The Use of the Latvian Models for Competitiveness Analysis

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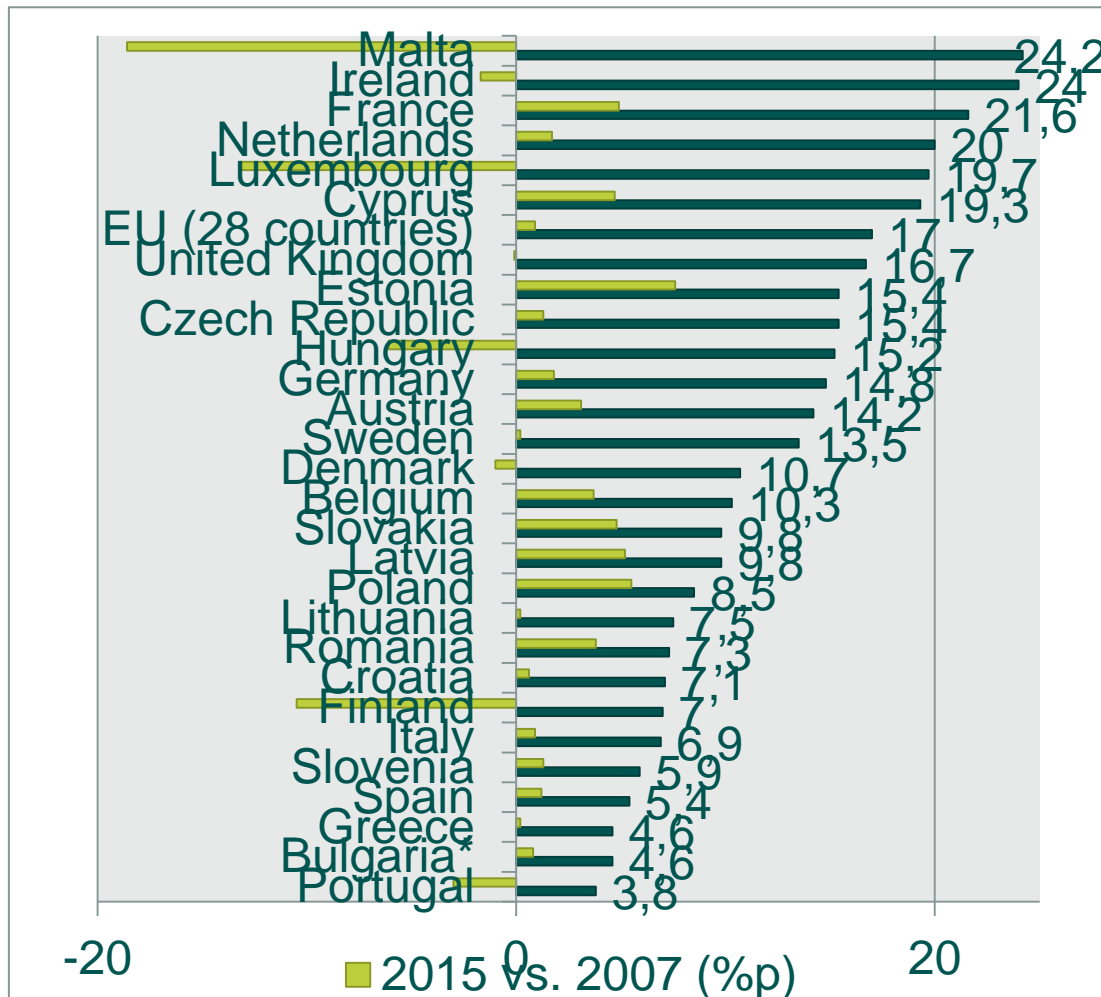- Progress on the Latvian Model of Development (LMD) in Euros

High-Tech Industries in Latvia

High-Technology Industries

- The main economic development drivers of the developed economies

- Definition of the Eurostat (NACE Rev.2 2-digit level code):

  – Manufacture of basic pharmaceutical products and pharmaceutical preparations (C21)

  – Manufacture of computer, electronic and optical products (C26)

  – *Manufacture of air and spacecraft and related machinery (C30.3)*

Exports of high-technology products as a share of total exports in 2015 (%) and change since 2007 (%p)

Country	2015 (%)
Malta	24,2
Ireland	24
France	21,6
Netherlands	20
Luxembourg	19,7
Cyprus	19,3
EU (28 countries)	17
United Kingdom	16,7
Estonia	15,4
Czech Republic	15,4
Hungary	15,2
Germany	14,8
Austria	14,2
Sweden	13,5
Denmark	10
Belgium	10,3
Slovakia	9,8
Latvia	9,8
Poland	8,5
Lithuania	7,5
Romania	7,3
Croatia	7,1
Finland	7
Italy	6,9
Slovenia	5,9
Spain	5,4
Greece	4,6
Bulgaria*	4,6
Portugal	3,8

■ 2015 vs. 2007 (%p)

Share of High-technology industries in total gross value added in 2004-2014 (%)

— Manufacture of basic pharmaceutical products and pharmaceutical preparations (C21)

— Manufacture of computer, electronic and optical products (C26)
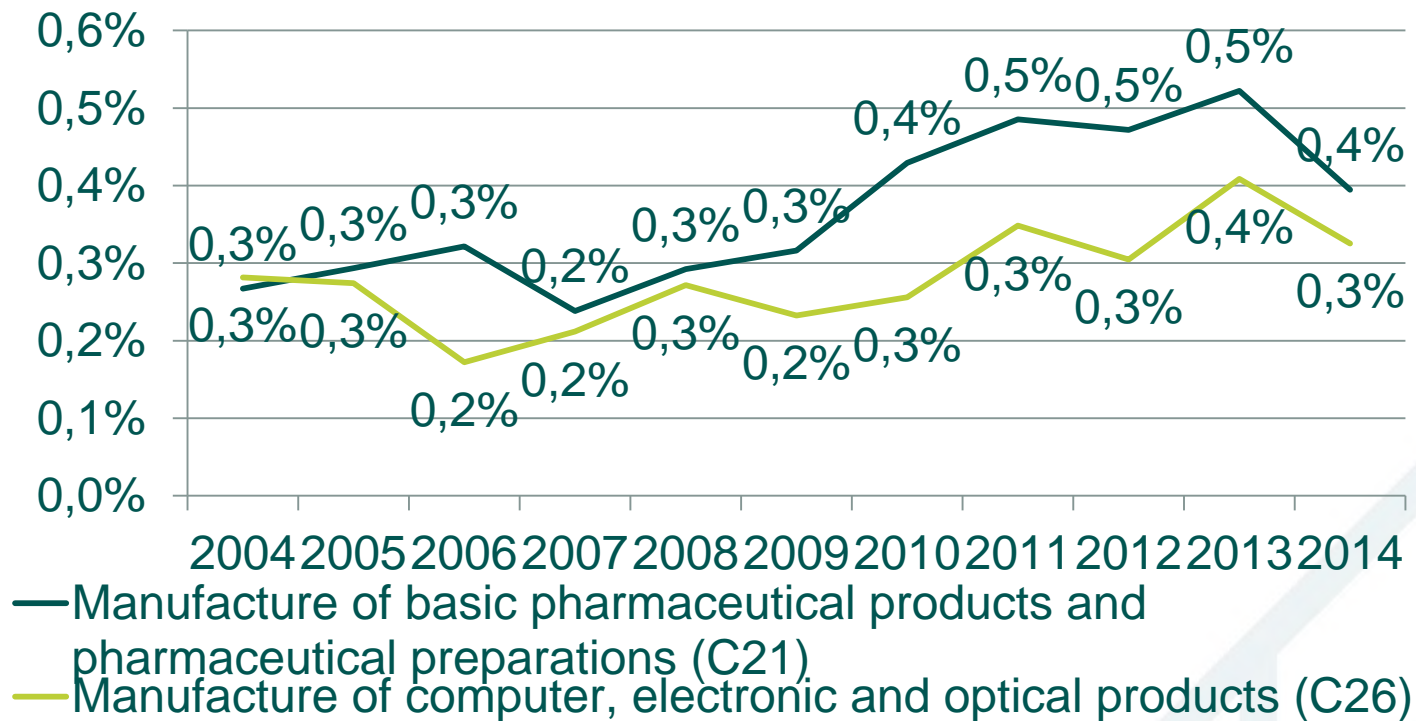
Employed Persons and Structure in 2014

Region	Manufacture of basic pharmaceutical products and pharmaceutical preparations (C21)		Manufacture of computer, electronic and optical products (C26)	
	Persons	Structure	Persons	Structure
Riga region	810	43%	963	65%
Pieriga region	1045	56%	239	16%
Vidzeme	2	0%	25	2%
Kurzeme	x	x	152	10%
Zemgale	6	0%	15	1%
Latgale	x	x	81	5%
TOTAL	1863	100%	1475	100%

Data source: CSB

Gross average monthly wages and salaries in high-technology industries in 2015 (in euro)

	Total economy (average)	Manufacture of basic pharmaceutical products and pharmaceutical preparations	above the average (%)	Manufacture of computer, electronic and optical products	above the average (%)
Total in the industry	818	1181	44%	1079	32%
total, excluding private sector enterprises with number of employees < 50	883	1194	35%	1214	37%
Public sector	853	x	x	x	x
Private sector	799	1181	48%	1079	35%
private enterprises with number of employees >=50	916	1194	30%	1214	33%

Conclusions

- High-technology industries are competitive in the global market due to the growing export values…

- The high-technology companies offer significantly higher wages and salaries that forms relative advantage over the other industries in Latvia.

- Regional allocation of the high-technology industries in Latvia is stable and notable changes or shifts are not observable or even foreseeable in the nearest future.

- The high-technology regional location depends on available labour resources and also education and professional training facilities in the region.

Input-Output Analysis

Whole Economy Data, mln EUR

CPA Codes	PRODUCTS	Intermediate Consumption	Final Consumption	Gross Capital Formation	Exports	Imports	Output	Final Demand-Imports
RA	Agriculture	1146.0	470.4	1.0	636.3	370.5	1883.1	737.2
RBDE	Mining and Utilities	2542.2	681.6	-77.2	408.4	634.2	2920.9	378.7
RC(HT)	High-Tech Products	223.5	243.1	203.0	678.4	1101.5	246.5	42.2
RC(MHT)	Medium-High-Tech Products	785.7	290.4	560.7	1057.8	2003.6	690.9	-94.8
RC(MLT)	Medium-Low-Tech Products	2138.2	264.3	168.5	1317.1	2174.3	1713.8	-424.4
RC(LT)	Low-Tech Products	1730.5	1817.0	335.6	2226.3	2103.2	4006.1	2275.6
RF	Construction	1829.4	96.9	1603.5	59.2	50.3	3538.7	1709.3
RG	Trade	1534.5	2051.4	109.5	443.8	46.1	4093.0	2558.5
GH	Transportation	3507.7	364.6	35.7	1494.5	367.3	5035.2	1527.5
RO	Government	85.5	1575.3	2.2	26.6	11.7	1677.9	1592.4
RP	Education	48.9	989.5	0.0	0.0	3.1	1035.3	986.4
RQ	Health and Social Work	21.2	787.2	0.0	2.4	0.0	810.8	789.6
R	Other Services	5292.1	3676.9	400.9	923.6	651.8	9641.7	4349.6

In More Detail

CPA Codes	PRODUCTS	Intermediate Consumption	Final Consumption	Gross Capital Formation	Exports	Imports	Output	Final Demand-Imports
RB	MINING AND QUARRYING	554.8	1.3	-79.7	97.9	387.5	186.8	-368.0
R17	Paper and paper products	220.2	20.7	2.0	79.7	207.0	115.5	-104.7
R19	Coke and refined petroleum products	572.2	162.0	15.6	237.3	986.4	0.6	-571.6
R20	Chemicals and chemical products	479.8	170.6	43.6	214.6	621.3	287.4	-192.5
R21	Basic pharmaceutical products and pharmaceutical preparations	121.4	195.8	11.2	268.4	461.3	135.5	14.1
R22	Rubber and plastic products	248.5	49.8	35.9	158.1	313.4	178.9	-69.6
R24	Basic metals	372.7	0.5	16.0	533.6	467.2	455.5	82.9
R26	Computer, electronic and optical products	102.1	47.3	191.8	410.0	640.2	111.0	9.0
R27	Electrical equipment	117.6	72.9	81.9	167.0	330.4	108.9	-8.6
R28	Machinery and equipment n.e.c.	88.6	2.4	291.7	229.4	489.6	122.5	33.9
R29	Motor vehicles, trailers and semi-trailers	42.9	33.4	46.1	389.3	425.6	86.0	43.1

Import Data, mln EUR

CPA Codes	PRODUCTS	Intermediate Consumption	Final Consumption	Gross Capital Formation	Exports	Total
RA	Agriculture	195.6	174.0	0.9	0.0	370.5
RBDE	Mining and Utilities	709.7	2.6	-79.7	1.5	634.2
RC(HT)	High-Tech Products	188.7	235.1	190.9	486.7	1101.5
RC(MHT)	Medium-High-Tech Products	542.8	246.3	539.3	675.2	2003.6
RC(MLT)	Medium-Low-Tech Products	1242.3	227.0	124.1	580.9	2174.3
RC(LT)	Low-Tech Products	395.7	1295.9	139.6	272.0	2103.2
RF	Construction	50.3	0.0	0.0	0.0	50.3
RG	Trade	42.3	3.4	0.4	0.0	46.1
GH	Transportation	367.3	0.0	0.0	0.0	367.3
RO	Government	11.7	0.0	0.0	0.0	11.7
RP	Education	3.1	0.0	0.0	0.0	3.1
RQ	Health and Social Work	0.0	0.0	0.0	0.0	0.0
R	Other Services	592.3	53.4	6.1	0.0	651.8
	Total	4341.7	2237.7	921.8	2016.4	9517.5

Import Shares

CPA Codes	PRODUCTS	Intermediate Consumption	Final Consumption	Gross Capital Formation	Exports	Supply
RA	Agriculture	17.1	37.0	92.5	0.0	16.4
RBDE	Mining and Utilities	27.9	0.4	103.3	0.4	17.8
RC(HT)	High-Tech Products	84.4	96.7	94.1	71.7	81.7
RC(MHT)	Medium-High-Tech Products	69.1	84.8	96.2	63.8	74.4
RC(MLT)	Medium-Low-Tech Products	58.1	85.9	73.7	44.1	55.9
RC(LT)	Low-Tech Products	22.9	71.3	41.6	12.2	34.4
RA-RE	Average	38.2	57.9	76.8	31.9	42.3

In More Detail

CPA Codes	PRODUCTS	Intermediate Consumption	Final Consumption	Gross Capital Formation	Exports	Supply
R17	Paper and paper products	55.2	95.5	0.0	82.4	64.2
R19	Coke and refined petroleum products	98.1	93.6	233.0	100.0	99.9
R20	Chemicals and chemical products	73.3	82.7	0.0	59.9	68.4
R21	Basic pharmaceutical products and pharmaceutical preparations	79.9	98.0	100.0	60.0	77.3
R22	Rubber and plastic products	58.4	99.1	91.7	54.4	63.7
R24	Basic metals	72.2	0.1	0.5	37.1	50.6
R26	Computer, electronic and optical products	89.7	91.4	93.7	79.4	85.2
R27	Electrical equipment	84.4	86.0	97.9	52.9	75.2
R28	Machinery and equipment n.e.c.	55.9	49.4	103.9	59.3	80.0
R29	Motor vehicles, trailers and semi-trailers	30.2	97.6	124.9	82.9	83.2

Import Shares in the Intermediate Output, %

CPA Code	Products	RA	RBDE	RC(HT)	RC(MHT)	RC(MLT)	RC(LT)	RF	RG	GH	RO	RP	RQ	R
RA	Agriculture	9.3	49.6	96.8	19.6	6.7	22.6	3.1	7.9	55.9	0.3	0.4	2.6	12.3
RBDE	Mining and Utilities	1.2	41.8	0.1	7.5	31.2	0.3	18.3	0.2	1.5	0.6	0.3	0.3	1.1
RC(HT)	High-Tech Products	23.2	65.8	98.9	95.3	85.2	99.7	84.5	67.2	85.2	79.0	78.9	96.8	80.4
RCMHT	Medium-High-Tech Products	56.6	66.7	67.3	85.0	82.7	86.5	71.3	46.6	56.6	54.4	58.1	55.6	57.6
RCMLT	Medium-Low-Tech Products	73.9	46.5	52.4	51.6	70.9	60.6	40.7	48.4	75.5	29.0	24.6	20.5	47.7
RCO	Low-Tech Products	6.3	13.7	35.6	44.2	41.7	30.3	4.5	16.4	16.8	25.2	10.3	16.3	13.4
RF	Construction	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
RG	Trade	0.8	1.5	45.8	2.5	1.4	3.0	0.5	0.5	10.0	0.5	0.5	0.6	0.8
GH	Transportation	1.2	2.8	3.0	1.8	1.4	1.3	2.2	4.6	13.2	7.1	8.2	1.8	27.0
RO	Government	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.7	0.1	2.0	0.1
RP	Education	0.1	5.4	17.7	0.2	2.9	1.7	0.2	2.7	30.1	0.0	0.7	0.6	7.2
RQ	Health and Social Work	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
R	Other Services	4.2	2.9	34.8	3.5	4.6	6.6	3.1	7.5	19.5	3.1	9.6	6.5	14.4

Simple IO Model

- Output = $(I - A)^{-1}$ ([Final Demand] – Imports)

- [Final Demand] = [Final Demand]$_0$ + Δ[Final Demand]

- Imports = Imports$_0$ + ΔImports

Scenarios

Increase in exports in an industry by 100 mln EUR (about 1% of Exports):

- Increase in exports does not increase imports (standard output multipliers) – ONLY EXPORTS

- Increase in exports implies increase in imports less than before (import share is smaller than in the base year) – PARTLY IMPORTS

- Increase in exports implies increase in imports (import share the same as in the base year) – CONSTANT IMPORT SHARE

Scenarios

	Only exports	Partly imports		Constant import share	
	Increase in exports by 100 EUR	Increase in imports	Net exports	Increase in imports	Net exports
High-Tech Products	100.0	35.9	64.1	71.7	28.3
Medium-High-Tech Products	100.0	31.9	68.1	63.8	36.2
Medium-Low-Tech Products	100.0	22.1	77.9	44.1	55.9
Low-Tech Products	100.0	6.1	93.9	12.2	87.8

Scenarios Results

	Only exports		Partly imports		Constant import share	
	d(Output), %	d(Imports), %	d(Output), %	d(Imports), %	d(Output), %	d(Imports), %
High-Tech Products	0.61	0.59	0.39	0.76	0.17	0.92
Medium-High-Tech Products	0.72	0.55	0.49	0.71	0.26	0.87
Medium-Low-Tech Products	0.78	0.68	0.61	0.76	0.44	0.84
Low-Tech Products	0.75	0.46	0.70	0.49	0.65	0.53

Conclusions

- There are large import shares in manufacturing product exports due to the transit flows. Therefore the increase in exports has to be analysed with causion.

- It is not possible to evaluate the efficiency of export policy only by looking at the export data.

- Increase in competitiveness should decrease the import shares.

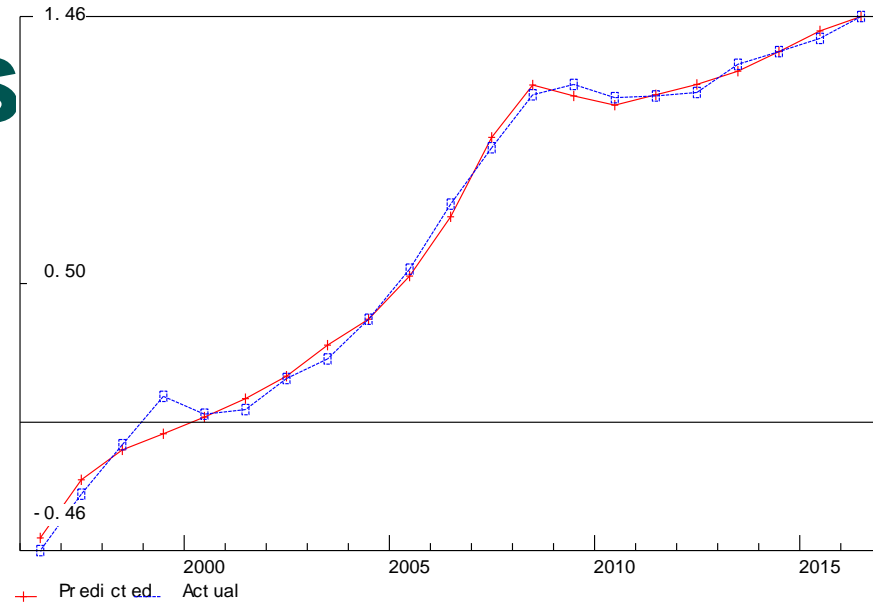# Latvian Model of Development (LMD)

Present Stage
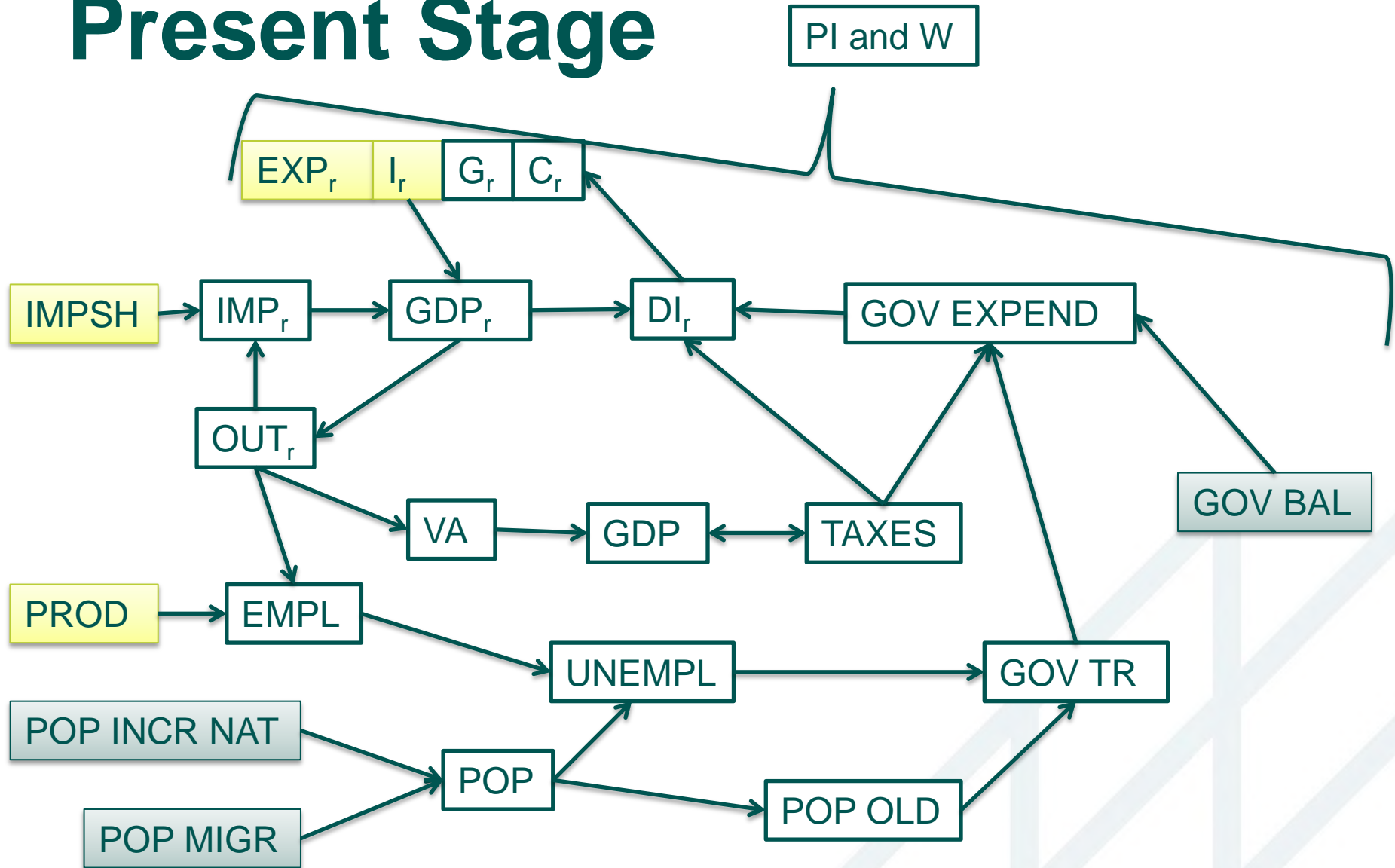
Industry Aggregation

- Agriculture
- Industry
- Manufacturing
- Construction
- Trade and hospitality
- Transport
- Public administration
- Education
- Health care
- Other services

Some Equations

Government Transferts

:   Government Transferts

```
SEE   =        0.04 RSQ  = 0.9952 RHO =   0.17 Obser  =   21 from 1996.000
SEE+1 =        0.04 RBSQ = 0.9947 DW  =   1.67 DoFree =   18 to   2016.000
MAPE  =      18.07
```

Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta
0 @log(G_E_TR/(POP_PENS+UNEMPL))	– – – – – – – – – – – – – – – –				0.66	– – –
1 intercept	-8.58607	38.1	-13.06	208.97	1.00	
2 @log(W/PI_CPR)	1.08834	46.9	14.40	1.97	8.69	0.522
3 @log(PI_CPR)	0.97119	40.3	-0.33	1.00	-0.23	0.478

Some Equations

Taxes on Products Revenues
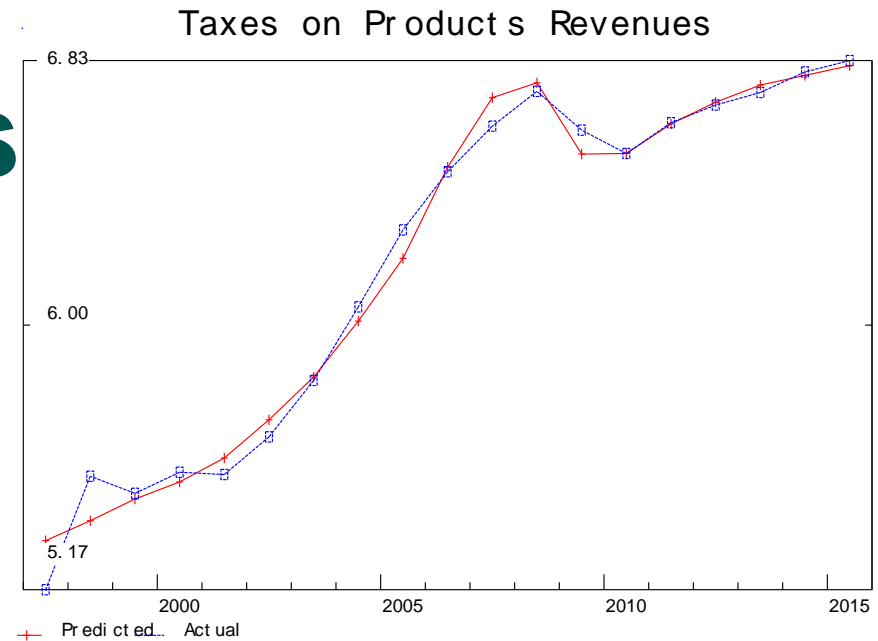

```
:                              Taxes on Products Revenues
  SEE   =         0.06 RSQ   = 0.9866 RHO =  -0.00 Obser  =    19 from 1997.000
  SEE+1 =         0.06 RBSQ  = 0.9858 DW  =   2.01 DoFree =    17 to    2015.000
  MAPE  =         0.78
     Variable name          Reg-Coef  Mexval  Elas    NorRes      Mean    Beta
  0 @log(TAX_PROD)          - - - - - - - - - - - - - - - -       6.20  - - -
  1 intercept              -3.28296   212.5  -0.53    74.36       1.00
  2 @log(U_HCES)            1.05116   762.3   1.53     1.00       9.02   0.993
```

Thank you

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