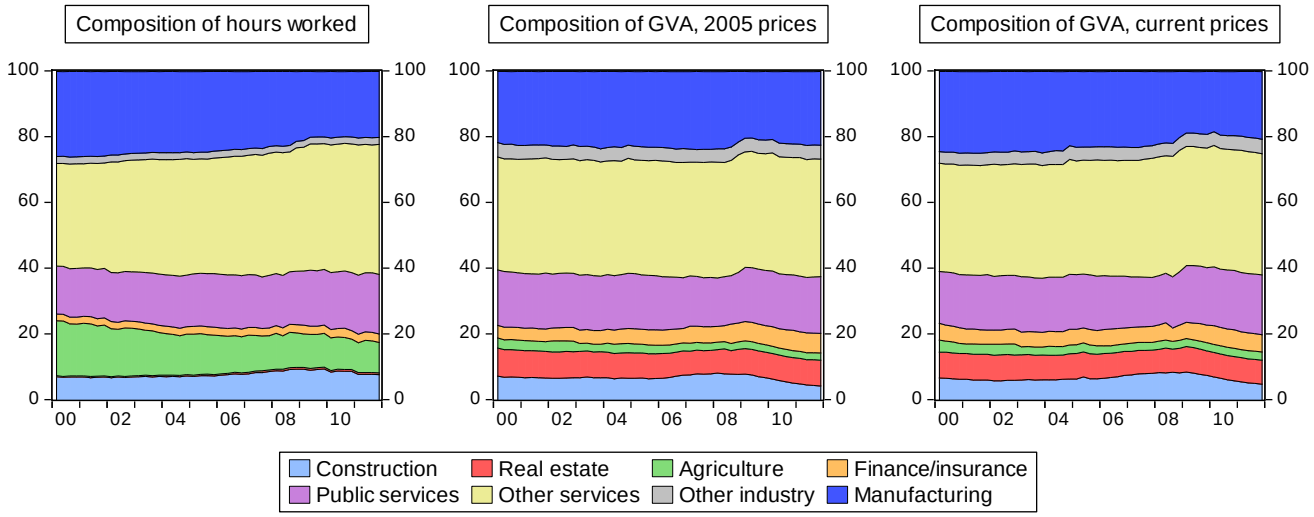
REER-CPI (2008Q1=100)

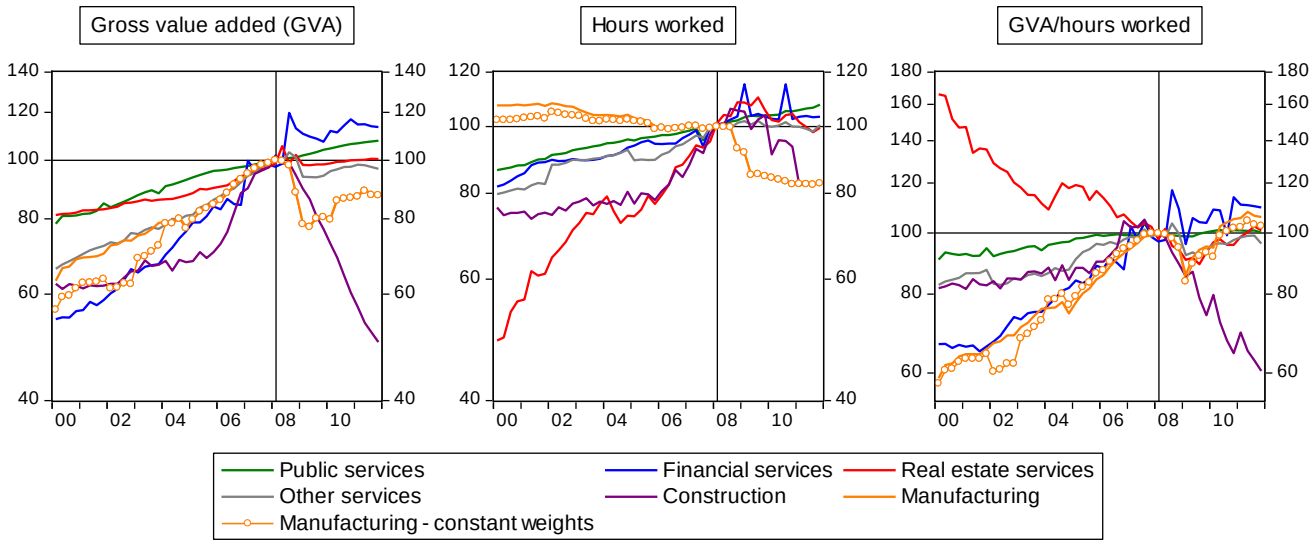


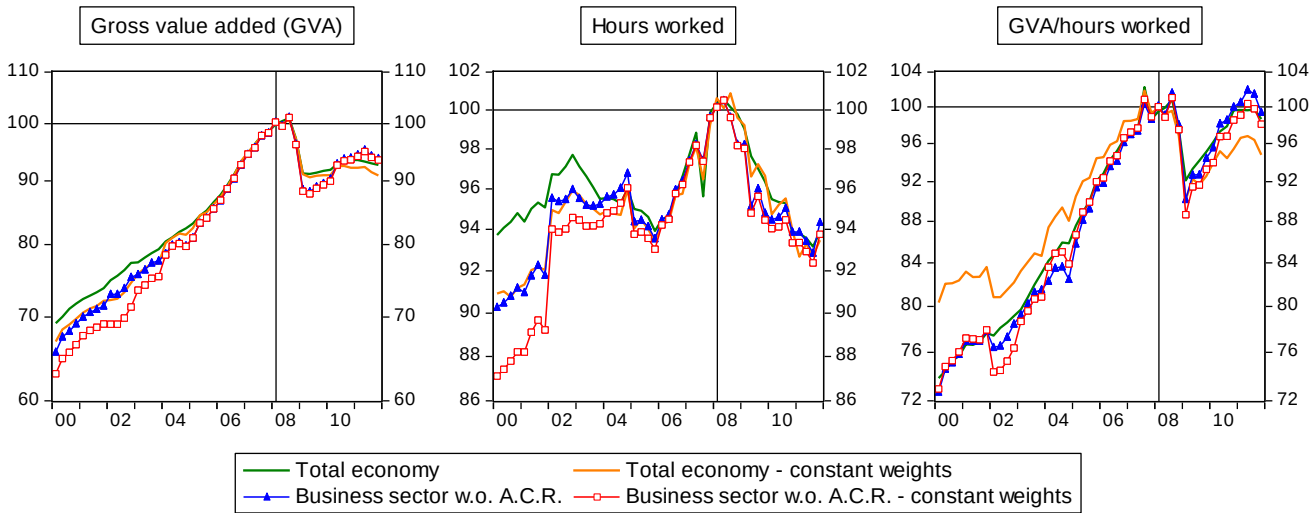
Export, export demand and REER



6.21. Slovenia

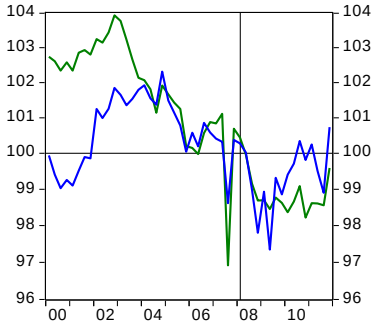




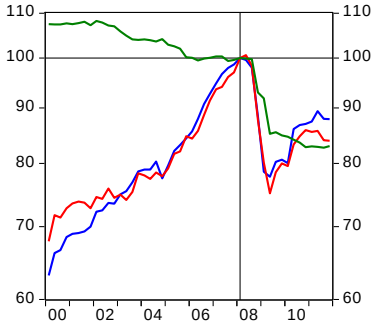


Slovenia, continued

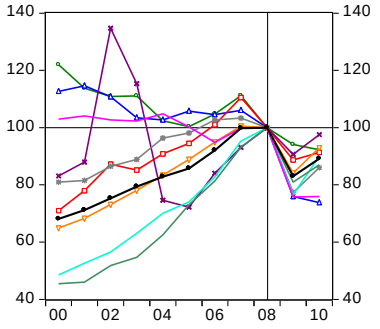
Hours worked/employee (2008Q1=100)



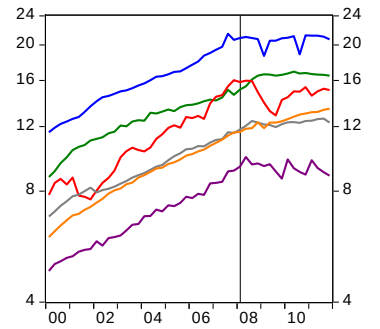
Manufacturing data from different databases (2008Q1=100)



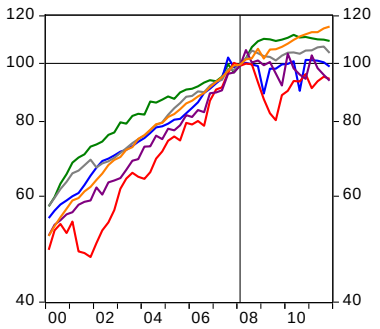
Gross value added in manufacturing sub-sectors



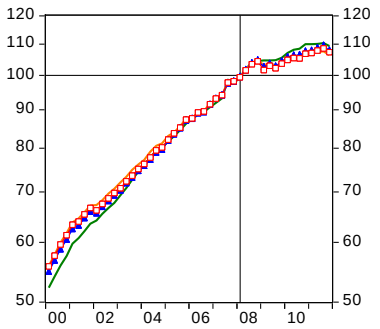
Hourly labour compensation (local currency)



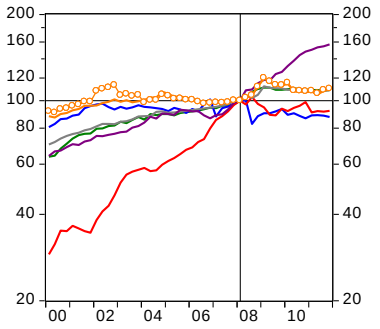
Hourly labour compensation (2008Q1=100)



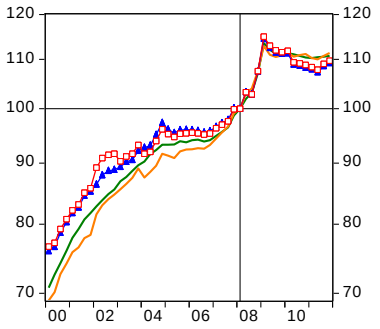
Hourly labour compensation (2008Q1=100)



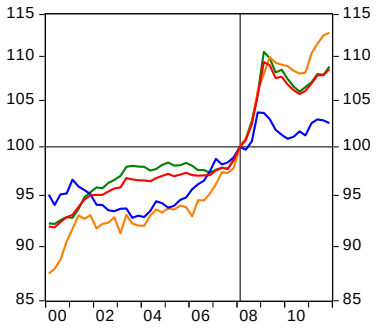
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

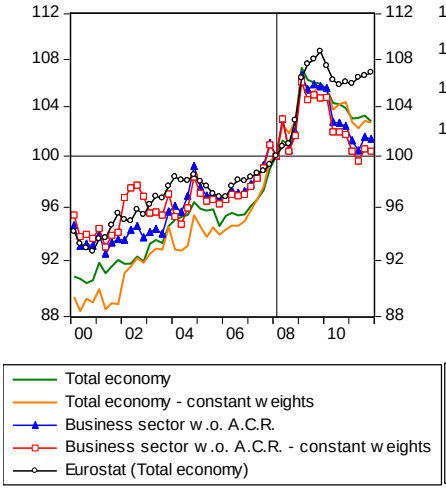


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

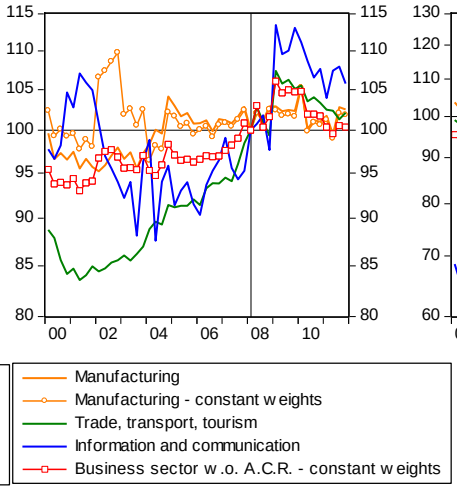


Slovenia, continued 2

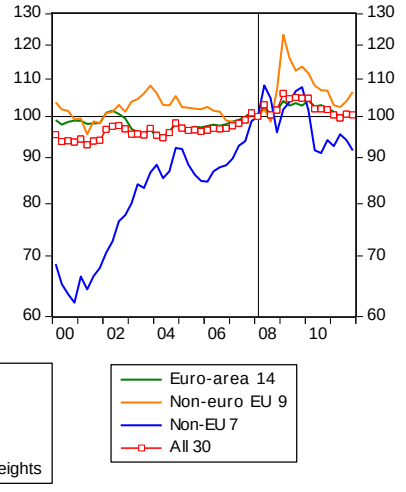
REER-ULC - aggregates (2008Q1=100)



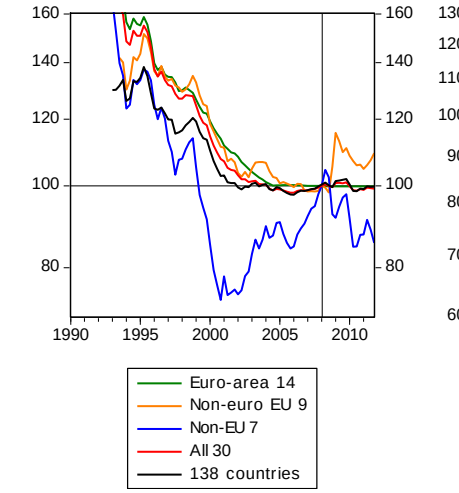
REER-ULC - sectors (2008Q1=100)



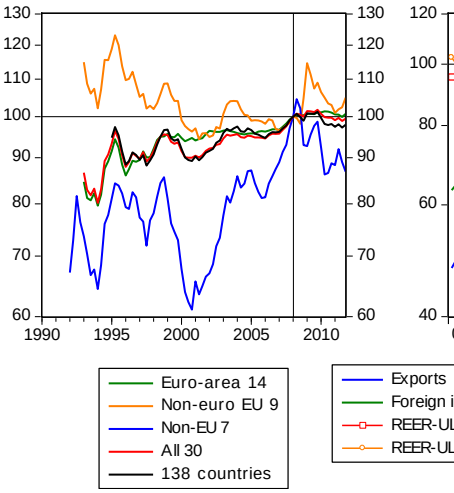
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



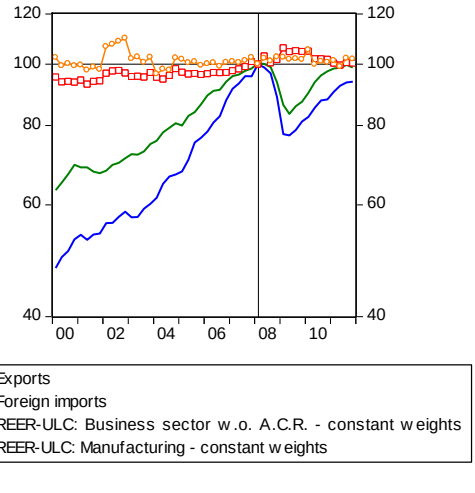
NEER (2008Q1=100)



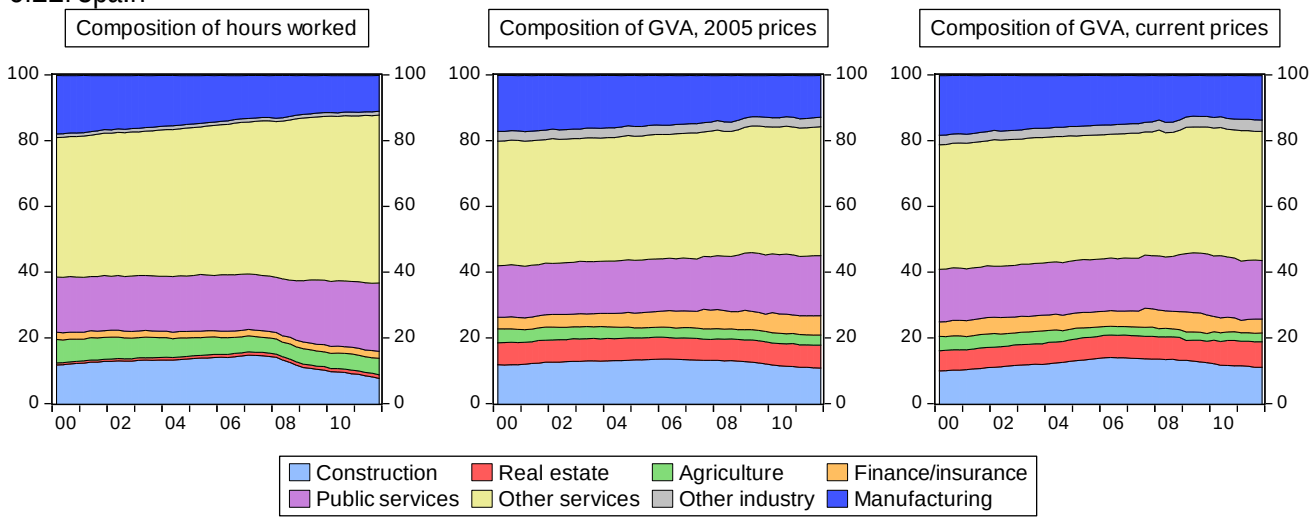
REER-CPI (2008Q1=100)

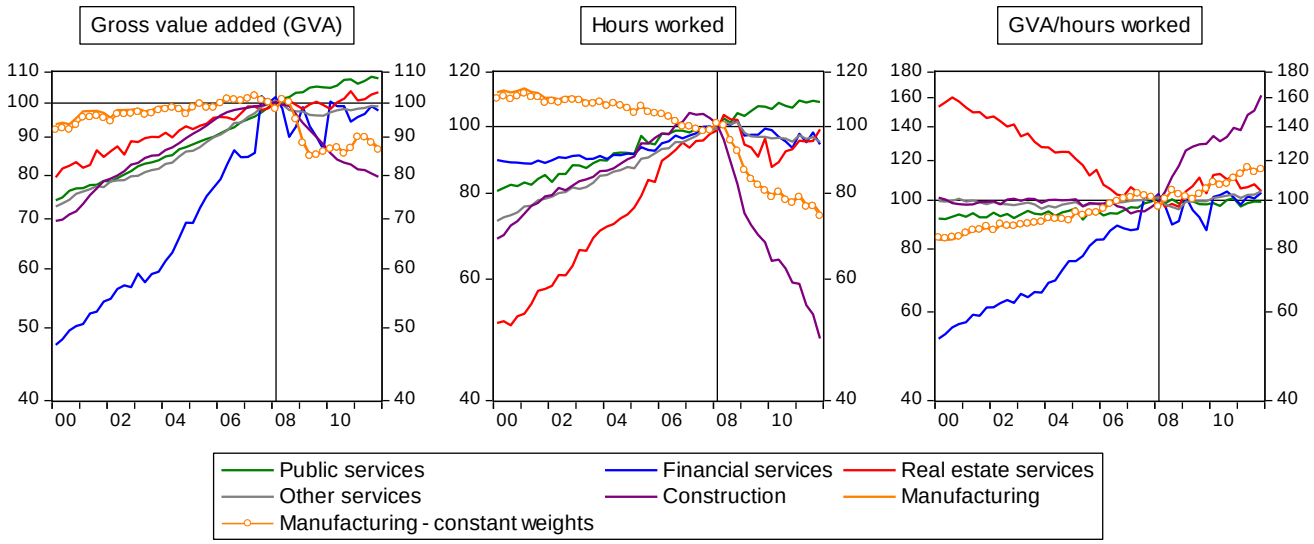


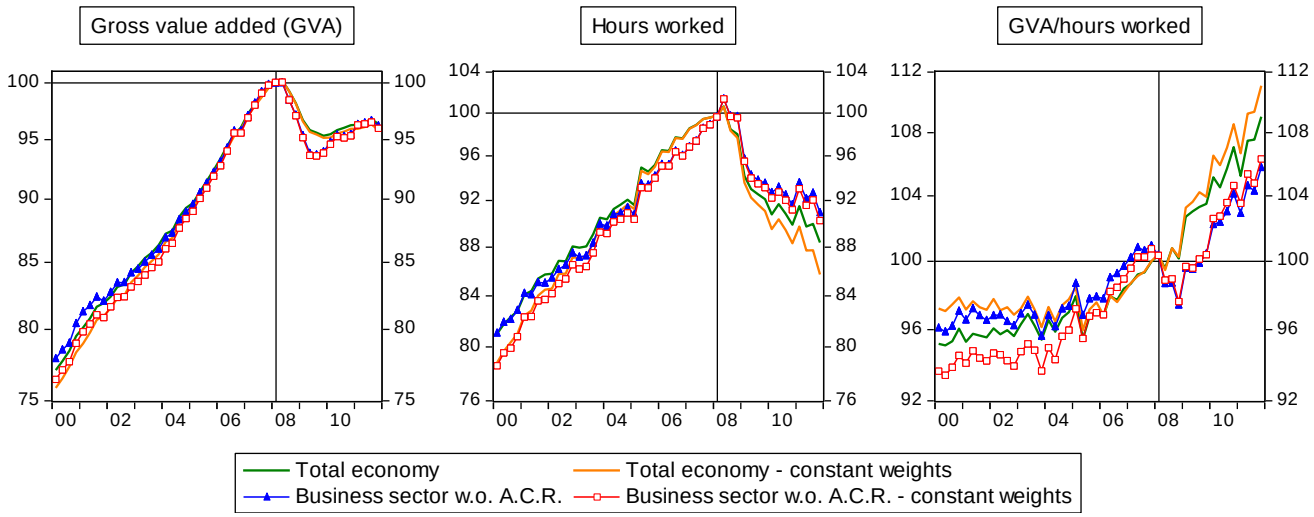
Export, export demand and REER



6.22. Spain

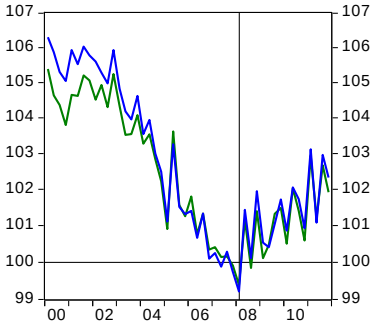

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

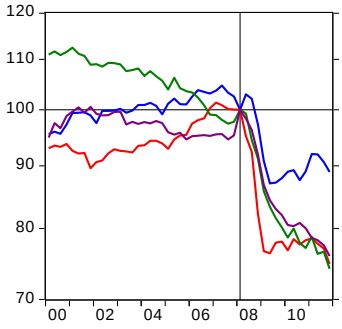

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Spain, continued

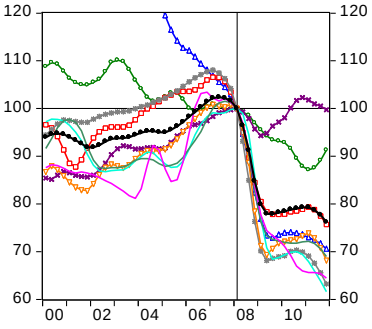
Hours worked/employee (2008Q1=100)



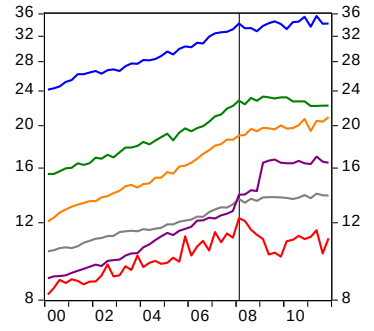
Manufacturing data from different databases (2008Q1=100)



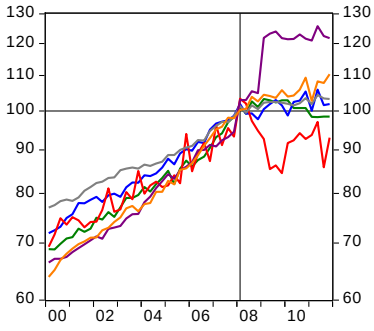
Gross production in manufacturing sub-sectors (2008Q1=100)



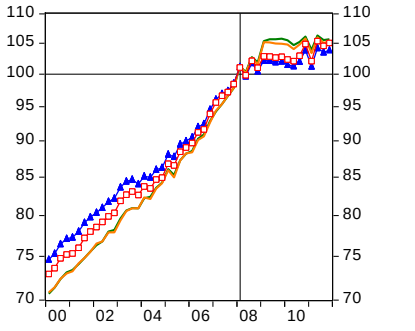
Hourly labour compensation (local currency)



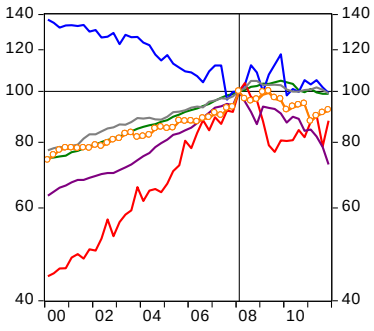
Hourly labour compensation (2008Q1=100)



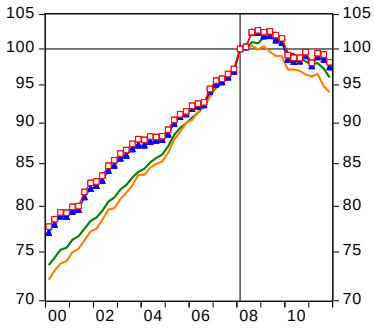
Hourly labour compensation (2008Q1=100)



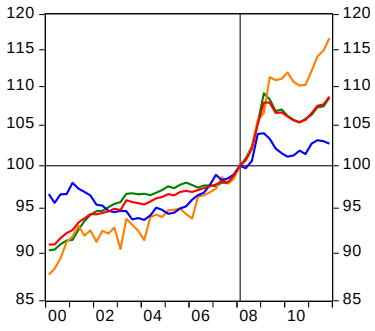
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

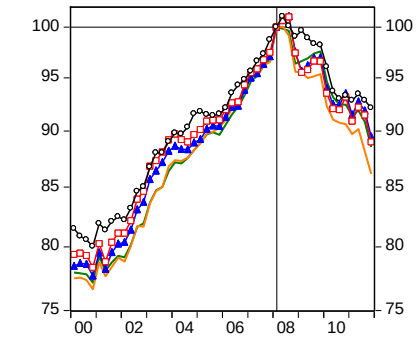


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

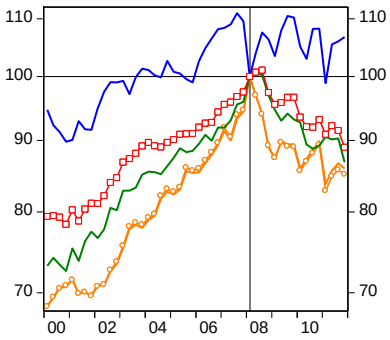


Spain, continued 2

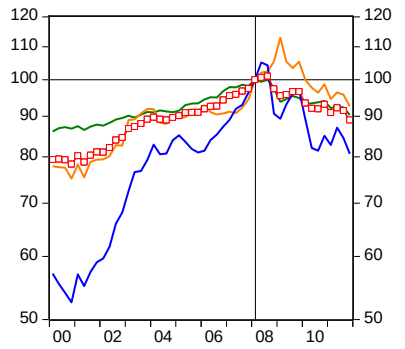
REER-ULC - aggregates (2008Q1=100)



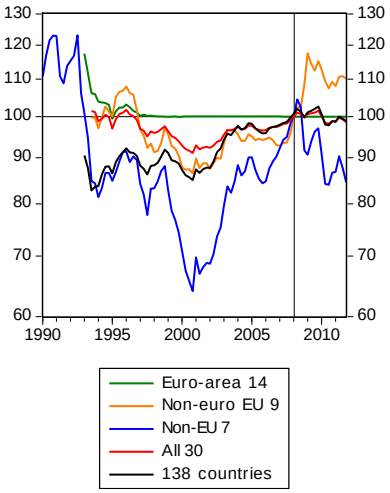
REER-ULC - sectors (2008Q1=100)



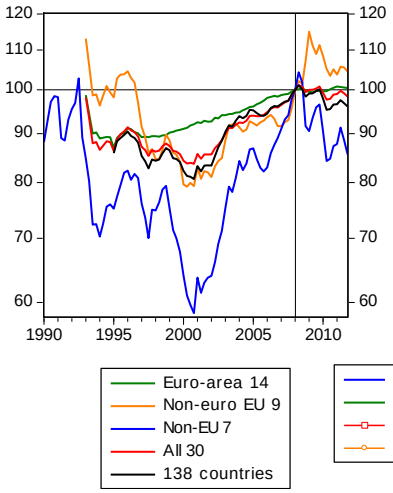
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



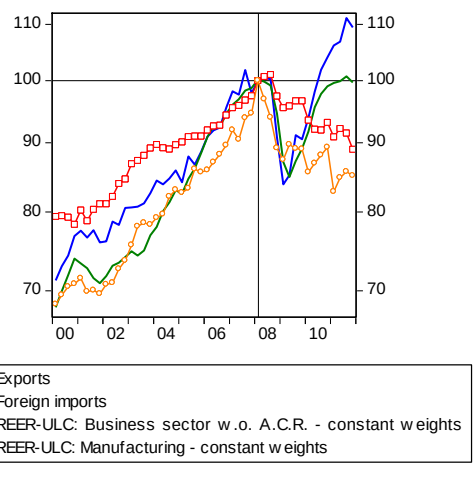
NEER (2008Q1=100)



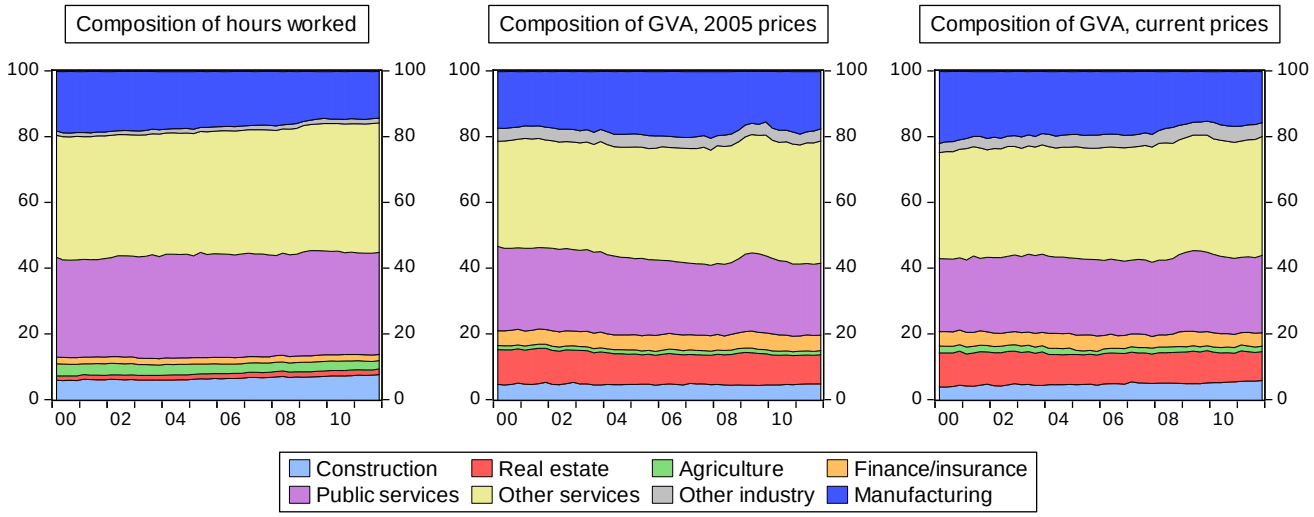
REER-CPI (2008Q1=100)

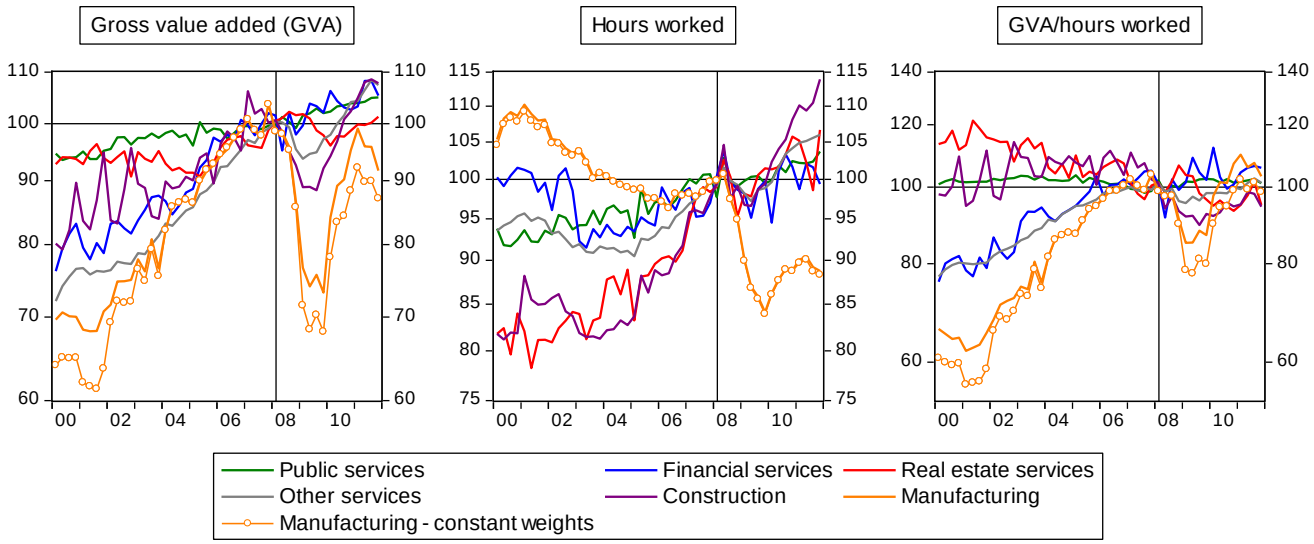


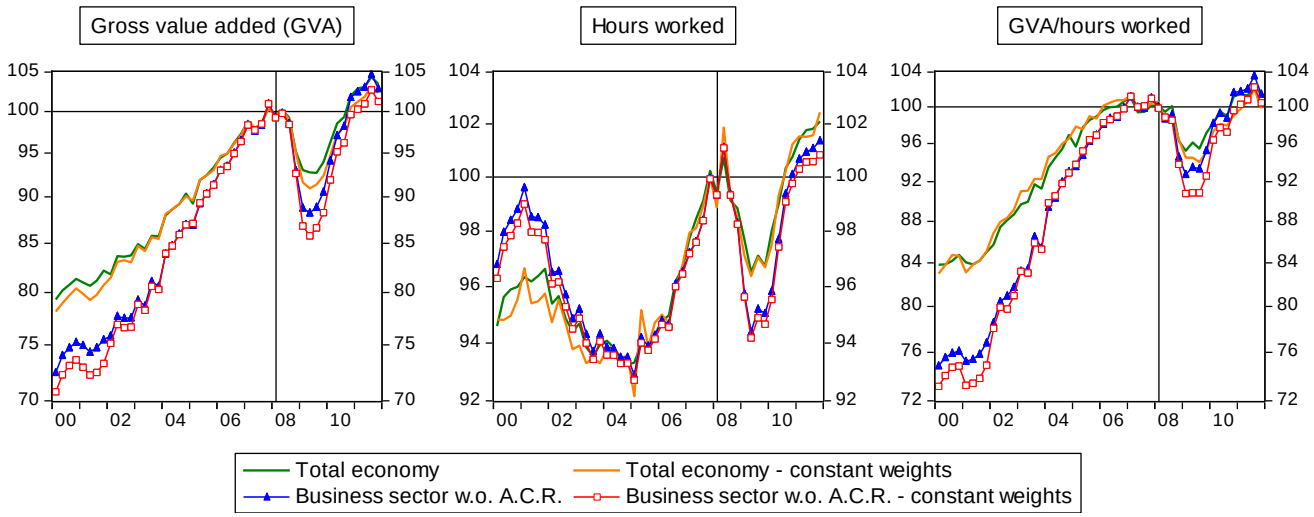
Export, export demand and REER



6.23. Sweden

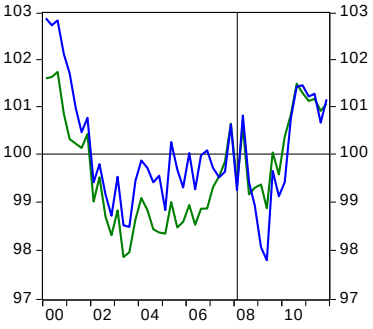

Composition of hours worked
Composition of GVA, 2005 prices
Composition of GVA, current prices
Construction
Real estate
Agriculture
Finance/insurance
Public services
Other services
Other industry
Manufacturing


Gross value added (GVA)
Hours worked
GVA/hours worked
Public services
Financial services
Real estate services
Other services
Construction
Manufacturing
Manufacturing - constant weights

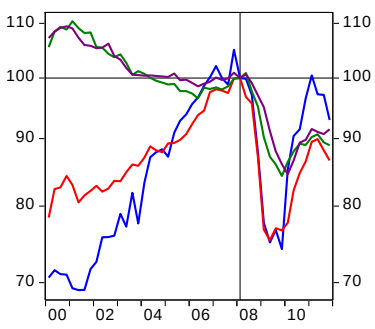

Gross value added (GVA)
Hours worked
GVA/hours worked
Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights

Sweden, continued

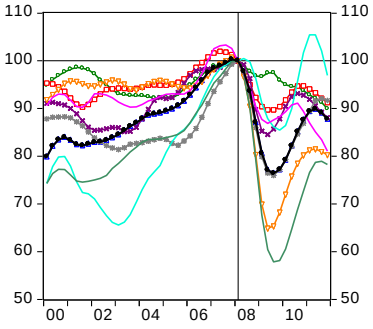
Hours worked/employee (2008Q1=100)



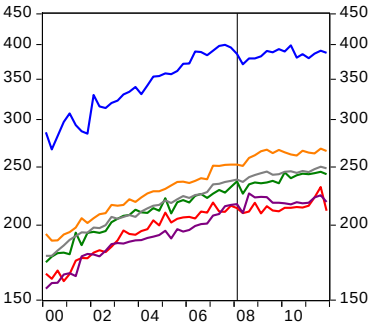
Manufacturing data from different databases (2008Q1=100)



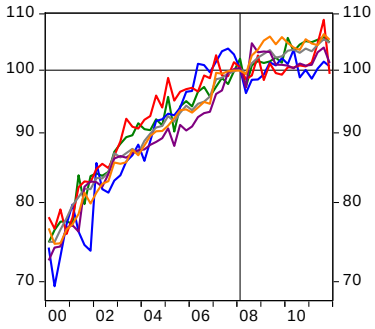
Gross production in manufacturing sub-sectors (2008Q1=100)



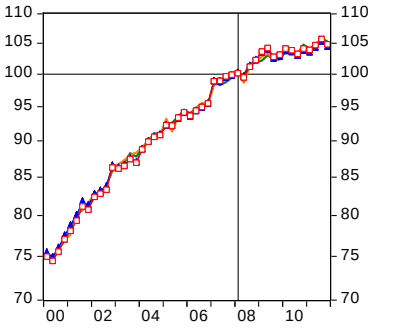
Hourly labour compensation (local currency)



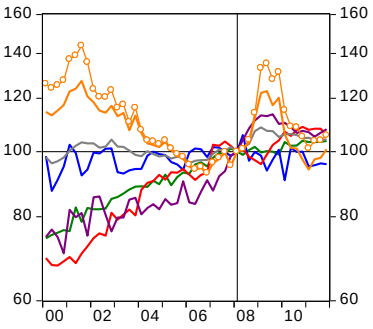
Hourly labour compensation (2008Q1=100)



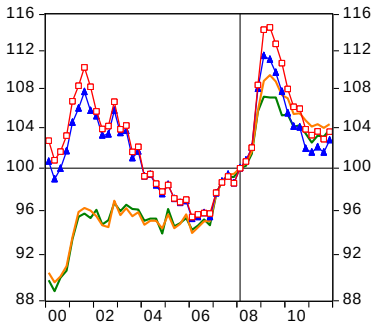
Hourly labour compensation (2008Q1=100)



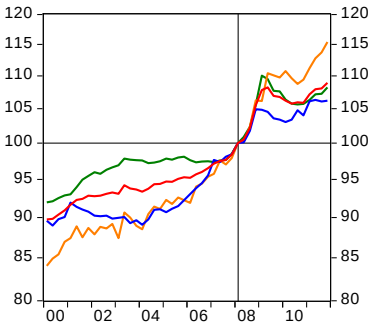
Unit labour costs (2008Q1=100)



Unit labour costs (2008Q1=100)

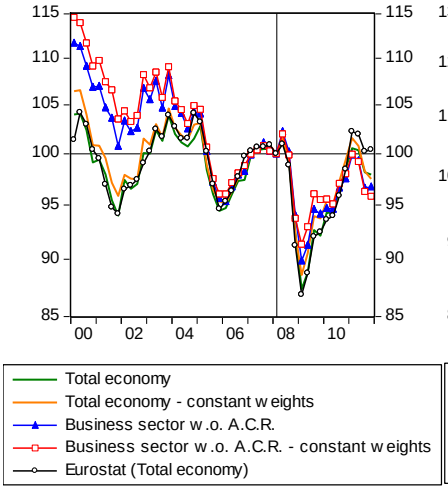


ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

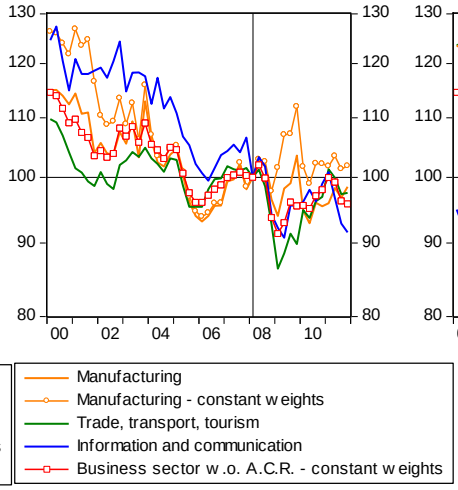


Sweden, continued 2

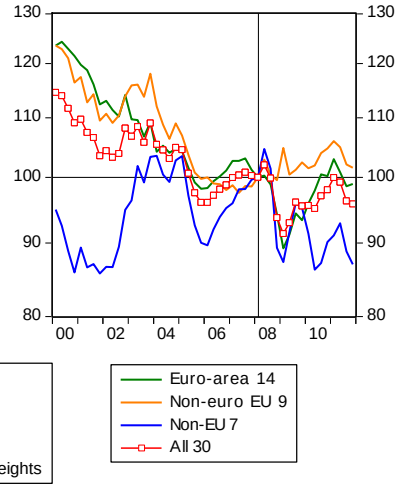
REER-ULC - aggregates (2008Q1=100)



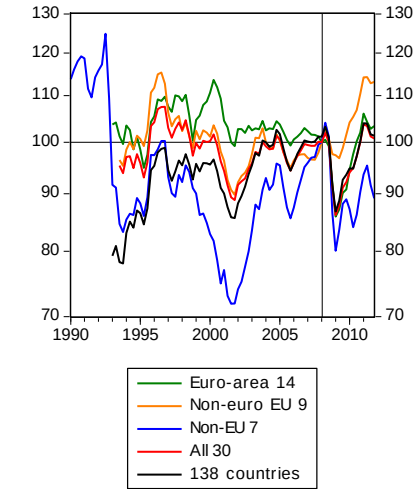
REER-ULC - sectors (2008Q1=100)



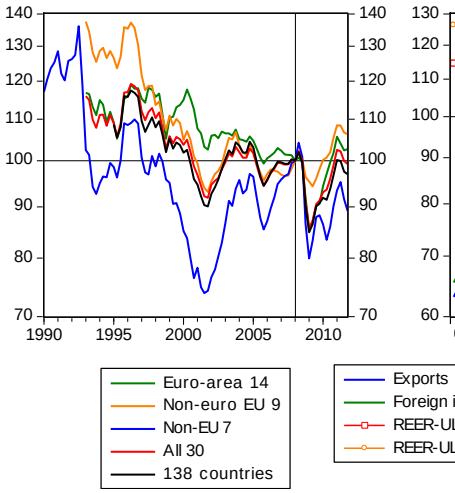
REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights



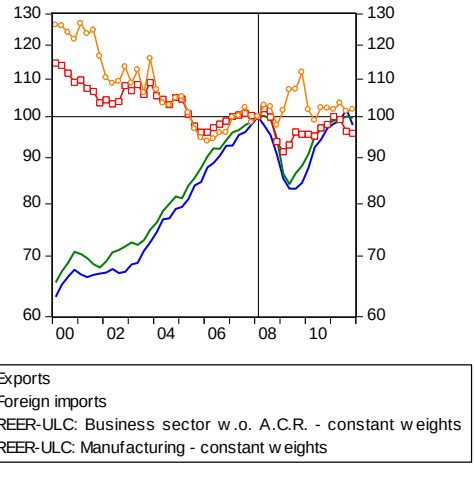
NEER (2008Q1=100)



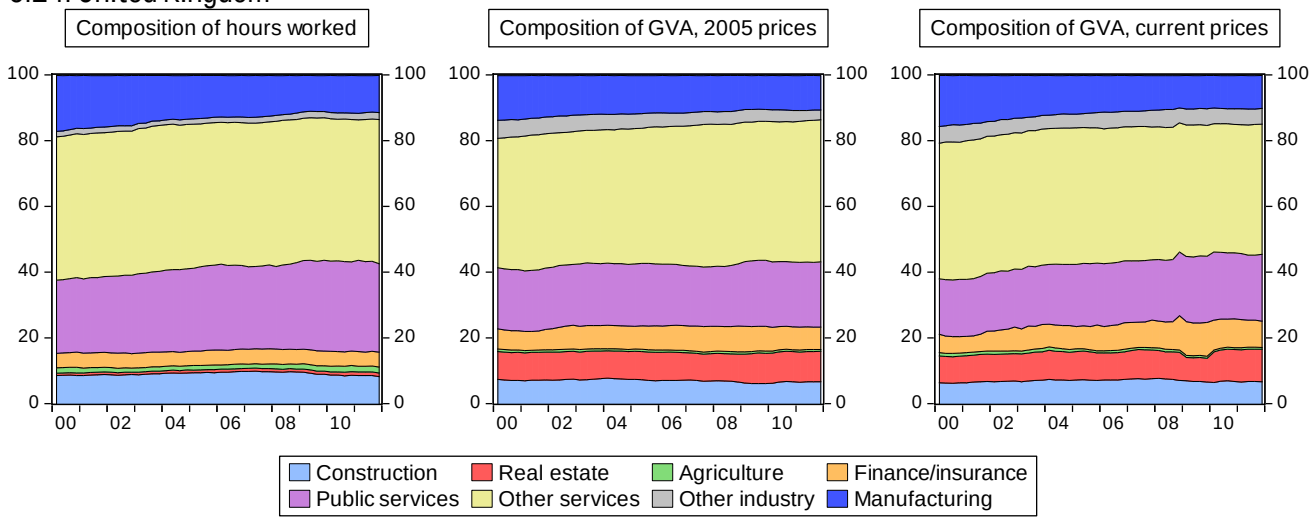
REER-CPI (2008Q1=100)

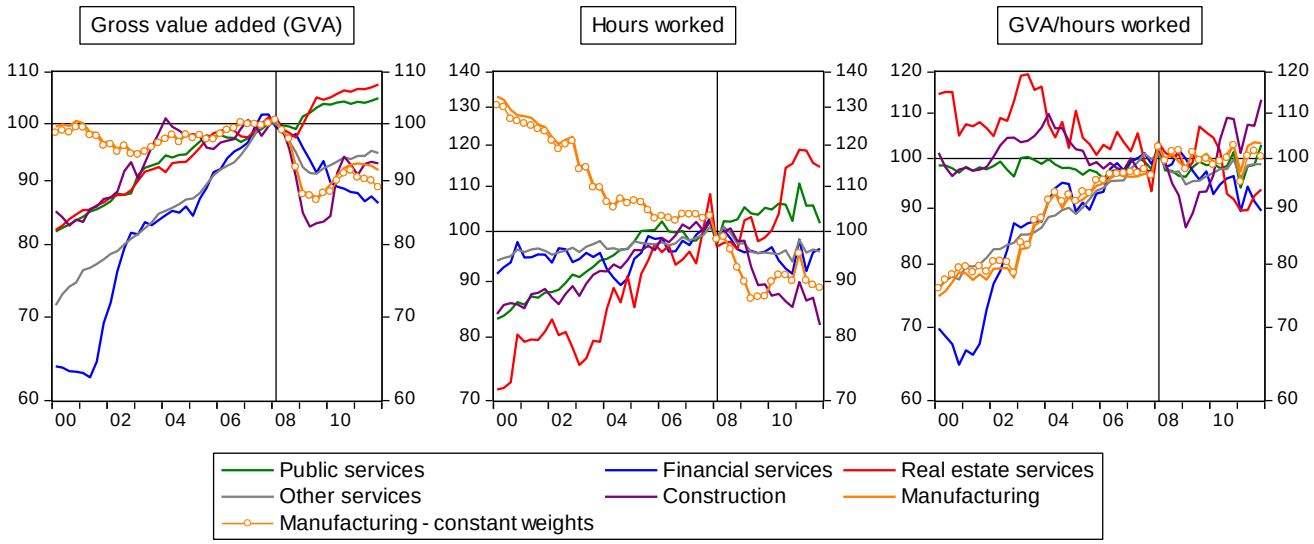


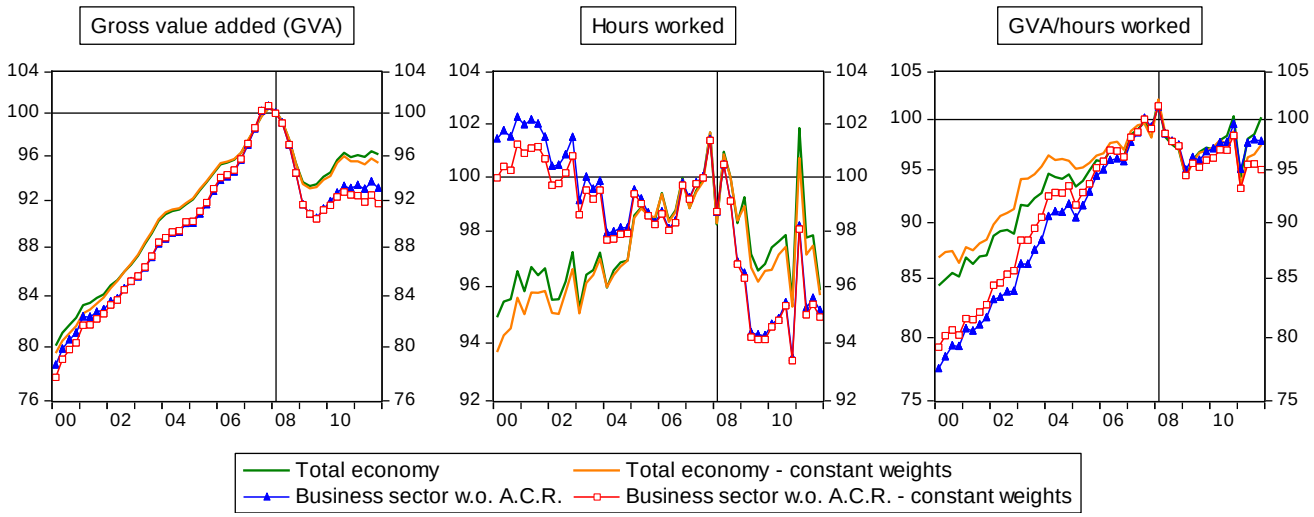
Export, export demand and REER



6.24. United Kingdom

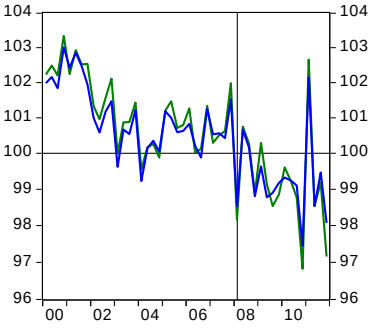




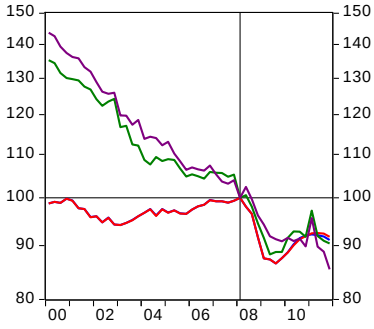


United Kingdom, continued

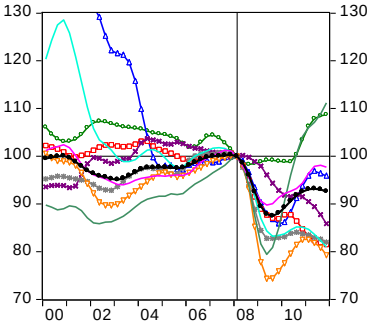
Hours worked/employee (2008Q1=100)



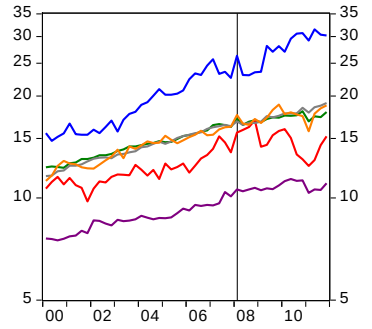
Manufacturing data from different databases (2008Q1=100)



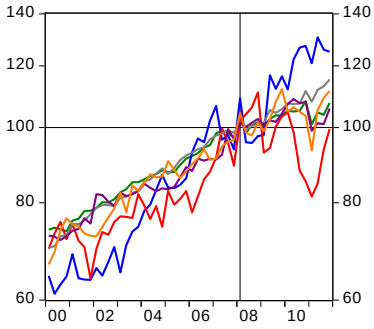
Gross production in manufacturing sub-sectors (2008Q1=100)



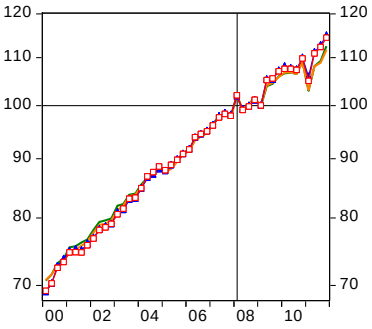
Hourly labour compensation (local currency)



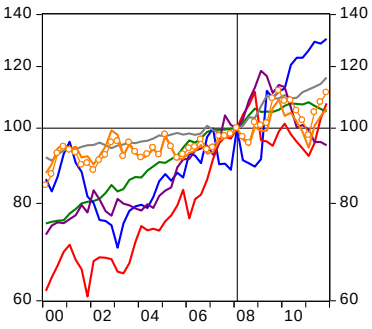
Hourly labour compensation (2008Q1=100)



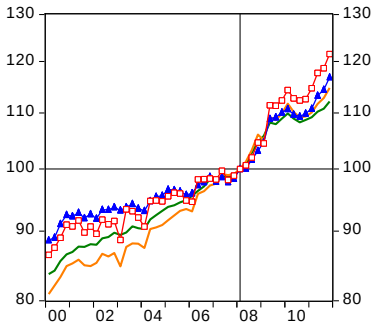
Hourly labour compensation (2008Q1=100)



Unit labour costs (2008Q1=100)



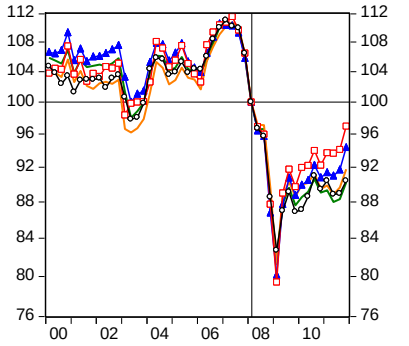
Unit labour costs (2008Q1=100)



ULC of trading partners Bus.sec.w.o. A.C.R. - const.w. (2008Q1=100)

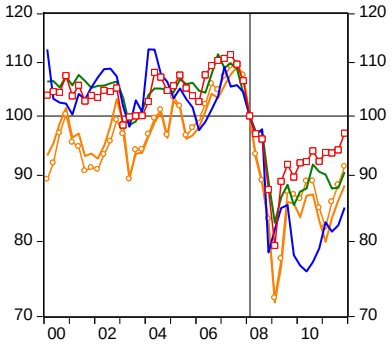
United Kingdom, continued 2

REER-ULC - aggregates (2008Q1=100)



Total economy
Total economy - constant weights
Business sector w.o. A.C.R.
Business sector w.o. A.C.R. - constant weights
Eurostat (Total economy)

REER-ULC - sectors (2008Q1=100)

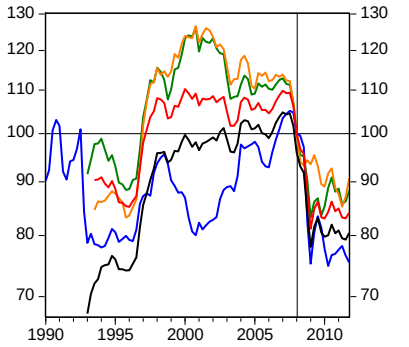


Manufacturing
Manufacturing - constant weights
Trade, transport, tourism
Information and communication
Business sector w.o. A.C.R. - constant weights

REER-ULC - trading partners (2008Q1=100)
Bus.sec. w.o. A.C.R. - constant weights

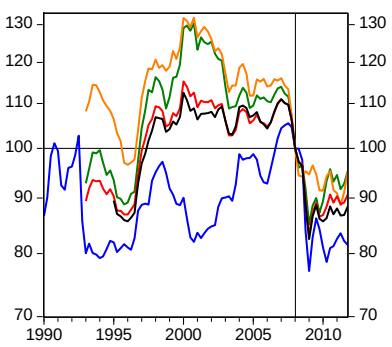
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30

NEER (2008Q1=100)



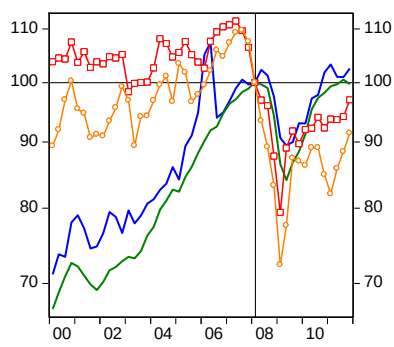
Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

REER-CPI (2008Q1=100)



Euro-area 14
Non-euro EU 9
Non-EU 7
All 30
138 countries

Export, export demand and REER



Exports
Foreign imports
REER-ULC: Business sector w.o. A.C.R. - constant weights
REER-ULC: Manufacturing - constant weights

7. Data sources and manipulations

Data for 11 main sectors of the economy[4]

For the list of the 11 sectors, see Table 1 in Darvas (2012b). We collected data from the online database of Eurostat for:

- gross added value at constant 2005 prices (our output measure),
- gross added value at current prices,
- total labour compensation in national currency,
- total hours worked (our labour input measure),
- number of employed people.

The sample period covers 2000Q1-2011Q4 for all countries but Romania, for which sectoral data is available from 2008. Seasonally adjusted data is available for almost all countries, except a few time series of Greece, Hungary, Romania and Sweden that we adjusted seasonally using X12.

In the case of Lithuania, seasonally adjusted hours worked data contained some obvious errors (eg the value of the seasonally adjusted series was about 10-times the value of the non-adjusted series in several quarters). Therefore we used the non-adjusted series and adjusted seasonally these times series using X12 by ourselves.

For most EU countries and Norway, all data were available at the quarterly level for at least the 2000Q1-2011Q4 period, but for the following countries there were some gaps in the data.

Filling gaps in the quarterly national accounts database for the 11 main sectors

For Belgium the hours worked series was not available at Eurostat, but was available at the National Bank of Belgium online statistical database.

For Belgium and Bulgaria manufacturing data is missing for all variables at Eurostat, but data for industry (excluding construction) is available. However, in the AMECO annual data, the data is available separately for the manufacturing sector for four of the five variables we collected: constant price gross value added, current price gross value added, labour compensation and employment. For Belgium AMECO data ends in 2011, but for Bulgaria the manufacturing sector data is available till 2010. We calculated the share of manufacturing in industry and we assumed that in Bulgaria the 2009-2010 trend of the share of manufacturing continued in 2011. We then converted the shares (of both Belgium and Bulgaria) to quarterly frequency using a cubic spline and multiplied the available industry data with these shares to approximate manufacturing data. For hours worked we assumed that the ratio is the same as in employment.

[4] Eurostat indicates '10 branches' (ie sectors) in the name of the database, but the 10 sectors include 'Industry (except construction)' and do not include manufacturing separately, for which data is also reported and is part of 'Industry (except construction)'. We separate manufacturing and 'Industry (except manufacturing and construction)' so we have 11 sectors.

For Greece and Norway quarterly hours worked were not available. Quarterly employment was available, as well as annual hours worked and employment. We have calculated the ratio of annual hours worked over employment and converted these ratios to the quarterly frequency using a cubic spline. Then we multiplied the quarterly employment figures with the one-fourth of these "quarterlised" annual ratios, in order to approximate hours worked at the quarterly level.

Employment data for the Greek real estate sector (both at the quarterly and annual frequencies) and hours worked (which is available at the annual frequency only) had rather strange patterns. Eg employment increased by 66 percent from 2001 to 2002, then fell by 33 percent the next year, and then increased by 63 percent the year after. Gross added value did not fluctuate that much and therefore the huge fluctuation in employment could be a data error. To eliminate these unreasonable fluctuations, we use a Hodrick-Prescott filtered trend for the employment and hours worked of the real estate sector of Greece. Since the real estate sector is not included in our preferred aggregate measure (business sector excluding agriculture, construction and real estate activities), the smoothing of labour input of the real estate sector of Greece will not affect our main results.

For Latvia, gross added value data is available since 2001 at the quarterly frequency, but annual data is available for earlier years as well. For 2000 we assumed identical quarterly percent changes in each quarter 2000 so that the average annual growth from 2000 to 2001 equals the growth of actual annual data.

For Poland, labour compensation data start in 2001 and hours worked in 2004 at the 11-sector classification (but data for the total economy is available since 1995). Quarterly data on hours worked for the 7-sector classification is available since 2001. Therefore, for 2001-2003 we used the 7-sector classification to match the 11-sector classification. Agriculture, industry, manufacturing, construction and the aggregate of 'Wholesale and retail trade, transport, accommodation and food service activities' are also available separately in the 7-sector classification (similarly to the 11-sector classification), but other services are less disaggregated in the 7-sector classification. For these sectors we assumed that the dynamics of each element of a broader group (eg finance and real estate) follow the dynamics of their aggregate. For 2000, in the case of hours worked and employment, we assumed that sectoral composition is identical to the sectoral composition of the 2001Q1 seasonally adjusted data. For labour compensation, annual data is available for 2000 at the 11-sector classification as well and we assumed identical quarterly percent changes in each quarter 2000 so that the average annual growth from 2000 to 2001 equals the growth of actual annual data.

For Portugal, sectoral labour compensation data are missing at the quarterly frequency (available only for the total economy), but sectoral data are available at the annual frequency up to 2009. Up to 2009 we converted the sectoral annual data to quarterly by assuming that the within-year distribution of labour compensation is the same as the within year distribution of gross added value, which should be a fair approximation. For 2010 and 2011, we assumed that the 2009 ratio of labour compensation to gross added value remained the same and used quarterly sectoral gross added value data to approximate the quarterly sectoral labour compensation, which brings some uncertainty to the approximation. For the total economy, the ratio of labour compensation to gross added value was remarkably stable during our whole sample period (including in 2010-2011), but at the sectoral level there were some changes up to 2009, till data for both indicators are available at the sector level, and hence we cannot exclude that this ratio has also changed in 2010-2011 for certain sectors. Due to these approximations, the sum of the sectoral data slightly deviated from the known total (the

deviation was typically in the range of plus/minus half percent), so we have rescaled the derived sectoral data so that their sum be equal the know total.

For Romania we aim to assemble a complete dataset starting in 2008Q1, because for earlier periods many time series are missing (yet a few of them are available and therefore the country-specific charts in Section 6.19 of this paper show some earlier data as well). Constant price GVA is available from 2000Q1 for the 7- sector classification, which to a large extent overlaps with the 11-sector classification we use (see the notes we made for Poland above). The current price GVA is available for all 11 sectors from 2008Q1. For those sectors for which constant price GVA is not available, we deflated the available current price GVA with the deflator of a sector which may have similar price developments. For example, for the aggregate of sectors R-U (other services, etc. – see Table 1 in Darvas 2012b) we use the deflator of 'Wholesale and retail trade; hotels and restaurants; transport'.

For Slovenia, seasonally adjusted gross added value at 2005 prices is not available for 2000-2001, but a non-adjusted series is available. We therefore adjusted, using X12, the non-adjusted series and extended backwards Eurostat's seasonally adjusted series.

For the United Kingdom, gross added value and total labour compensation are available from Eurostat, but total hours worked are not. The UK's Office for National Statistics has data for employment and average hours worked per week at the sectoral level as well. We have multiplied the number of employees with average hours worked per week and with 13 to get a quarterly measure of total hours worked. The different sources for labour compensation and total hours worked may not make the derived hourly wage level of UK data fully comparable to data of other countries, though the figures are reasonable and the dynamics should not be impacted much by our approximation of the total hours worked.

Data for manufacturing sub-sectors

We highlight that data for the total manufacturing industry is available from the 11-sector decomposition of the economy for all five indicators (see the previous sub-section). In this sub-section we describe data for sub-sectors within manufacturing.

We used two main data sources of Eurostat:

- "Short term business indicators" (for simplicity we call it 'industry database'), which includes quarterly data on gross production, hours worked, employment, and wages for 24 manufacturing sub-sectors (C10, C11, C12, ... and C33). Only indices (2005=100) are available. The latest observation is 2011Q4.
- "Annual national accounts database", which includes data for all five indicators we collected for the 11 main sectors of the economy (see above). Data is available in their natural unit (eg euro, 1000 hours worked, etc). This database decomposes the manufacturing sector into 13 sub-sectors only, which are the combinations of the 24 subsectors available in the industry database: C10-12, C13-15, C16-18, C19, C20, C21, C22-23, C24-25, C26, C27, C28, C29-30, and C31-33. The latest observation is 2010 for most countries, but there are some gaps.

In order to be consistent with the 11- sector data, we use constant price gross added value as the output measure for manufacturing sub-sectors as well. Therefore, we use 13 sub-sectoral decomposition for which at

least annual data is available and use data from the quarterly industry database to approximate the within-year developments (whenever annual data is available) and also use quarterly data from the industry database to approximate these sub-sectoral data for those years (eg 2011) for which even annual data is missing. Our principles for these approximations are:

1. Matching: we match the 24 sub-sectors of the industry database with the 13 sub-sectors of the national accounts database. Since we do not have sub-sectoral weights at the 24 sub-sectoral level, we simply assume equal weights for the sub-sectoral aggregates of the 13 sub-sectoral classification, eg we approximate the aggregate of C10-13 as the equally-weighted average of C10, C11 and C12.
2. "Quarterising": for the period for which annual constant price gross added value is available for manufacturing sub-sectors (2000-2010 for most countries) we use the within-year development of gross production to approximate the within-year development of gross added value.
3. Projecting: for those years for which constant price gross added value is not available (2011 for most countries), we chain gross production to the "quarterised" gross added value and then rescale these projected sub-sectoral series so that their sum be equal the known manufacturing total data. (ie: we calculate the sum of gross added value of the 13 manufacturing subsectors, calculate the ratio of actual manufacturing total to the sum of the approximated sub-sectors, and scale the approximated sub-sectoral data with this ratio).

Similarly, we use hourly labour compensation as the labour cost measure for the manufacturing sub-sectors in order to be consistent with our data for the 11 main sectors of the economy. We follow the same procedure as described above using quarterly wage indexes from the industry database.

Filling gaps of the quarterly industry database for manufacturing sub-sectors

Data for some sub-sectors are missing in the industry database. This is not a major concern, because we use data from the industry database primarily to approximate the within-year developments of national accounts data. Therefore even if the approximation is not correct, this does not impact the medium term (ie over one year) movement of the indicators. Yet we tried to fill the gaps in the industry database as well.

In a number of cases data was not available for one sub-sector of the three sub-sectors which form an aggregate in the national accounts database. For example, the sub-sectors C10 (Manufacture of food products), C11 (Manufacture of beverages) and C12 (Manufacture of tobacco products) form an aggregate in the national accounts database. For some countries data was not available for C12 and therefore we used the average of C10 and C11 only (Austria, Czech Republic, Estonia, Ireland, Italy, Latvia, Lithuania and Sweden). We followed a similar procedure for other sub-sectoral aggregates.

Whenever data was not available for a sector which is in itself (without further aggregation) included in the annual national accounts database, then we used data for total manufacturing instead. For example, data for sub-sector C19 (Manufacture of coke and refined petroleum products) was missing for Bulgaria, Denmark, Finland, Ireland, Latvia, Lithuania and Norway.

For Hungary only production was available in the database of Eurostat and we collected employment data from Central Statistical Office of Hungary. The within-year movements of hours worked and labour compensation was approximated with the within-year movements of employment.

For Slovakia and Slovenia the only indicator in the database of Eurostat is total manufacturing gross production that we used to approximate the within-year developments of all indicators of all sub-sectors. For Step 3 above (Projecting) we therefore could not rely on sub-sectoral data and therefore we had to assume that there were no further compositional changes within the manufacturing industry of these two countries in 2011.

Filling gaps of the annual national accounts database for manufacturing sub-sectors

Belgium: for 2000 gross added value, labour compensation and hours worked are missing (available from 2001). We worked back from the corresponding indicators of the industry database (gross production, wages and hours worked) to approximate the missing values in 2000.

Bulgaria: no national accounts data is available, but data from industry database is available for all sub-sectors. For 2005 we take the composition of the EU13 national accounts data.[5] For later and earlier years we use data from the industry database to approximate the missing annual national accounts series, yet we always normalise the resulting series so that the sum of approximated data equals the actual manufacturing total. The first approximation (the use of 2005 data from EU13) may carry a significant error, but second (the use of data from the industry database) may not increase much the approximation error in our view.

For the Czech Republic the constant price GVA data for sub-sector C19 (Manufacture of coke and refined petroleum products) has negative values in 1995-2004 (eg -14.9 percent of total manufacturing in 2001) and very large positive values toward the end of the sample (eg 20.5% of total manufacturing in 2010), which likely reflect data errors. For Denmark the constant price GVA for sub-sector C19 also has a negative figure for 2002 (albeit quite small, -0.1 percent of total manufacturing). But for both countries the current price GVA figures look reasonable (eg the share of sub-sector C19 in total manufacturing varies between plus 0.3 percent and 1.7 percent in the case of the Czech Republic). We therefore assume that the share of sub-sector C19 in constant price GVA is the same as its share in current price GVA.

Germany, Portugal and Sweden: Annual national accounts data end either in 2009 (Germany and Portugal), or the 2010 data includes some obvious errors (Sweden: added value of sector C19 increases 10-fold from 2009 to 2010 and C20 data is not available for 2010). For these three countries we approximated 2010 data in a similar way as we approximated the 2011 data for most countries.

Estonia: hours worked is missing only for sub-sectors C19 (Manufacture of coke and refined petroleum products) and C21 (Manufacture of basic pharmaceutical products and pharmaceutical preparations) for the full period and for C29-30 (Manufacture of motor vehicles, trailers and semi-trailers; and Manufacture of other transport equipment) for 2000-2003. Data for total manufacturing and for other sub-sectors is available and hence we can calculate the sum of these missing sectors. We divide this sum across C19, C21 and C29-30 by

[5] EU13 is the aggregate of the 13 EU countries for which all national accounts data (added value, hours worked, labour compensation, employment) is available for 2005. The share of these 13 countries is 66 percent in EU27 output.

assuming that the distribution is the same as the distribution of labour compensation among these two or three sectors.

Ireland: constant price gross value added is not available. For 2005 we use current price gross value added (note that Eurostat reports constant price gross value added at 2005 prices and therefore constant and current price gross value added are equal for 2005 for all countries). For later and earlier years we use gross industrial production to approximate gross value added, and then re-scale the resulting approximated series do that their sum be equal the available manufacturing total. Note that gross value added and gross production diverged significantly after 2008 (see Darvas 2012b for possible explanations). Since gross value added grew by about a cumulative 25 percent more than gross production from 2008Q1 to 2011Q4, our procedure implicitly "scales up" gross production data with this divergence. If the divergence between gross value added and gross production varies across sub-sectors then then our approximation is poor. Unfortunately, the non-publication of sub-sectoral deflators prevents us from making a better approximation. Data on sub-sectoral hours worked is also missing, but employment is available. We therefore assume that the distribution of total manufacturing hours worked (which is available) is the same as the distribution of total manufacturing employment.

Spain: constant price gross value added is missing for 2000 that we approximated using gross industrial production (ensuring that the sum of the approximated sub-sectoral data equals the available data on total manufacturing).

France: data on hours worked and labour compensation is missing for 8 sub-sectors, but we can calculate their sum, since data for total manufacturing and for the other 5 sub-sectors is available. Employment is available for all 13 sub-sectors. We assume that the distribution of hours worked across these 8 sub-sectors is the same as the distribution of employment among these sub-sectors. For labour compensation we use wages from the industry database to approximate the values of the national accounts data (ensuring that the sum of the approximated sub-sectoral data equals the available data on total manufacturing).

Latvia: labour compensation is missing for 5 subsectors up to 2008 and for 6 subsectors in 2009-2010, but data for total manufacturing and the other sub-sectors is available, so we can derive the sum of values of the missing sub-sectors. Hours worked is available for all 13 sub-sectors. For 2005 we assume that the distribution of labour compensation within the aggregate of the 5 sub-sectors for which data is missing is the same as the distribution of hours worked among the same sub-sectors. For earlier and later years we use the wage indexes of the industry database (ensuring that the sum of the approximated sub-sectoral data equals the available data on total manufacturing). Current price gross value added is also missing for 5 sub-sectors up to 2008 and 6 sub-sectors in 2009-2010. Employment data is available for all 13 sub-sectors. We assume that the current price gross value added/employment ratio is similarly distributed in Latvia to the distribution in the EU27. Constant price gross value added data is also not available for manufacturing sub-sectors. For 2005 we use the current price gross value and for later and earlier years we use industrial production volume to track constant price GVA (ensuring that the sum of the approximated sub-sectoral data equals the available data on total manufacturing).

Lithuania: data for sub-sector C19 (Manufacture of coke and refined petroleum products) is missing, but data for total manufacturing and all other sub-sectors is available. We therefore calculate data for sector C19 as the residual (total minus the sum of other sub-sectors).

Hungary: data for hours worked is not available for sub-sectors, but employment is. We assume that the distribution of manufacturing hours worked across sub-sectors is the same as the distribution of employment.[6]

Poland: constant price gross value added is missing for 2000 and therefore we use industrial output to approximate values for this year (ensuring that the sum of the approximated sub-sectoral data equals the available data on total manufacturing). Sub-sectoral data on employment and hours worked are also missing. We assume that the current price GVA/employment ratio is similarly distributed in Poland to the distribution in the EU27. For hours worked we assume that the distribution of hours worked within manufacturing is the same as the distribution of employment.

Romania: only data for current price GVA, labour compensation and employment is available and only for 2008-2009. (Note that we anyway use Romania data only from 2008Q1.) For 2008 we take the current price GVA as the starting point for constant price GVA (ie we use data in 2008 prices) and use industrial production data for later years to approximate volume changes. For 2010-11 labour compensation data we use the wage index from the industry database. For 2010-11 employment data we use the employment index from the industry database. For hours worked we assume that the sub-sectoral distribution is the same as the sub-sectoral distribution of employment. For all variables, again, we rescaled the approximated figures so that the sum of the approximated sub-sectoral data equals the available data on total manufacturing.

United Kingdom: Eurostat does not publish manufacturing sub-sectoral data for the UK. The UK Office for National Statistics provided us data on hours worked and employment for manufacturing sub-sectors aggregated into 10 aggregates (even at the quarterly frequency) for 1994-2011 and volume change in GVA for 13 subsectors (annual) for 2007-2011. To approximate current price GV we assume that the current price GVA /hours worked ratio is similarly distributed in the UK to the distribution in the EU27. For the constant price GVA take the 2007 current price GVA as the starting point (ie we use data in 2007 prices) and use the volume index of GVA for 2008-2011. Before 2007 we use industrial production as a proxy. For labour compensation we assume that for 2007 the labour compensation/hours worked ratio is similarly distributed in the UK to the distribution in the EU13.[7] For earlier and later years we use wages from the industry database. For all variables, again, we rescaled the approximated figures so that the sum of the approximated sub-sectoral data equals the available data on total manufacturing.

Norway: hours worked is not available at the sub-sectoral level, but employment is. We assume that the distribution of sub-sectors within total manufacturing is the same in hours worked and in employment.

Sectoral data for six non-EU countries

For Australia, Canada, Japan, Korea, New Zealand, and the United States we use sectoral unit labour cost data from the OECD. Unfortunately, the OECD does not publish the components of ULCs and we could not collect

[6] We note that in the case of Hungary, the large compositional effect on productivity and REER is the result of an unusual development of a single manufacturing sub-sector, C29 (Manufacture of machinery and equipment not elsewhere classified). The added value at constant prices grew by a cumulative 179% between 2008 and 2010, raising the share of this sector from 5 percent of manufacturing added value to 17 percent, according to the available statistical data. Employment in this sector has even declined, by 11 percent, during this period. The Central Statistical Office of Hungary confirmed that the numbers are correct, yet the 2010 numbers are preliminary and may change.

[7] See the previous footnote on the definition of EU13.

these either from the national statistical offices, or central banks, of these countries (except New Zealand). In addition to the total economy, the OECD published sectoral unit labour costs for Manufacturing (D), Industry (C_E), Construction (F), Trade, transport and communication (G_I), Financial and business services (J_K), Market services (G_K), and business sector excl. agriculture (C_K), which overlaps with the 11-brach decomposition of the Eurostat, but not perfectly. Therefore, we matched these OECD sectors with our 11 sectors. To match our aggregate of 'business sector excluding agriculture, construction, and real estate activates', we used OECD's 'business sector excl. agriculture' and cleaned it from construction, assuming that construction has a six percent (constant) share.

We could not collect quarterly sub-sectoral manufacturing data for these countries and therefore we are unable to calculate the compositional effect within the manufacturing industry.

Exchange rates

We collected exchange rate against the euro from Eurostat. For euro-area members exchange rates are not available (which is obviously needed only for the period prior to their entry to the euro area), but Eurostat publishes certain variables, such as gross added value at current prices, both in national currency and in euros, which we used to derive the exchange rate.

Weights for the NEERs and REERs

Similarly to Darvas (2012a), we derive the weights of trading partners for the REER calculations on the basis of Bayoumi, Lee and Jaewoo (2006).

Export and imports volume

Exports and imports volume data correspond to goods and services from the quarterly national accounts database and were taken from Eurostat (for all EU and some other OECD countries), from the OECD (for the remaining OECD countries), and from Statistics Committee of Ukraine (for Ukraine).

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