

AEIOU

Towards a new Austrian INFORUM model

General characteristics

Interindustry model according to the INFORUM philosophy

Based on the input-output identities, bottom-up

INFORUM software

Data oriented, attempt to make use of all empirical evidence available in Austria

Designed as a flexible, general purpose instrument

Present stage: Under construction

Accounting framework - IO core

Base year 2001

Set of commodity by commodity tables
total deliveries
imports

Full set of matrices for trade and transport margins,
commodity taxes and commodity subsidies

Value added by components and commodities
as well as by activities

Employment by types and commodities
as well as by activities

Accounting framework - IO core

Standard EU classification with a few exceptions:

Aggregations:

NACE/CPA 01 + 05	Products of agriculture and fishing
NACE/CPA 60 + 61	Land transport and water transport

Disaggregation:

NACE/CPA 40.1	Electricity
NACE/CPA 40.2 and 40.3	Gas, steam and hot water

Accounting framework - Final demand

Private Consumer Expenditures:

Nationals (Austrian in Austria)

Foreigners (Tourism)

Austrians abroad (global)

Private non profit institutions

Distinction between nationals and foreigners because of
different explanatory variables
different commodity structure

Public Consumption:

Individual Consumption

Collective Consumption

Accounting framework - PCE

PRIVATE CONSUMER EXPENDITURE IN AUSTRIA 2001

Table 2

Shares in total PCE in Austria; selected COICOP groups

COICOP		Austrians in Austria	Foreigners in Austria
1,1	Food	0,94	0,06
1,2	Non-alcoholic beverages	0,94	0,06
2,1	Alcoholic beverages	0,94	0,06
2,2	Tobacco	0,92	0,08
3,1	Clothing	0,93	0,07
4,1	Actual and imputed rentals for housing	1,00	0,00
5,1	Furniture, carpets and other floor coverings	0,97	0,03
7,3	Transport services	0,44	0,56
9,1	Audiovisual, photographic and information processing equipment	0,93	0,07
9,2	Other major durables for recreation and culture	0,97	0,03
9,4	Recreational and cultural services	0,64	0,36
11,1	Catering services	0,53	0,47
11,2	Accommodation services	0,53	0,47
12,1	Personal care	0,88	0,12
12,4	Social protection	1,00	0,00
12,5	Insurance	1,00	0,00
Total		0,89	0,11

Accounting framework - Final demand

Gross capital formation

Residential buildings

Other buildings

Machinery and equipment by activities NACE 01 to 37, NACE 45 (agriculture, manufacturing, construction)

Machinery and equipment by activities NACE 40 and 41 (utilities)

Machinery and equipment by activities NACE 50 to 55 (trade, hotel, rest.)

Machinery and equipment by activities NACE 60 to 64 (transportation)

Machinery and equipment by other activities

Transportation equipment by activities NACE 01 to 05 (agriculture, forestry)

Transportation equipment by activities NACE 10 to 55 (manufacturing, trade)

Transportation equipment by activities NACE 60 + 61 (transp. land, water)

Transportation equipment by activities NACE 62 (transportation air)

Transportation equipment by other activities

Productive livestock

Intangible fixed assets by activity NACE 92

Intangible fixed assets by all other activities

Accounting framework - Investment

Criteria for finding a manageable breakdown of investment by type of investment and groups of investors:

- o Relevance

- o Aggregates big enough to make sure that the investment decision of a single agent does not play a dominant role in the aggregate

- o Form clusters of investing industries which are characterized by the similarity in the commodity structure of the investment

Accounting framework - Investment

INVESTMENT IN EQUIPMENT

Relative importance of groups of investors

Table 3

Aggregation	Investors	Share 2001 in %
NACE 01 to NACE 37 plus NACE 45	Agriculture, Manufacturing, Construction	40
NACE 40,41	Utilities	6
NACE 50 to NACE 55	Trade, Hotel & Restaurants	13
NACE 60 to NACE 64	Transports	15
NACE 65 pp	Others	26
	Total	100

Accounting framework - Investment

INVESTMENT IN EQUIPMENT

Table 4

Column Shares of Final demand (Purchaser Prices) 2001

		Investors				
CPA	Most important commodity groups	NACE 01 to 37 and 45	NACE 40,41	NACE 50 b 55	NACE 60 b 64	NACE 65 pp
17	Textiles	0,000	0,000	0,001	0,000	0,001
25	Rubber and plastic products	0,002	0,007	0,006	0,002	0,005
26	Other non-metallic mineral products	0,001	0,011	0,006	0,002	0,001
27	Basic metals	0,001	0,014	0,000	0,004	0,000
28	Fabricated metal products	0,128	0,147	0,084	0,090	0,033
29	Machinery and equipment	0,668	0,157	0,186	0,118	0,280
30	Office machinery and computers	0,063	0,009	0,223	0,032	0,281
31	Electrical machinery and apparatus	0,029	0,365	0,022	0,151	0,013
32	Radio, TV and communication equipment	0,014	0,003	0,035	0,455	0,048
33	Med., precision, opt. instruments, watches, clocks	0,056	0,201	0,059	0,050	0,157
34	Motor vehicles, trailers and semi-trailers	0,000	0,000	0,000	0,000	0,000
35	Other transport equipment	0,000	0,000	0,000	0,000	0,001
36	Furniture other manufactured goods	0,038	0,013	0,372	0,037	0,181
Others		0,001	0,072	0,006	0,058	0,001
Total		1,000	1,000	1,000	1,000	1,000

Accounting framework - Investment

INVESTMENT IN VEHICLES

Table 5

Relative importance of groups of investors

Aggregation	Investors	Share 2001 in %
NACE 01 to NACE 05	Agriculture, Forestry	7
NACE 10 to 55	Manufacturing, Trade, Hotels	15
NACE 60, 61	Transportation land	20
NACE 62	Transportation air	5
NACE 63 pp	Others	53
	Total	100

Accounting framework - Investment

INVESTMENT IN VEHICLES

Table 6

Column Shares of Final demand (Purchaser Prices) 2001

		Investors				
CPA	Most important commodity groups	NACE 01 to 05	NACE 10 to 55	NACE 60, 61	NACE 62	NACE 63 pp
29	Machinery and equipment	0,939	0,000	0,000	0,000	0,000
34	Motor vehicles, trailers and semi-trailers	0,060	0,974	0,485	0,002	0,967
35	Other transport equipment	0,002	0,006	0,498	0,998	0,019
50	Trade and repair services of motor vehicles etc.	0,000	0,018	0,016	0,000	0,014
Others		0,000	0,003	0,001	0,000	0,001
Total		1,000	1,000	1,000	1,000	1,000

Accounting framework - Investment

INVESTMENT IN INTANGIBLE FIXED ASSETS

Table 7

Relative importance of groups of investors

Aggregation	Investors	Share 2001 in %
NACE 92	Recreational, cultural and sporting services	11
All other industries	All other industries	89
	Total	100

INVESTMENT IN INTANGIBLE FIXED ASSETS

Table 8

Column Shares of Final demand (Purchaser Prices) 2001

Investors	
NACE 92	Others
0,105	1,000
0,895	0,000
0,000	0,000
1,000	1,000

CPA Most important commodity groups

72	Computer and related services	0,105	1,000
92	Recreational, cultural and sporting services	0,895	0,000

Others

Total

Accounting framework - Final demand

Other final demand categories:

Acquisitions less disposals of valuables
Changes in inventories

Exports, goods
Exports, services

Statistical discrepancy

Accounting framework

Value added

Compensation of Employees
Social Security Contributions of employers
Other Taxes on Production
Other Subsidies on Production
Depreciations
Operating Surplus, net

Employment

Full time equivalents
 Employed
 Selfemployed
Number of jobs
 Employed
 Selfemployed

Accounting framework – Accountant PH

	Wages and salaries *)
+	Employers' social contributions *)
+	Mixed income (share in operating surplus of self-employed persons) **)
+	Property income received
-	Property income paid
-	Taxes on income and wealth
-	Social contributions
+	Social benefits
+	Transfers received
-	Transfers paid
+	Net change in claims
=	Disposable income

*) Direct link to value added

**) Link to value added

Behavioural equations – PCE

PADS approach, main explanatory variables:

Totpce Sum over all real private consumption expenditures of Austrian residents

$ppce(i) = pcen(i) / pce(i)$ chained price index for group $i = 1, \dots, 37$; (2001 = 1)

tppce Chained price index of Totpce (2001 = 1)

$ppceg(j)$ Chained group price indices of sums of COICOP-groups ($j = 1, \dots, 13$); (2001 = 1)

Behavioural equations – PCE

Standard equation:

$$q_i = \left(a_i + b_i \frac{y}{P} + c_i t \right) \left(\frac{p_i}{P_G} \right)^{-\lambda_{Gi}} \left(\frac{p_i}{P} \right)^{-\lambda_{0i}}$$

Experiments with alternative specifications and restrictions

Examples given

The shares refer to the share of the COICIP group in total consumption

COICOP		Average share	Share in 2003
4.1	Rent, water etc	0.1439	0.1426
1.1	Food	0.1160	0.0927
3.1	Clothing	0.0734	0.0586
13	Consumption abroad	0.0665	0.0728
7.2	Operation of vehicles	0.0636	0.0562
11.1	Catering	0.0505	0.0497
4.3	Housing maintenance	0.0409	0.0380
7.1	Purchase of vehicles	0.0392	0.0430

Consumption expenditures by Austrians – Actual and imputed rentals for housing, water supply and misc. services related to dwelling (04.1+2+4)

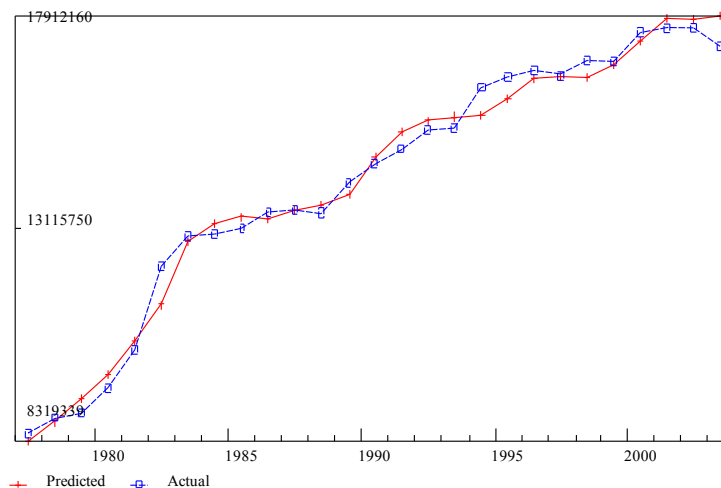
$$\text{nlp pce7} = (\text{a0} + \text{a1} * \text{Totpce} + \text{a2} * \text{pce7}[1]) * @\text{pow}(\text{ppce7} / \text{ppceg4}, \text{a3})$$

Param	Coef	T-value	StdDev
a0	-4198033.000000	-22.15	189521.437500
a1	0.091535	9.18	0.009970
a2	0.638043	9.73	0.065545
a3	-0.789460	-7.35	0.107377

Consumption - rent, water etc (04.1+2+4)

1977 2003

SEE = 333515.093750



Consumption expenditures by Austrians - Food (01.1)

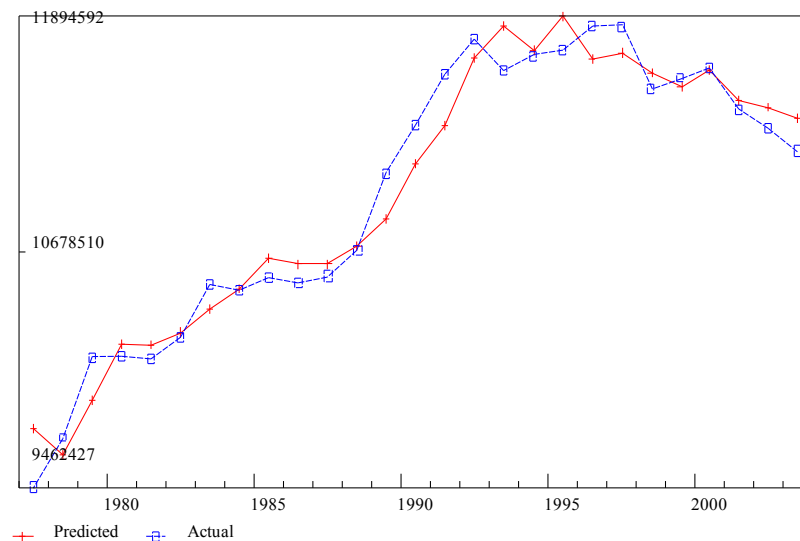
$$\ln pce1 = (a0 + a1 * Totpce + a2 * pce1[1]) * @pow((ppce1 / tppce), a3) * @pow((ppce1[1] / tppce[1]), a4)$$

Param	Coef	T-value	StdDev
a0	301835.437500	2.80	107737.750000
a1	0.013584	1.53	0.008855
a2	0.833943	9.34	0.089292
a3	-0.356845	-2.02	0.176616
a4	0.550673	2.85	0.193033

Consumption - Food (01.1)

1977 2003

SEE = 143452.406250



Investment

Variables:

totcap(j)R	Real investment expenditures for category j (chained to 2001)
totcap(j)P	Price index of investment expenditures of category j (chained, 2001 = 1)
outc(j)ag	Real gross production of sector j (chained to 2001)
outp(j)ag	Price index of gross production of sector j (chained to 2001=1)
zins	Interest rate in percent*100
totcap(j)d	Depreciation rate of capital good j (= 1/ period of use in years)
cap(j)co	User costs of capital (nominal) for category j defined by $\text{totcap}(j)P * (\text{zins}/100 + \text{totcap}(j)d - @d(\text{totcap}(j)P)/\text{totcap}(j)P[1])$
Trend	Starting with 0 in year 1976, dummy variables

Cyclical variables:

cos10, sin10	(Co)sinus with period of 10 years
cos2_29, sin2_29	(Co)sinus with period of 29/2 years
cos5, sin5	(Co)sinus with period of 5 years

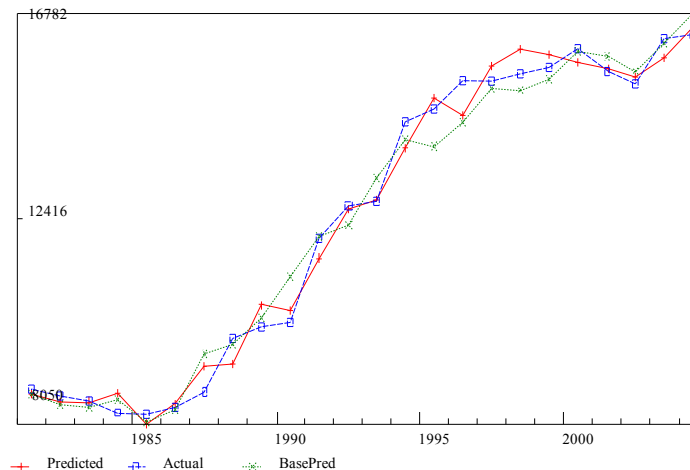
Example: largest group (investment in residential buildings)

Investment - Residential buildings

$r_{totcap1R} = totcap1R[1], totcap1R[3], totcap1R[5], outclag[4], caplco/outplag$

	Name	Reg-Coef	t-value	Elas	Mean
0	totcap1R	-	-	-	12407.21
1	intercept	1709.22145		0.14	1.00
2	totcap1R[1]	0.54574	3.866	0.53	12085.69
3	totcap1R[3]	0.63289	3.062	0.58	11453.11
4	totcap1R[5]	-0.58943	-4.132	-0.51	10828.91
5	outclag[4]	0.25376	3.722	0.38	18417.71
6	caplco/outplag	-25813.8765	-2.903	-0.12	0.06

Investment - Residential buildings



1981 2004

Obser = 24 DoFree = 18

SEE = 353.42 SEE+1 = 331.48

RSQ = 0.9870 RBSQ = 0.9834

RHO = -0.34 DurH = -2.32

MAPE = 2.45

Labour demand and wages

- Exogenous labour supply
- Sector labour demand (employment coefficients) as functions of real wage rates (labour costs) and other variables
- Nominal wage rates of sectors depend on total wage rate
- Total wage rate depends on consumer price inflation and unemployment rate

Total wage rate (in d(logs))

r dlnwagerate = dlntppce, dlnwagerate[1], lnwagerate[2], lnwagerate[3], dlnunemp[1]

	name	Reg-Coef	t-value	Elas	Mean
0	dlnwagerate	-	-	-	0.04
1	intercept	0.09627		2.44	1.00
2	dlntppce	0.35392	1.920	0.25	0.03
3	dlnwagerate[1]	0.59729	3.388	0.63	0.04
4	lnwagerate[2]	-0.39742	-2.146	-29.83	2.97
5	lnwagerate[3]	0.37244	2.048	27.54	2.92
6	dlnunemp[1]	-0.01765	-0.959	-0.02	0.05

total wage rate

1979 2004

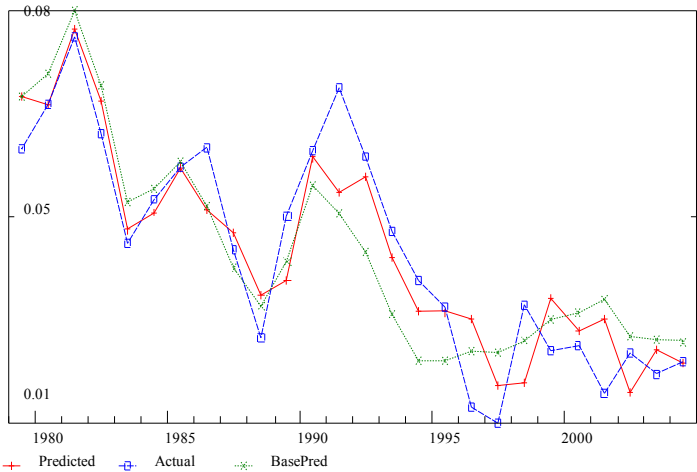
Obser = 26 DoFree = 20

SEE = 0.01 SEE+1 = 0.01

RSQ = 0.825 RBSQ = 0.7818

RHO = -0.05 DurH = -0.55

MAPE = 21.83



Employment coefficient - Construction (45)

r dlnempouta45 = dlnrwagva45, lnempouta45[1], lnrwagva45[1], lnrwagva45[2], trend

	Name	Reg-Coef	t-value	Elas	Mean
0	dlnempouta45	-	-	-	-0.02
1	intercept	3.20530		-171.80	1.00
2	dlnrwagva45	0.24632	0.717	-0.08	0.01
3	lnempouta45[1]	-0.41749	-2.467	179.46	8.02
4	lnrwagva45[1]	-0.79815	-2.754	145.17	3.39
5	lnrwagva45[2]	0.87797	2.630	-159.35	3.39
6	trend	-0.00886	-3.219	7.60	16.00

Employment coefficient (45)

Construction work

1978 2004

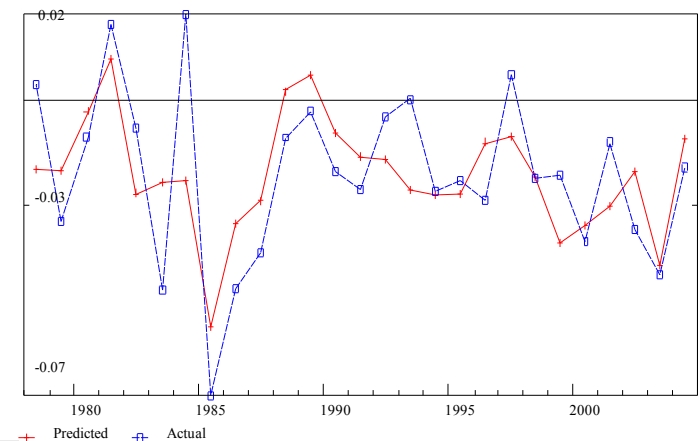
Obser = 27 DoFree = 21

SEE = 0.02 SEE+1 = 0.01

RSQ = 0.4496 RBSQ = 0.3185

DW = 2.50 RHO = -0.25

MAPE = 571.83



Imports

Use is made of detailed import matrices for intermediate demand and final use

Treat demand pull and structural effects on imports differently from impact of changes in commodity and user specific market shares of imports versus domestically produced goods

Two step procedure:

- 1) Calculate hypothetical imports (assume constant market shares)
- 6) Ratio of actual to hypothetical imports explained by relative import to domestic prices and other variables

Note: only very short time series available (1996 – 2004)

Thank you for your attention