



PORTABLE DYME FOR LATVIA'S ECONOMY

Astra Auziņa-Emsiņa,
Riga Technical University, Latvia

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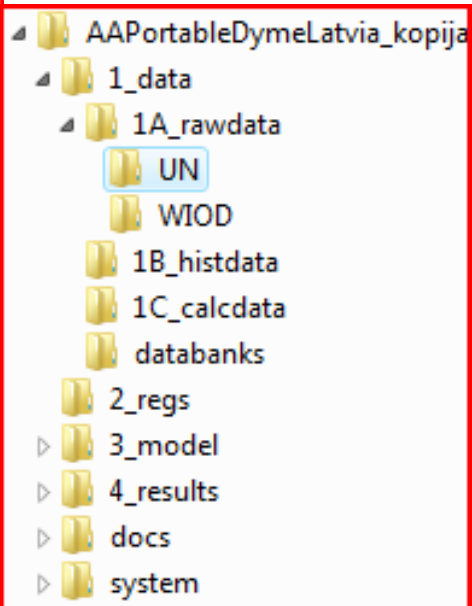




STRUCTURE OF PRESENTATION

- Topicality – revision of facts
- Some words about the Workshop in June 2013 (Florence), complete subjective evaluation of PortableDyme
- Latvia's model description
- 'Scenarios'
- Results
- Conclusions

```
0 10 20 30 40
1 #include <dymesys.h>
2 #include "tseries.inc"
3 #include "heart.h"
4
5 const char *ModelName="Portable Dyme LAM
6
7 Equation imEQN("dummy.eqn");
8 Equation hcesrEQN("dummy.eqn");
9
10 int i,j;
11 float OLDOUT,OLDHCES; |
12
13 Matrix I(35,35);
14
15 // Initialization routine automatically
16 void model_init()
17 {
18 // Print the name of the model
19 printf("%s\n\n", ModelName);
20 // Print header
21 printf("year iter HCES OUT\n");
22 printf("-----\n");
23
24 imEQN.SetConstantTerm(); // activate
25 hcesrEQN.SetConstantTerm(); // activa
26 //imEQN.ZeroRho(); // rho value
27
28 //Identity matrix
29 I.set(0); //initializing
30 for(i=1;i<=I.lastrow();i++)
31 I[i][i] = 1.0; //set diagonal = 1
32 } // end model_init
33
34 // Initialization routine automatically
35 void model_init t(const int t)
```

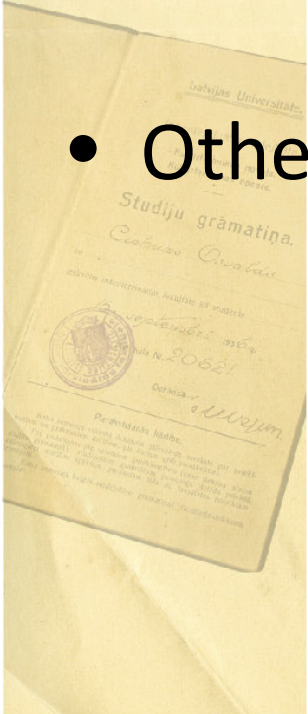




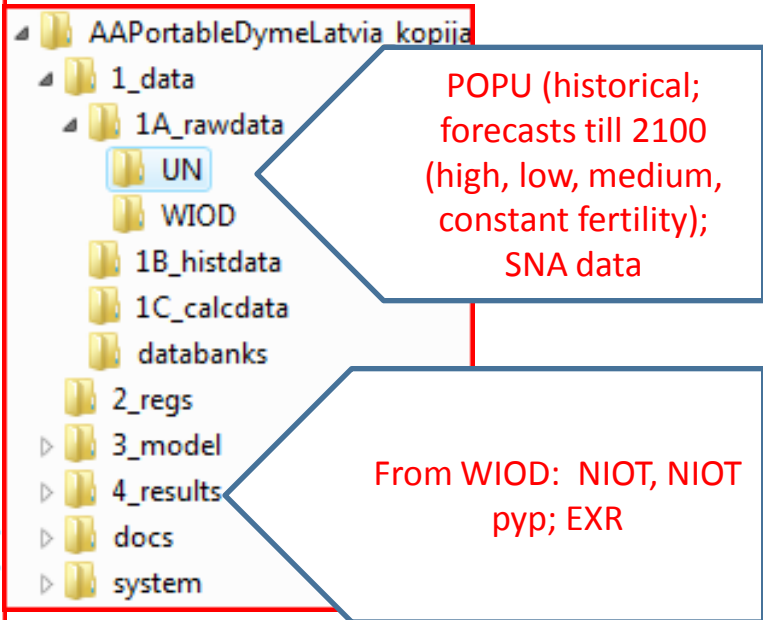
- Topicality – revision of facts
- Some words about the Workshop in June 2013 (Florence)
- Half-day workshop during the Conference in Florence
- One week seminar by Frank and Anett



- Aim: to build a model that is easier to handle, if needed more people might be involved in this modeling approach.
- Otherwise: Too technical, too specific...



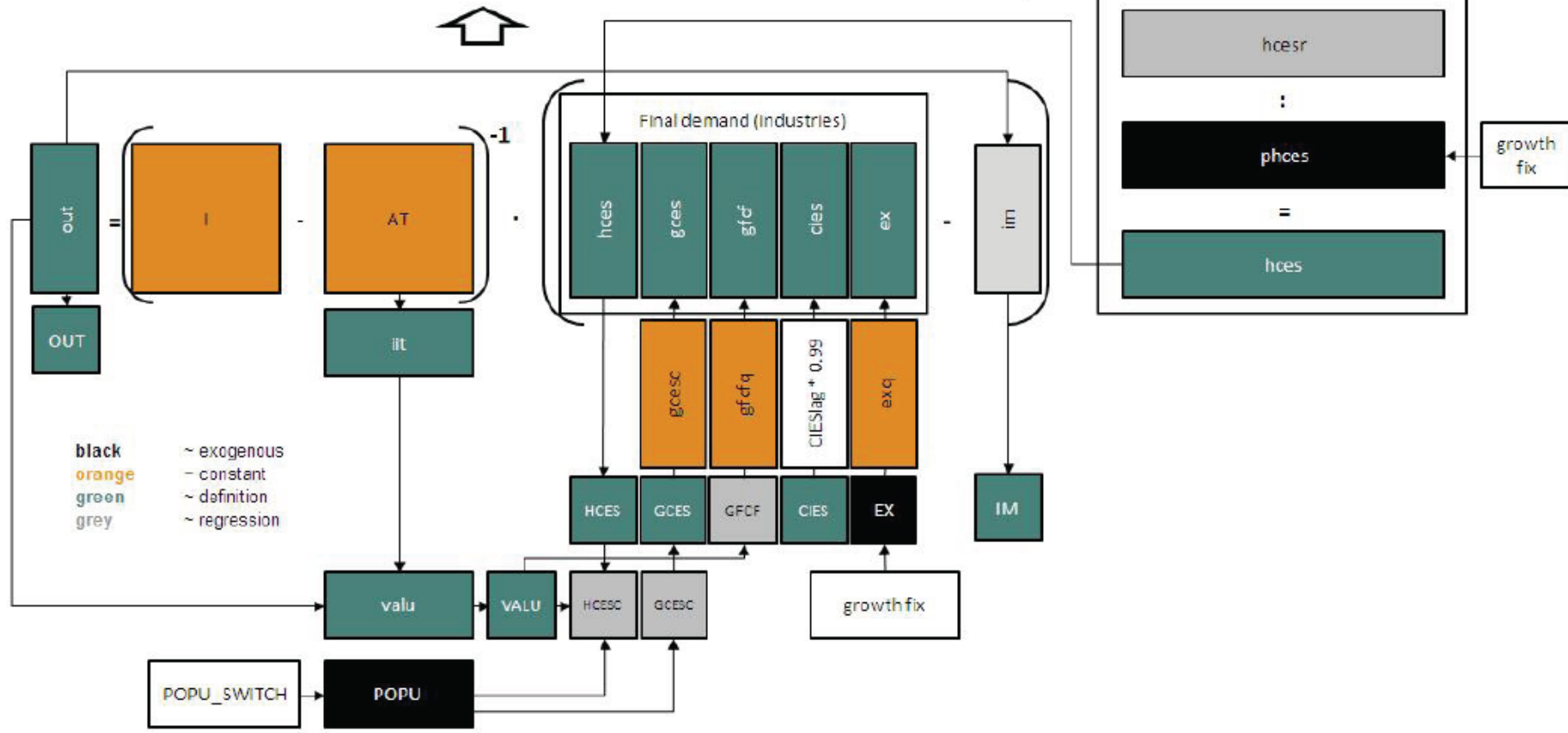
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20     // Print header
21     printf("year iter      HCES      OUT\n");
22     printf("-----\n");
23
24     imEQN.SetConstantTerm(); // activate
25     hcesrEQN.SetConstantTerm(); // activa
26     //imEQN.ZeroRho(); // rho value
27
28     //Identity matrix
29     I.set(0); //initializing
30     for(i=1;i<=I.lastrow();i++)
31         I[i][i] = 1.0; //set diagonal = 1
32 } // end model_init
33
34 // Initialization routine automatically
35 void model_init_t(const int t)
```





- Model description
- 35 sectors (=WIOD)
- 1995-2030
- IO tables 2000-2009 (WIOD)
- Historical data from 1995 (2000) till 2011 (2012)
- Vecfixes, macfixes till 2012 (historical)
- Vecfixes, macfixes till 2030 (assumptions)
- Name of the model

System of National Accounts and Balancing Items



Source: PortableDyme documentation, June 2013; p.38



Interesting tasks during the workshop that only increased the interest:

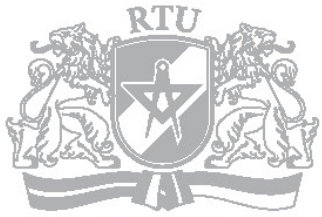
Regressions

SNAB.reg

hcesr.reg



- Regressions
- FD.reg, im.reg, SNAB.reg, hcesr.reg

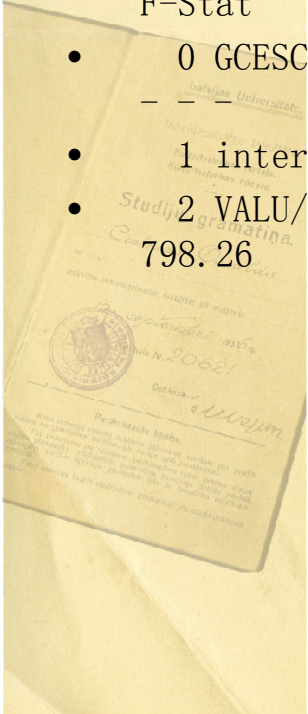


ANNO 150 1862

FD.reg

- t1 Government consumption expenditure per capita, nominal
- r GCESC = VALU / POPU * 1000.0
- : Government consumption expenditure per capita, nominal
- SEE = 43.06 RSQ = 0.9840 RHO = 0.32 Obser = 15 from 1995.000
- SEE+1 = 40.92 RBSQ = 0.9827 DW = 1.36 DoFree = 13 to 2009.000
- MAPE = 4.92

Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta	t-value
0 GCESC	---	---	---	---	629.81	---	---
1 intercept	67.70407	28.6	0.11	62.40	1.00		2.918
2 VALU/POPU*1000.0	0.19708	690.0	0.89	1.00	2852.18	0.992	28.254
	798.26						





- ti Gross fixed capital formation, nominal
- r GFCF = !OUT
- : Gross fixed capital formation, nominal
- SEE = 350.97 RSQ = 0.9373 RHO = 0.55 Obser = 15 from 1995.000
- SEE+1 = 317.13 RBSQ = 0.9373 DW = 0.90 DoFree = 14 to 2009.000

• MAPE = 24.35

Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta
---------------	----------	--------	------	--------	------	------

0 GFCF	-----	-----	-----	-----	1917.43	---
--------	-------	-------	-------	-------	---------	-----

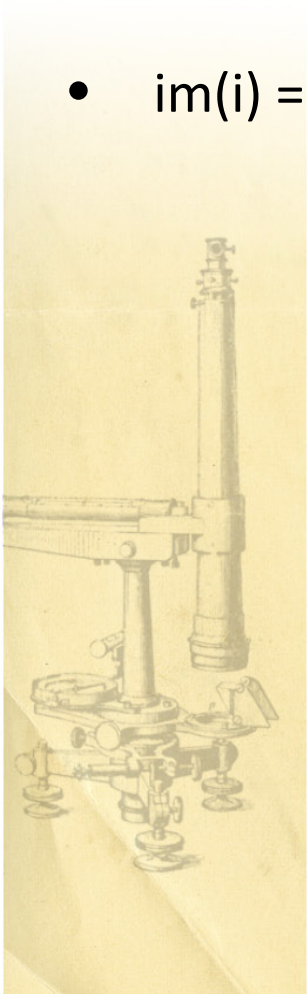
1 OUT	0.13774	576.7	1.05	1.00	14622.74	
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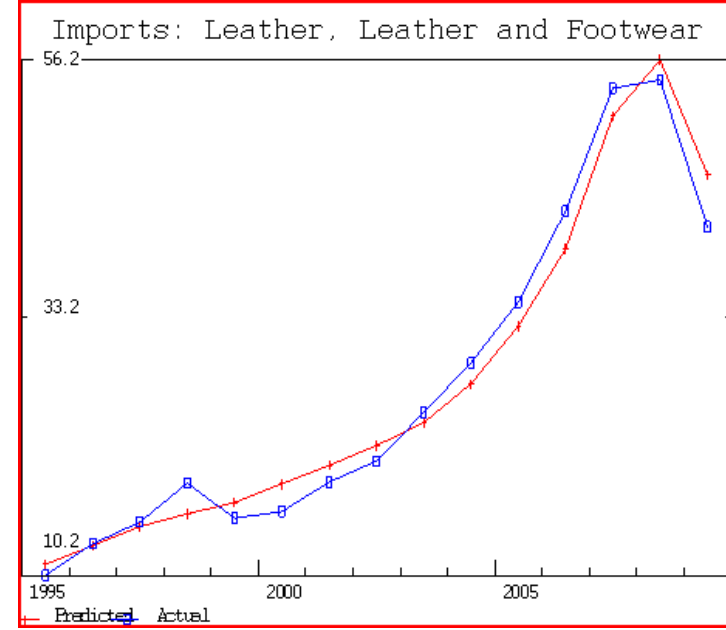
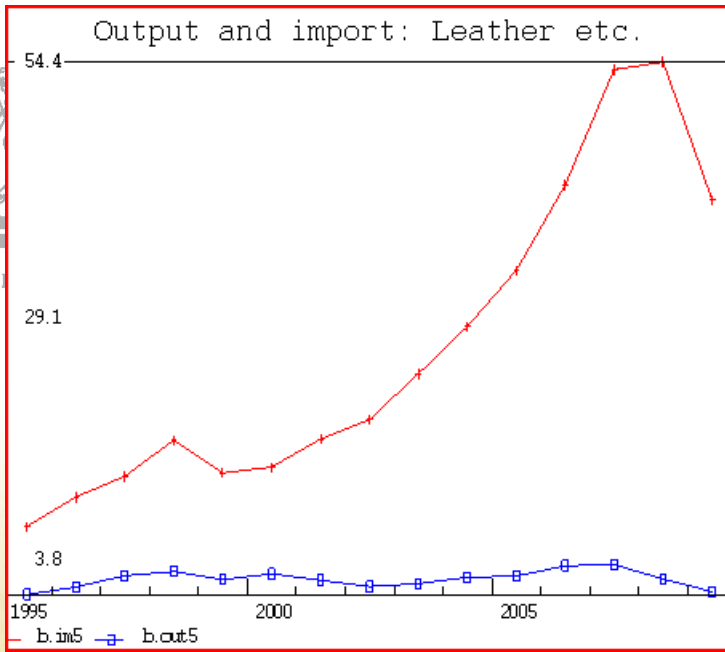
25.043



im.reg

- 35 equations
- $im(i) = f(out, OUT, VALU, GDP...)$

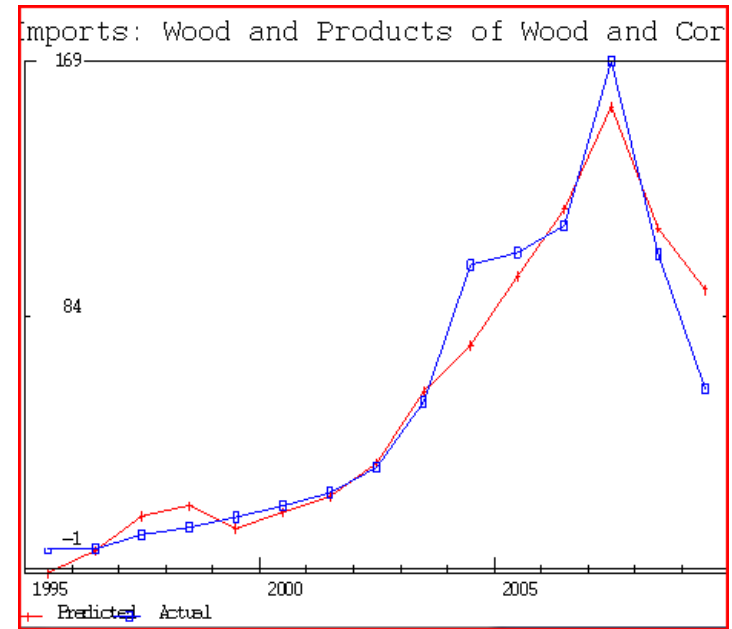
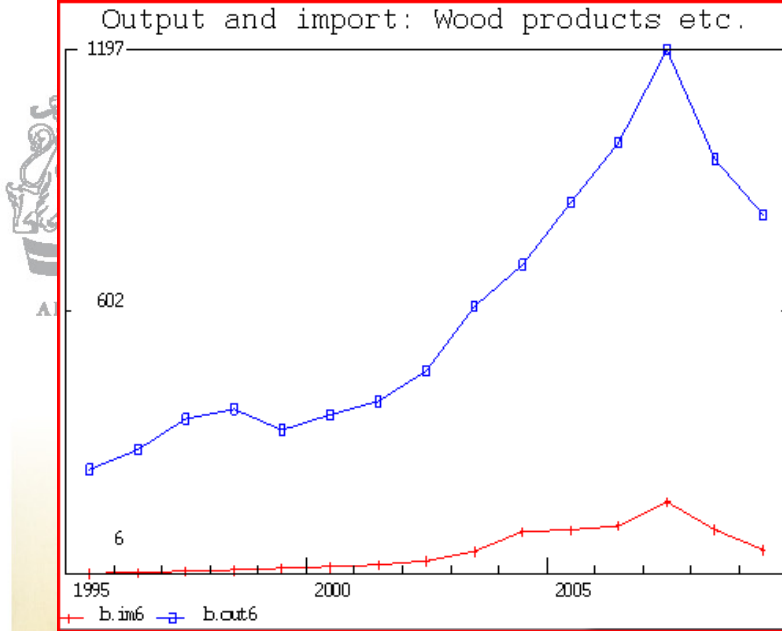




```
ti Imports: Leather, Leather and Footwear
cc depend = im[5];
r im5=GDP
```

```
: Imports: Leather, Leather and Footwear
SEE = 2.21 RSQ = 0.9761 RHO = 0.58 Obser = 15 from 1995.000
SEE+1 = 1.91 RBSQ = 0.9743 DW = 0.85 DoFree = 13 to 2009.000
MAPE = 7.42
```

Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta	t-value	F-Stat
0 im5	-----	-----	-----	-----	27.17	-----	-----	-----
1 intercept	2.60112	16.0	0.10	41.86	1.00		2.116	
2 GDP	0.00349	547.0	0.90	1.00	7031.77	0.988	23.048	531.19



lim 1995 2009

ti Imports: Wood and Products of Wood and Cork

cc depend = im[6];

r im6 = out6

:

Imports: Wood and Products of Wood and Cork

SEE = 12.59 RSQ = 0.9334 RHO = 0.32 Obser = 15 from 1995.000

SEE+1 = 12.63 RBSQ = 0.9283 DW = 1.37 DoFree = 13 to 2009.000

MAPE = 26.71

Variable name	Reg-Coeff	Mexval	Elas	NorRes	Mean	Beta	t-value	F-Stat
0 im6	-----	-----	-----	-----	56.11	-----	-----	-----
1 intercept	-40.60391	73.1	-0.72	15.03	1.00		-5.095	
2 out6	0.16211	287.6	1.72	1.00	596.61	0.966	13.503	182.33



- For SNA

- K1UT Consumption of Fixed Capital, Total Economy
- D1UT Compensation to employees
- ...

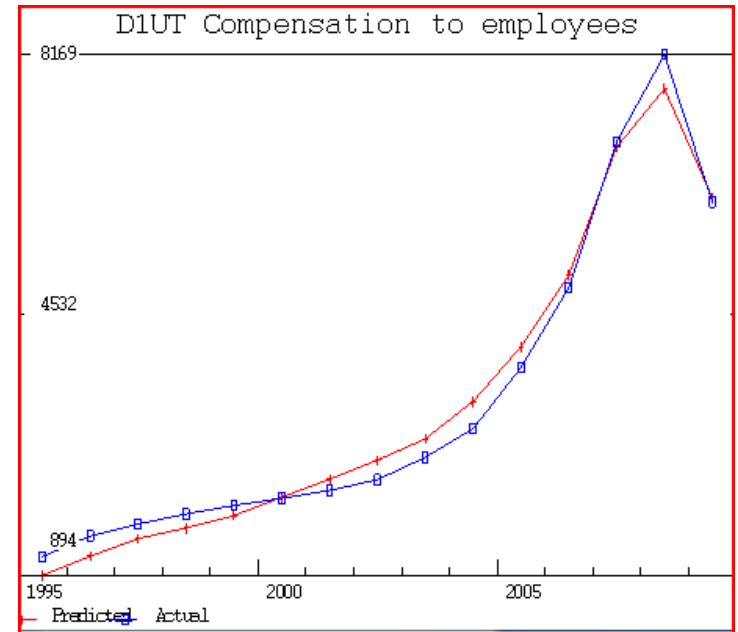
1	Variable Name	Variable Description	Unit
24	P2UT	Intermediate consumption, at purchaser's prices (uses)	converted in Million NC
25	B1GT	GROSS DOMESTIC PRODUCT	converted in Million NC
26	K1UT	Consumption of fixed capital (uses)	converted in Million NC
27	B1NT	Net domestic product	converted in Million NC
28	D1UT	Compensation of employees (uses)	converted in Million NC
29	D23UT	Taxes on production and imports, less Subsidies (uses)	converted in Million NC
30	B2GT	Gross operating surplus	converted in Million NC
31	B3GT	Gross mixed income	converted in Million NC
32	D1RT	Compensation of employees (resources)	converted in Million NC
33	D23RT	Taxes on production and imports, less Subsidies (resources)	converted in Million NC
34	D4RT	Property income (resources)	converted in Million NC
35	D4UT	Property income (uses)	converted in Million NC
36	B5GT	Gross national income	converted in Million NC
37	D5RT	Current taxes on income, wealth, etc. (resources)	converted in Million NC
38	D61RT	Social contributions (resources)	converted in Million NC
39	D62RT	Social benefits other than social transfers in kind (resources)	converted in Million NC
40	D7RT	Other current transfers (resources)	converted in Million NC
41	D5UT	Current taxes on income, wealth, etc. (uses)	converted in Million NC
42	D61UT	Social contributions (uses)	converted in Million NC
43	D62UT	Social benefits other than social transfers in kind (uses)	converted in Million NC
44	D7UT	Other current transfers (uses)	converted in Million NC
45	B6GT	Gross disposable income	converted in Million NC
46	D8RT	Adjustment for the change in net equity of households on pension fun	converted in Million NC
47	P3UT	Final consumption expenditure (uses)	converted in Million NC
48	D8UT	Adjustment for the change in net equity of households on pension fun	converted in Million NC
49	B8GT	Gross saving B8GT	converted in Million NC
50	D9RUT	Capital transfers, receivable less payable D9RUT	converted in Million NC
51	B101NT	Equals: changes in net worth due to saving and capital transfer	converted in Million NC
52	P5UT	Gross capital formation (uses)	converted in Million NC
53	K2UT	Acquisitions less disposals of non-produced non-financial assets (use	converted in Million NC
54	B9NT	Net lending (+) / Net borrowing (-)	converted in Million NC

```

1 #####SNAB.REG####
2
3 catch SNAB.cat
4 save SNAB.sav
5
6 # Lastdata SNAB data
7 cc extern unsigned short SNABLASTDAT;
8
9 ##### Production Account #####
10 ti P1RT Output Total Economy
11 lim 1995 2009
12 r P1RT = !OUT
13 gr *
14
15
16 ti D2131RT Taxes less Subsidies on Products, Total Economy
17 r D2131RT = HCES
18 gr *
19
20
21 ti P2UT Intermediate Consumption, Total Economy
22 r P2UT = !IIT
23 gr *
24
25 ti B1GT Gross value Added, Total Economy
26 cc if (t>SNABLASTDAT)
27 id B1GT = P1RT + D2131RT - P2UT
28 gr *
29
30 lim 1996 2009
31 ti K1UT Consumption of Fixed Capital, Total Economy
32 r K1UT = GFCF[1]
33 gr *
34

```

SNAB.reg



lim 1995 2009

ti D1UT Compensation to employees

r D1UT = VALU

:

D1UT Compensation to employees

SEE = 246.88 RSQ = 0.9866 RHO = 0.65 Obser = 15 from 1995.000
 SEE+1 = 195.37 RBSQ = 0.9856 DW = 0.70 DoFree = 13 to 2009.000
 MAPE = 9.08

Variable name	Reg-Coeff	Mexval	Elas	NorRes	Mean	Beta	t-value	F-Stat
0 D1UT	-----	-----	-----	-----	3295.94	-----	-----	-----
1 intercept	-383.67822	26.5	-0.12	74.65	1.00		-2.796	
2 VALU	0.55576	764.0	1.12	1.00	6620.81	0.993	30.943	957.47



G 7.383

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add SNAB.reg

2 HCES 0.18541 614.5 0.99 1.00 428

gr *

ti P2UT Intermediate Consumption, Total Economy
r P2UT = IIT

SEE = 179.14 RSQ = 0.9989 RHO = 0.68 Obser = 15 from 1995.000
SEE+1 = 140.25 RBSQ = 0.9989 DW = 0.63 DoFree = 14 to 2009.000
MAPE = 2.95

Variable name	Reg-Coeff	Mexval	Elas	NorRes	Mean	Beta	t-value	F-Stat
0 P2UT	-----	8538.26	-----	-----	-----	-----	-----	-----
1 IIT	1.13118	5555.7	1.01	1.00	7590.97		211.583	

gr *

ti B1GT Gross value Added, Total Economy
cc if (t>SNABLASTDAT)
id B1GT = P1RT + D2131RT - P2UT
gr *

lim 1996 2009

ti K1UT Consumption of Fixed Capital, Total Economy
r K1UT = GFCF[1]

SEE = 83.59 RSQ = 0.9768 RHO = 0.42 Obser = 14 from 1996.000
SEE+1 = 78.40 RBSQ = 0.9749 DW = 1.16 DoFree = 12 to 2009.000
MAPE = 5.48

Variable name	Reg-Coeff	Mexval	Elas	NorRes	Mean	Beta	t-value	F-Stat
0 K1UT	-----	1396.61	-----	-----	-----	-----	-----	-----
1 intercept	692.42159	415.5	0.50	43.16	1.00		17.517	
2 GFCF[1]	0.37844	557.0	0.50	1.00	1860.75	0.988	22.493	505.93

gr *

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nd title

K1UT Consumption of Fixed Capital, Total Economy

2522

1618

713

2000 2005

— Predicted Actual



hcesr.reg

ANNO 1

```
1 #### Household consumption expenditure in yoy prices, COMPO
2
3 catch hcesr.cat
4 save hcesr.sav
5
6 cc hcesrEQN.rhstart = hcesr.LastData();
7
8 lim 1996 2009
9 ti HCESR: Agriculture, Hunting, Forestry and Fishing
10 cc depend = hcesr[1];
11 r hcesr01 = @log(B6GT/PHCES), @log(phces01/PHCES)
12 cc hcesr[1] = hcesrEQN.rhoadj(hcesr[1],depend, 1);
13 cc assert( hcesr[1] > 0 );
14 gr *
15
16
17 ti HCESR: Mining and Quarrying
18 cc depend = hcesr[2];
19 r hcesr02 = @log(B6GT/PHCES), @log(phces02/PHCES)
20 cc hcesr[2] = hcesrEQN.rhoadj(hcesr[2],depend, 1);
21 cc assert( hcesr[2] > 0 );
22 gr *
23
24 ti HCESR: Food, Beverages and Tobacco
25 cc depend = hcesr[3];
26 r hcesr03 = @log(B6GT/PHCES), @log(phces03/PHCES)
27 cc hcesr[3] = hcesrEQN.rhoadj(hcesr[3],depend, 1);
28 cc assert( hcesr[3] > 0 );
29 gr *
30
31 ti HCESR: Textiles and Textile Products
```



hcesr.reg

- 35 equations for real household consumption expenditure
- $$hcesr(i) = a + b * \log(B6GT/PHCES) + c * \log(phces(i)/PHCES) + d * D109FF$$
- B6GT – disposable income
- PHCES – price index
- phces(i) – price index of i products

- Dummy variables:
- D109FF – for crisis ('problem to forecast' dilemma)



```

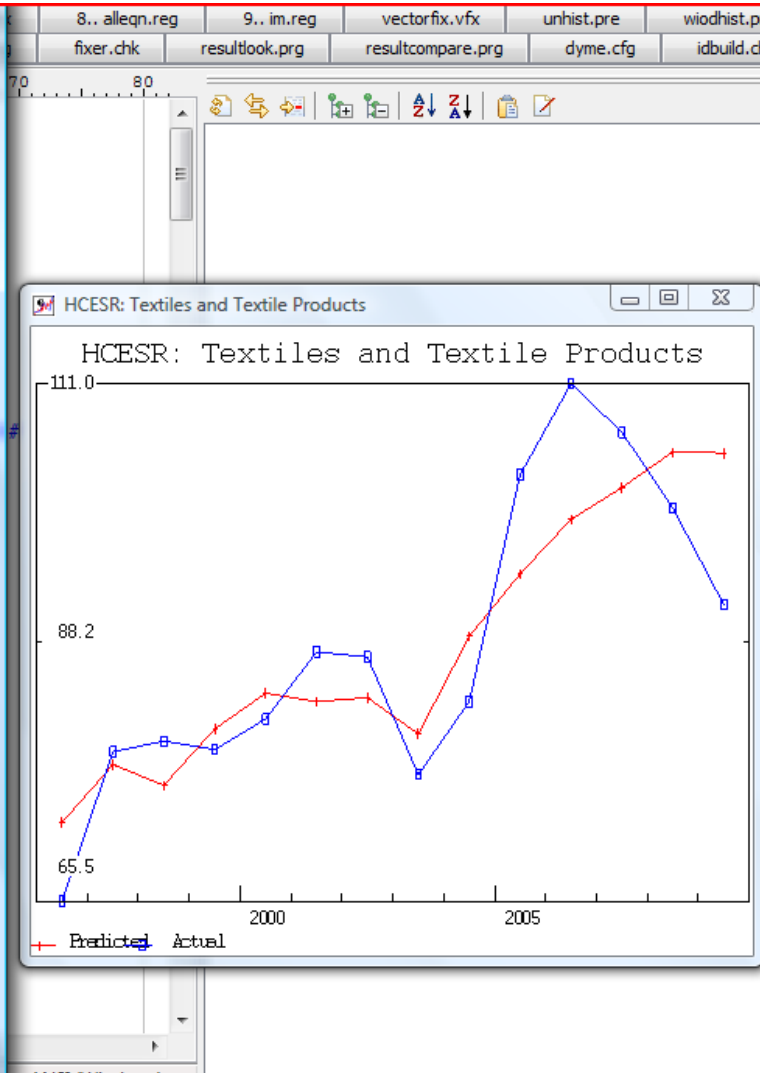
G 7.383
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gr *
ti HCESR: Food, Beverages and Tobacco
cc depend = hcesr[3];
r hcesr03 = @log(B6GT/PHCES), @log(phces03/PHCES)
: HCESR: Food, Beverages and Tobacco
SEE = 16.70 RSQ = 0.9500 RHO = 0.61 Obser = 14 from 1996.000
SEE+1 = 14.38 RBSQ = 0.9409 DW = 0.78 DoFree = 11 to 2009.000
MAPE = 4.69
Variable name Reg-Coeff Mexval Elas NorRes Mean Beta t-value F-Stat
0 hcesr03 ----- 345.09 -----
1 intercept -594.06129 192.3 -1.72 20.01 1.00 -9.110
2 @log(B6GT/PHCES) 250.44336 347.3 2.71 1.35 3.73 0.984 14.460 104.55
3 @log(phces03/PHCES) -304.68859 16.2 0.02 1.00 -0.02 -0.134 -1.963 3.85

cc hcesr[3] = hcesrEQN.rhoadj(hcesr[3],depend, 1);
cc assert( hcesr[3] > 0 );
gr *

ti HCESR: Textiles and Textile Products
cc depend = hcesr[4];
r hcesr04 = @log(B6GT/PHCES), @log(phces04/PHCES)
: HCESR: Textiles and Textile Products
SEE = 6.52 RSQ = 0.7304 RHO = 0.46 Obser = 14 from 1996.000
SEE+1 = 6.19 RBSQ = 0.6814 DW = 1.08 DoFree = 11 to 2009.000
MAPE = 6.15
Variable name Reg-Coeff Mexval Elas NorRes Mean Beta t-value F-Stat
0 hcesr04 ----- 87.87 -----
1 intercept -54.51267 18.1 -0.62 3.71 1.00 -2.084
2 @log(B6GT/PHCES) 37.59950 92.5 1.60 1.20 3.73 0.878 5.454 14.90
3 @log(phces04/PHCES) -69.13158 9.7 0.03 1.00 -0.03 -0.241 -1.497 2.24

cc hcesr[4] = hcesrEQN.rhoadj(hcesr[4],depend, 1);
cc assert( hcesr[4] > 0 );
gr *
  
```





- Next steps:
- 1) DATA
- Eurostat
- National statistical office
- 2) NEW/Additional VARIABLES
- Changes in DATABASEMANAGER (Excel file; vectors, matrices, time series (variables) defined).



ADDITIONAL VARIABLES

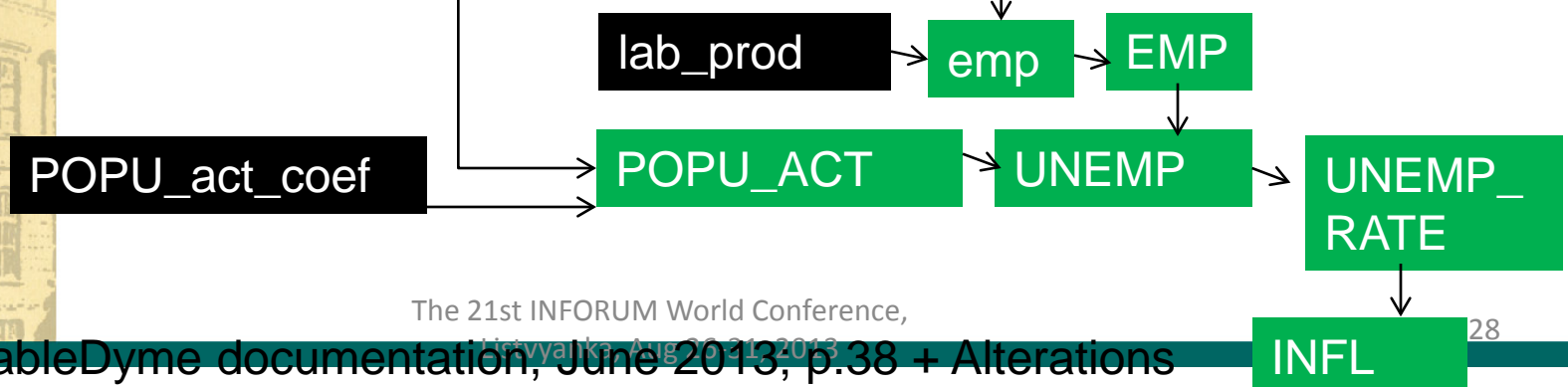
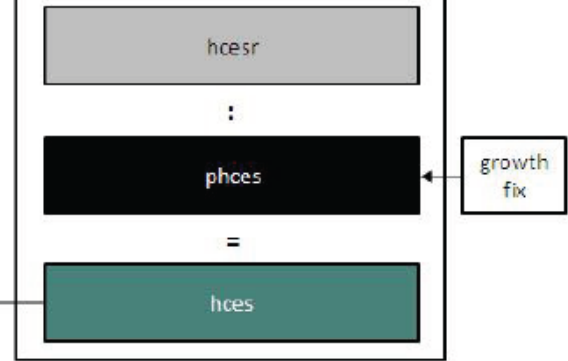
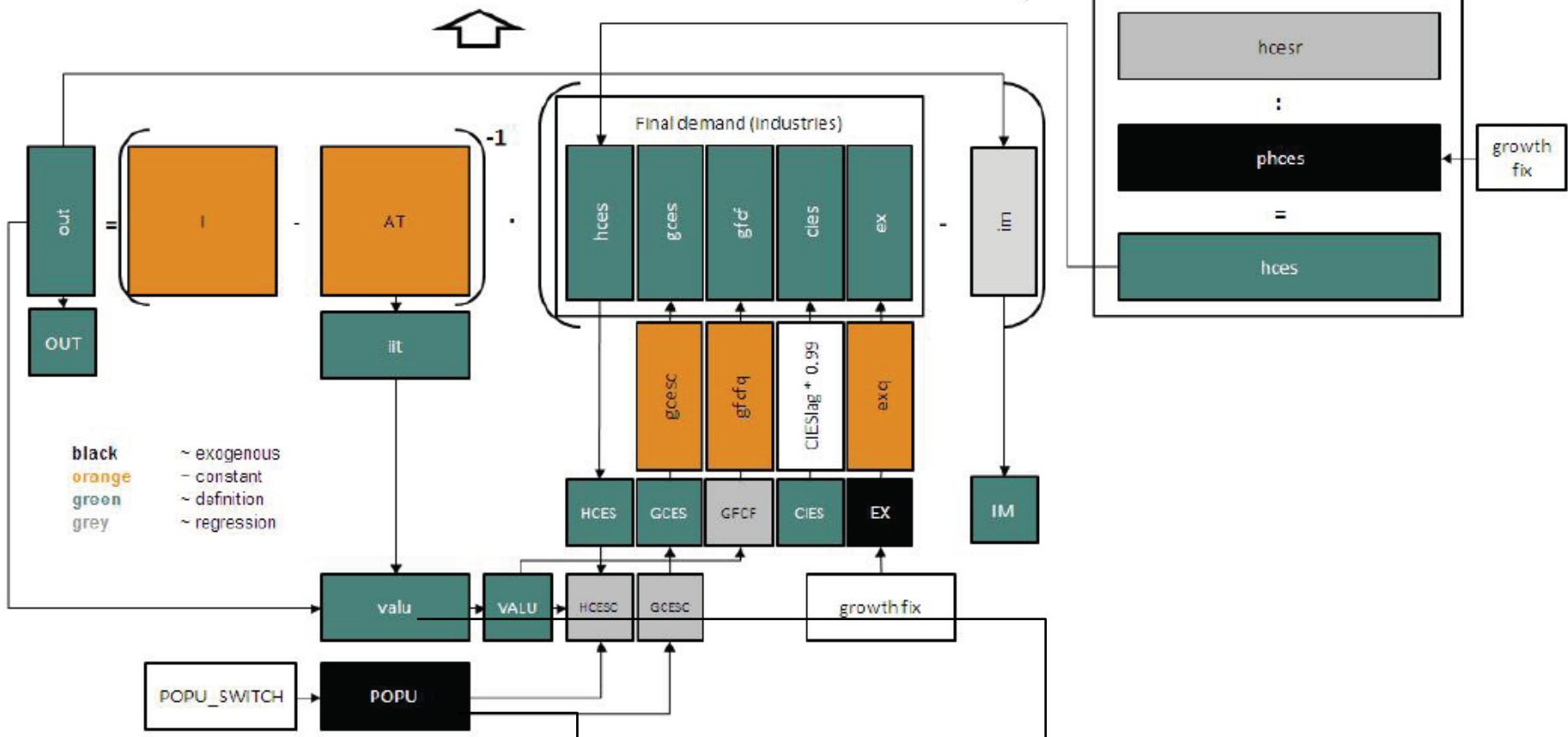
- Selected to do what is intended to do
- Hence, the focus unintentional or intentionally are on productivity, international competitiveness (convergence with neighbouring countries), then ..

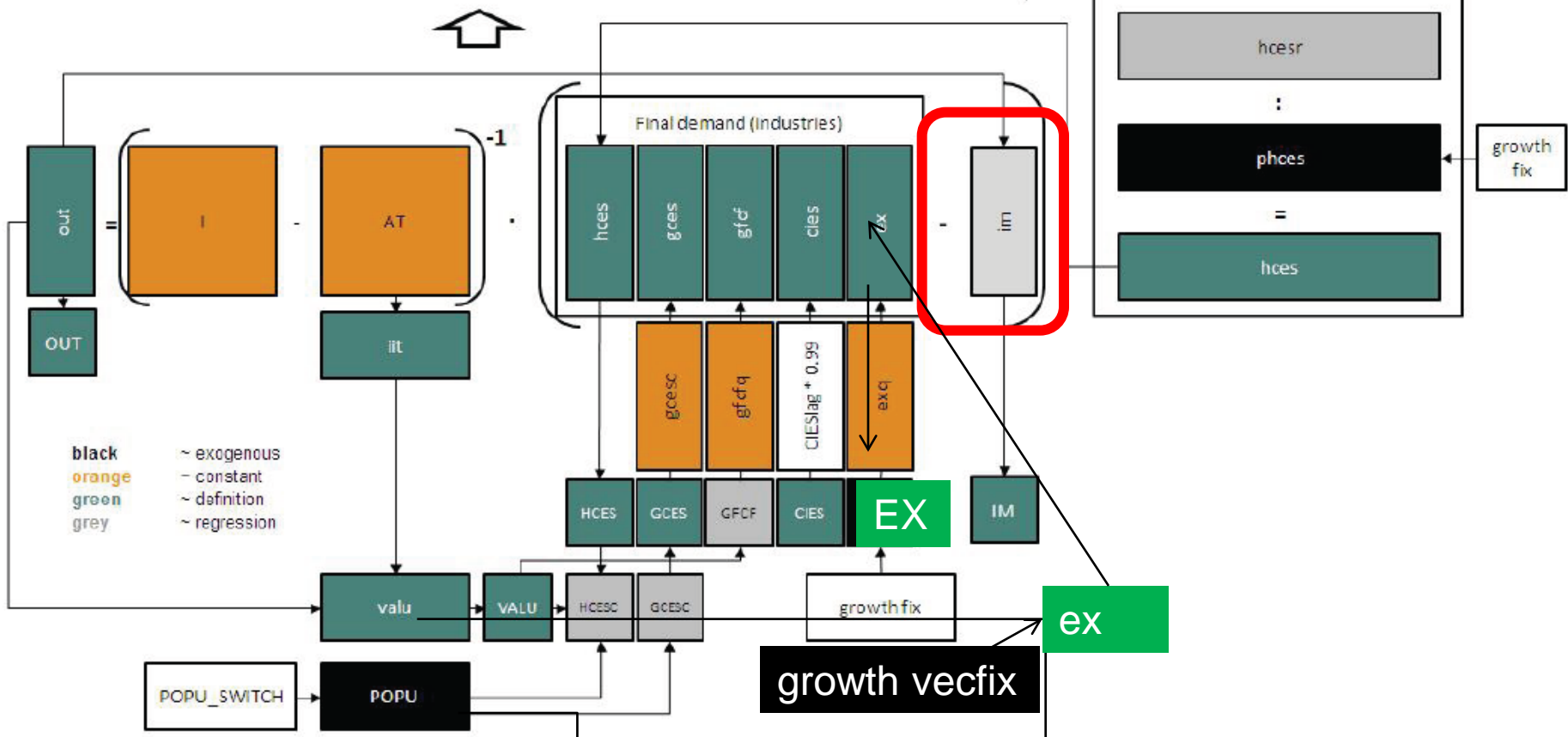
Additional vectors

1	Variable Name	Variable Description	Rows	Columns	Lags	Row Description TTL	Column Description TTL	LASTDATE
38	hcesr	Household consumption expenditure	35		1	0	wiod.ttl	2009
39	emp	Number of employed persons	35		1	0	wiod.ttl	2010
40	empq	Structure of employed persons	35		1	0	wiod.ttl	2010
41	lab_prod	Labour productivity= VA/emp	35		1	0	wiod.ttl	2009
42	lab_prodr	Real labour productivity	35		1	0	wiod.ttl	2009
43	valur	Real value added	35		1	0	wiod.ttl	2009
44	valuq	Structure of value added	35		1	0	wiod.ttl	2009



Variable Name	Variable Description
D107FF	Dummy
D109FF	Dummy
EMP	Total number of employed persons
LAB_PROD	Total labour productivity
LAB_PRODR	Real total labour productivity
POPU_ACT	Population, active
POPU_ACT_COEF	Coefficient of economic active in total population
UNEMP	Total number of un employed persons
UNEMP_RATE	Unemployment rate
GDP_DEFL	GDP deflator
P_HCES	Price index, 2000=100
P_VALU	Price index, 2000=100
P_GDP	Price index, 2000=100
P_PTAX	Price index, 2000=100 (Taxes on products)
INFL	Inflation, change of price index
CIESR	IOT changes in inventories and valuables
EXR	Real Exports
GCESR	Real IOT government consumption expenditures
GDPR	Real Gross domestic product
GFCFR	Real IOT gross fixed capital formation
HCESR	Real IOT households consumption expenditures
HCESCR	Real IOT households consumption expenditures per capita
IMR	Real Imports
OUTR	Real IOT output
D_GDP	Nominal GDP growth rate
D_GDPR	Real GDP growth rate
D_EX	Growth rate, export, nominal
D_EXR	Real growth rate, export, nominal
D_IM	Growth rate, import, nominal
D_IMR	Real growth rate, import, nominal







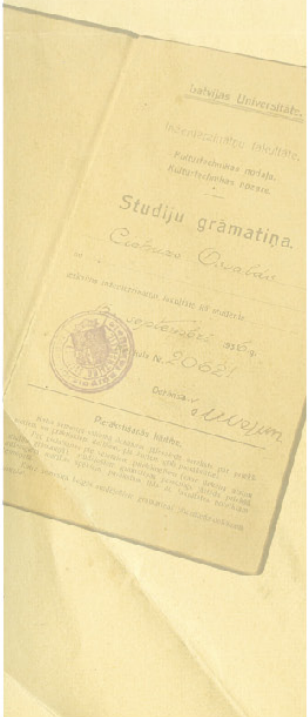
Labour productivity, employment

- $\text{lab_prod}(i) = \text{valu}(i) / \text{emp}(i)$
- $\text{lab_prod}(i)$ exogenous – vecfixes
- $\text{emp}(i) = \text{valu}(i) * \text{lab_prod}(i)$
- EMP
- POPU_ACT – economic active
- UNEMP
- UNEMP_RATE



Export

- $\exp(i)$ – by vecfixes
- EXP





Limits and limitations

- Nominal side
- Price indexes exogenous
- HCES
- Problems with specific sectors:
- 35 NOT=NACE 2 (38 industries)
- Specifics
 - 2 - Mining and Quarrying
 - 5 - Leather, Leather and Footwear
 - 8 - Coke, Refined Petroleum and Nuclear Fuel
- What is base line for Latvia – too long with 2-digit growth

- Direction of development:
 - 1) Import modeling
 - 2) International competitiveness (convergence of productivity) (assumption regarding the impacts of euro area; faster convergence with Estonia's labour costs and productivity, in long-term convergence with next closest Euro Area country (Finland), «ideal» case » - Germany).
 - 3) hces..

- Assumptions:
- POPU – lowest (realistic) forecast (Census in 2011 showed);
- lab_prod :food, :manuf, mining, energy, :services
- ex fixes

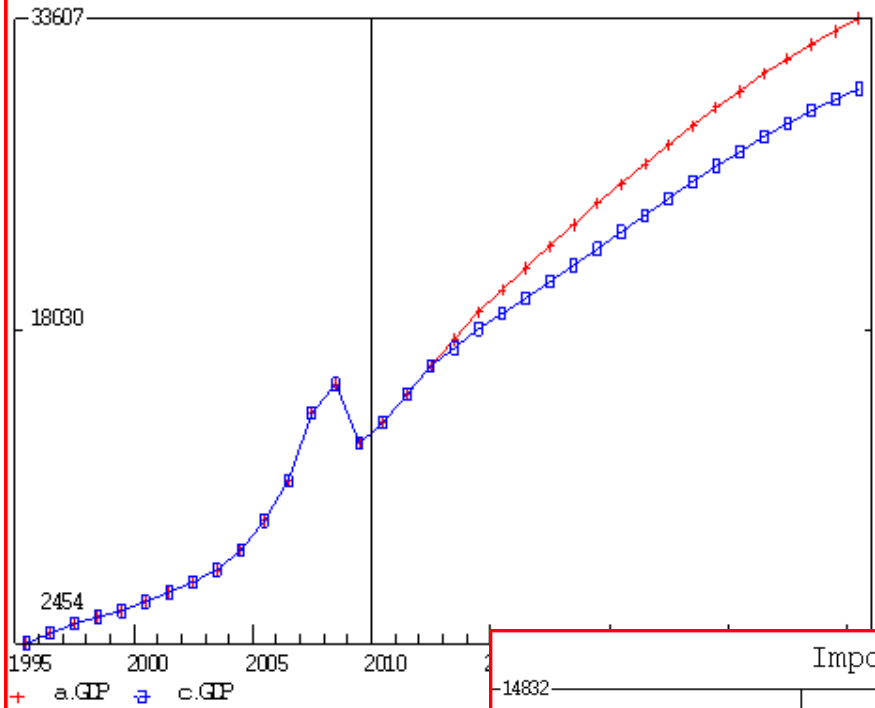


- Import modelling
- By im.reg
- Each sector has its import function
- Not linked to intermediate flows

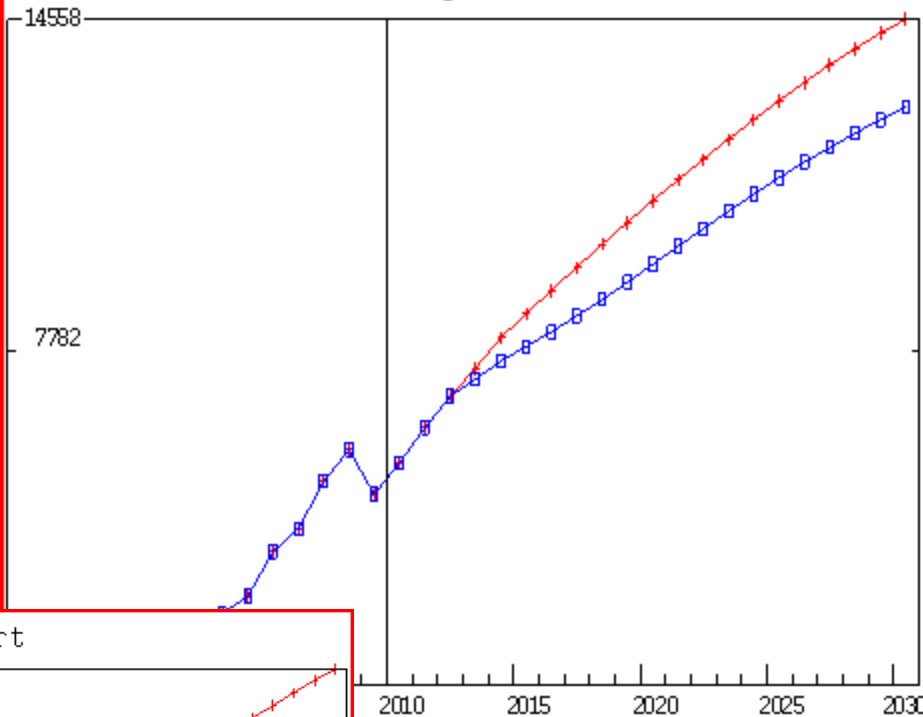
- 2 scenarios
- High Export – red line
- Low Export – blue line

- Conclusion – export is very linked (has an impact on) import.

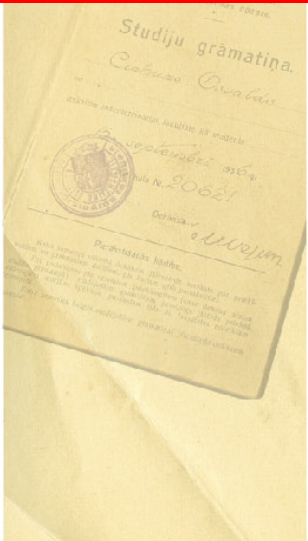
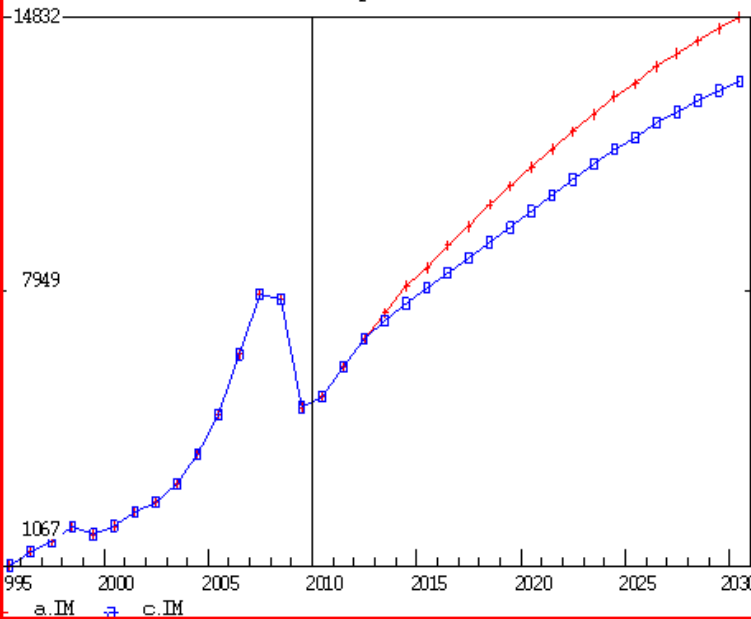
GDP



Export



Import





- Comparison – High&Low Export

	2000	2012	2013	2014
• Export	1840.7	6868.6	7440.9	8066.0
• Import	2056.4	6762.7	7414.1	8089.0
• GDP	4521.3	16280.9	17601.4	18979.8
• Number of employed persons	939.0	875.2	901.0	934.2



- Comparison – High&Low Export

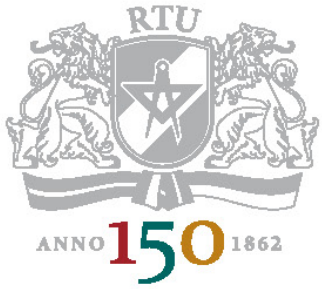
- Titles of Alternate Runs

- Line 1: Base

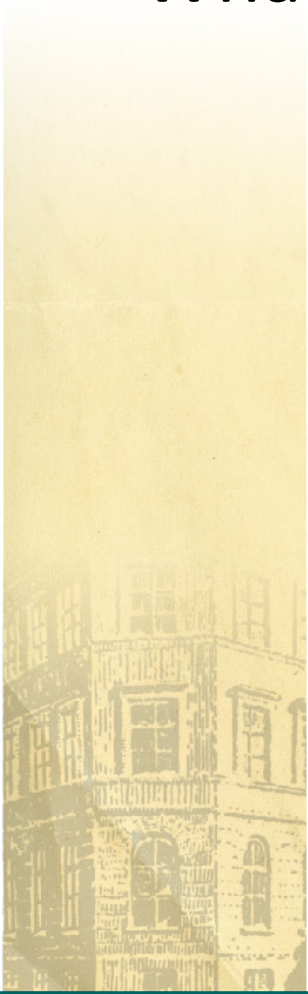
- Line 2: Base – values in levels

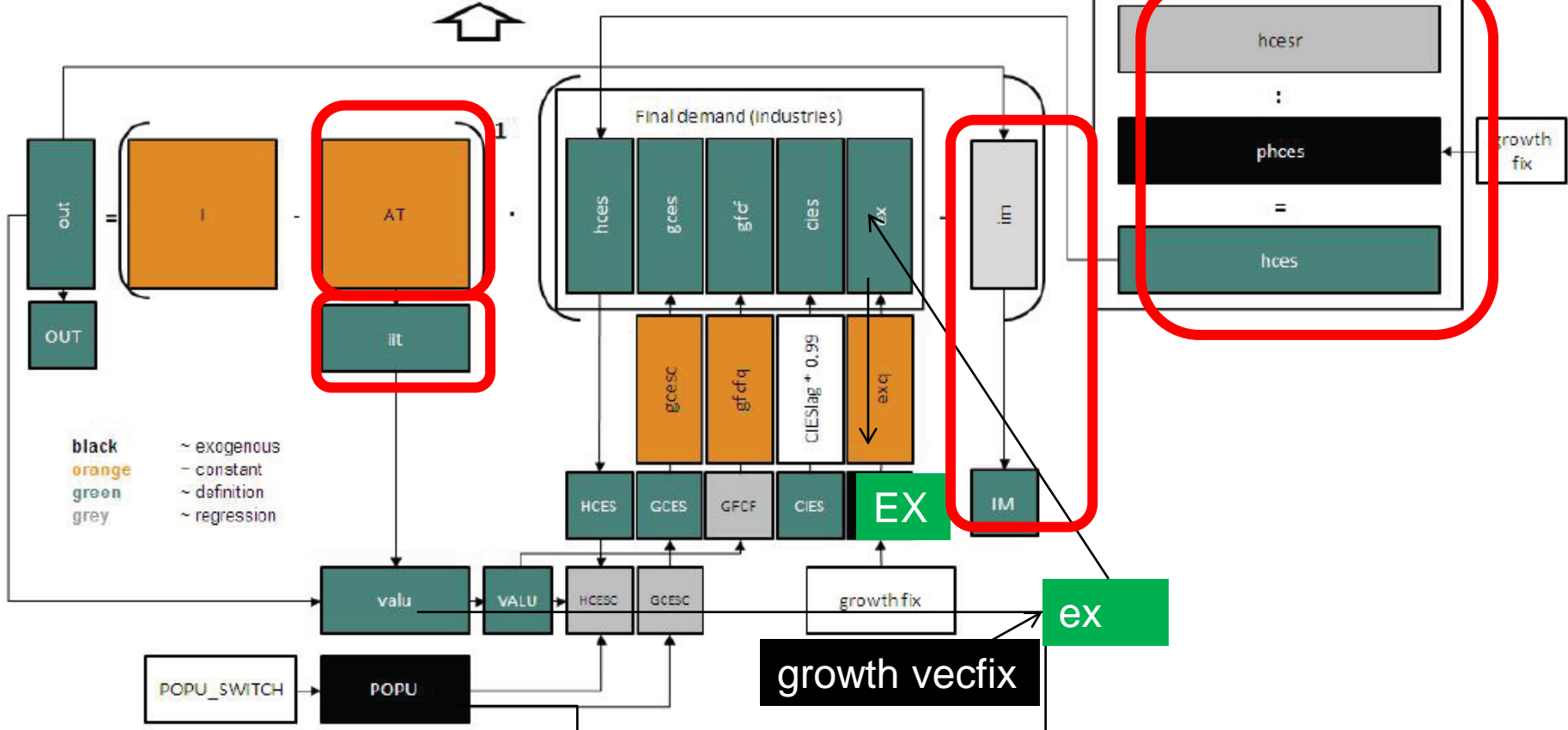
- Alternatives are shown as actual values.

	2000	2010	2012	2013	2014	2015	2020	2030
Export	1840.7	5508.7	6868.6	7440.9	8066.0	8546.1	110850.8	14557.9
Import	1840.7	5508.7	6868.6	7218.4	7586.2	7880.3	9562.1	112756.4
GDP	2056.4	5319.3	6762.7	7414.1	8089.0	8540.9	11074.6	14832.2
Number of employed persons	2056.4	5319.3	6762.7	7210.8	7648.5	8033.4	9966.0	13220.3
	4521.3	31344.5	416280.9	17601.4	18979.8	20071.8	25366.1	3606.5
	4521.3	31344.5	416280.9	17190.9	18109.6	18878.8	22951.5	30095.2
	939.0	973.6	875.2	901.0	934.2	951.0	989.6	888.4
	939.0	973.6	875.2	881.7	895.4	899.6	904.6	804.9



- What NEXT?





POPU_act_coef

lab_prod

emp

EMP

POPU_ACT

UNEMP

UNEMP_RATE

INFL

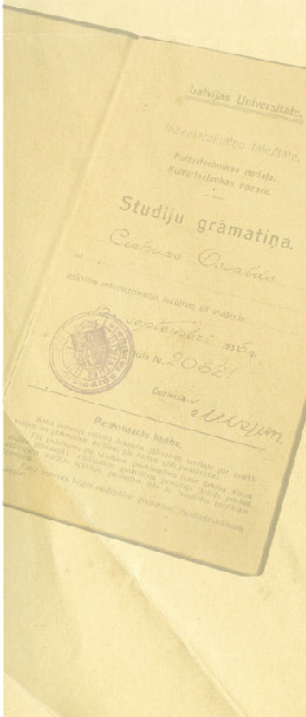


- Conclusions:
- 1) about the PortableDyme
- 2) Latvia's model

Conclusions: about the PortableDyme



- Good tool
- Good technical documentation
- Powerful





Conclusions: about Latvia's model

- Specific sectors demand addition/specific attention.
- Export is important-dependent (import prices should strongly influence domestic production, export, competitiveness).
- Limits and limitations limit



Thank You for the attention!

Contacts:

Astra Auziņa-Emsiņa

e-mail: astra.auzina-emsina@rtu.lv

Riga Technical University, Latvia