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2nd Comment on "The Austrian Quarterly Model of the OeNB, WIFO-Macromod and Macroeconometric Model-Lima (IHS)"

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This block entailed presentations of three large structural econometric models, produced and used by the OENB, the IHS and the WIFO. The objective of this session was to illustrate the forecast properties of the three models by means of three representative shocks (fiscal, monetary and external demand shocks). Although an assessment of the forecast performance of any model would require additional information (such as e.g. recent residual paths), it is nevertheless fair to say that such a model comparison exercise through shock evaluation gives also important information about the forecast performance of the models. First of all, this is because the starting point of a forecast is never that of an equilibrium, and the exogenous assumptions underlying the forecast have sometimes the nature of economic shocks.

This part of the discussion aims to highlight the main model features that are key for the transmission of the shock. Although not comprehensive, we identified four main channel categories. These will be discussed in more detail below. Summary tables provide an overview regarding the simulation properties of the three models.

1. Imports

Imports represent a key crowding-out mechanism for any given shock. All three models include standard import equations which model imports as a function of domestic demand and price competitiveness. A positive feature of all three models is that they use weights derived from Input / Output tables for a weighted import demand indicator. This is important, as this specification allows imports to react differently to changes in the individual final demand components. However, even though all three models have used the 1995 I/O table for the calculation of the weights, the export weights differ (IHS: 0.48, OENB: 0.54, WIFO: 0.33), so that some differences in the import crowding-out effects can be attributed to the

different weights. Another important issue in this respect is the elasticity of imports with respect to activity, i.e. with respect to the weighted import demand indicator.

Theory or steady-state consistency implies unit elasticity, but data suggests an elasticity of significantly higher than one. This is an effect of globalisation and trade integration in the course of the last decades. However, this exogenous process can also be incorporated by means of a deterministic trend. Although, seemingly similar for describing the data in-sample, out-of-sample forecast or policy simulation implies hugely different multipliers for the two alternative specifications. The IHS model displays a medium-run elasticity which is larger than one. The OENB model incorporates a unit restriction and includes a deterministic trend, which accounts for exogenous import growth of 0.5% p.a. The WIFO model also uses unit elasticity but without including a trend, which implies presumably a compromise in terms of fitting the data.

2. Consumption

Consumption plays a role for the speed of transmission of a shock, as it tends to be the most sticky GDP component, reflecting a tendency for consumption smoothing. The quarterly OENB model has a coefficient on the lagged endogenous variable of 0.26, whereas the two annual models of the IHS and the WIFO do not include the lagged endogenous variable. The difference between the annual and the quarterly model also plays a role for the interpretation of the coefficient on the error correction term. The quarterly error correction in the OENB model is 0.1, which is in annual terms higher than the 0.2 displayed in the two annual models. The speed of adjustment also depends on the coefficient on contemporaneous income, which appears to be relatively small in all three models. Both features above imply that any shock would initially have a relatively strong impact on the savings ratio.

Long-run homogeneity is in the OENB imposed with respect to the sum of income and wealth. The WIFO model displays a long-run elasticity of 1.1, where it may not be possible to reject homogeneity statistically. The IHS model has no restriction across the three sub-components of consumption, but the individual elasticities suggest the homogeneity may also fit the data.

3. Investment

Contrary to the cushioning role of consumption, investment is normally expected to work as an accelerator. The size of this accelerating effect depends largely on the short-run coefficient on activity. Both, the IHS and the WIFO model entail a disaggregation of investment. The individual components in the IHS model exhibit elasticities between 1.3 and 2.6, and in the WIFO model between 1.3 and 1.8. The short-run elasticity in the OENB model is relatively small (1.1). The long-run accelerator effects also differ significantly. The OENB model entails a theory-

consistent unit elasticity, the IHS model displays elasticities for the investment components which range also around unity, whereas the WIFO model shows a long-run elasticity of 2.

The role of the interest rate and user cost of capital is very small or even insignificant in the IHS model, whereas the other two models enter the long-run capital accumulation specification in a theory-consistent way.

4. Labour Market

The labour market channel is important first in view of the adjustment of labour demand to output shocks. The elasticities in the short-run labour demand equations are quite similar in the IHS and the WIFO model (about 0.4), whereas the OeNB model entails are more sluggish response in the short run (0.2).

The second important labour market channel is the Phillips curve effect. The short-run adjustments are modelled in different ways, the OeNB model is the only one which assumes explicitly a long-run vertical Phillips curve.

Table 1 below summarises the main differences across the three models in the context of the four channels outlined above. Table 2 summarises the differences between the three models regarding their responses to three representative shocks. Table 3 is an overall summary with general comments for all three models.

Table 1: Main Transmission Channels

Main Channel Category	Sub-category	IHS	OENB	WIFO
Imports	Activity variable (role of exports?)	I/O weighted import demand (export weight 0.48)	I/O weighted import demand (export weight 0.54)	I/O weighted import demand (export weight 0.33)
	Elasticity w.r.t. activity	1.35 (medium-run?)	SR: 0.8, LR: 1	1
	Deterministic trend	–	0.5% p.a.	–
Consumption	Lagged endogenous	0	0.26	0
	Contemporaneous income	0.291 (CS), 0.452 (CND), 1.846 (CD)	0.19	0.35
	Long-run income effect	Not restricted across 3 sub-components, probably about one.	0.93, homogeneity w.r.t. income plus wealth	1.12
	ECT coefficient	–0.186	–0.09	–0.21
	Other variables	Interest rate in equation for consumer durables.	Long-term interest rate in long-run Relationship (coefficient -0.6). Wealth effect (small)	–
Investment	Accelerator	SR 2.61(IFE)/1.25(IFC), LR 1.39 (IFE) / 0.792(IC)	SR coefficient 1.11, long-run supply-side determined (implicit elasticity is 1)	SR 1.76 (IPM) / 1.32 (IPC), LR 2.0(IPM / IPC)
	Role of Interest rate	Very small (insignificant) coefficient	User cost of capital in long-run (equilibrium) relationship, not SR	User cost of capital in long-run (equilibrium) relationship
	User cost of capital specification	–	Function of nominal interest rate, 1:1 relationship prices to real interest rates	Function of nominal interest rate, 1:1 relationship prices to real interest rates
Labour market	Elasticity of Employment w.r.t. GDP	SR: 0.435, LR: 1	SR: 0.20, long-run supply-side determined (implicit elasticity is 1)	SR: 0.41 (no LR)
	Wages – Phillips curve effect (productivity/unemployment rate)	Through unemployment rate, no unit labour cost effect exacerbates output effect	Through employment gap in the short-run, long-run vertical Phillips curve	Productivity 0.29 (dynamic LR 0.41), long-run effect from prices smaller than unity

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Table 2: Comparison of Representative Shocks

	IHS	OENB	WIFO
Fiscal Shock	➢ Almost full multiplier effect in Y1 (1.5%), rising to 1.6% in Y3. ➢ High and lasting price effect from wages ➢ Not clear where negative effect on income comes from (with positive real wage and employment effect) ➢ Why is consumption staying high?	➢ 1.1% in Y1, rising to 1.6% in Y4 ➢ Usual caveat of real interest rate effect on investment ➢ Price effect seems on the high side, coming from ULC, as employment reacts strongly (1:1 to GDP) ➢ Import crowding out relatively strong, which is surprising given (i) a lower elasticity w.r.t. GDP and (ii) a rise in the import deflator.	➢ Almost full multiplier effect in Y1 (1.2%), rising to 1.3% in Y3 ➢ Strong investment cycle leads to relatively strong negative GDP effect towards the end of the simulation horizon ➢ Lasting investment effect seems also at odds with real interest rate effect ➢ Strong and continuing decline in the savings ratio after Y5 ➢ Price effect comparatively small, but reasonable
Monetary Shock	➢ Price/wage effect permanent (although small)? ➢ Not clear where positive income effect comes from (with negative real wage and employment effect) ➢ Instantaneous negative impact on consumption in spite of higher real income	➢ Investment down through user cost of capital ➢ Consumption is taking over as main negative contributor to the fall in GDP from Y2/Y3. Why is there no favourable effect on disposable income from lower prices? ➢ Negative income effect from employment, why is there no favourable impact from the supply side (relative factor costs)?	➢ Bumpy GDP profile, possibly from strong factor substitution (capital/employment?) ➢ Price effect not in line with central bankers views (and hopes). ➢ Positive investment effect from Y3 onwards
Foreign Shock	➢ Size of shock not clear (exports up by ~1.5%) ➢ High and lasting price effect from wages ➢ Why is consumption departing substantially from the income path? ➢ Not clear where negative income effect (after Y5) comes from (with positive real wage and employment effect)	➢ Why is there such a comparatively low contribution from the trade balance? ➢ Size of employment effect equal to GDP effect, i.e. no productivity effect	➢ Exports exogenously shocked (not foreign demand), which seems better in view of high elasticity of exports w.r.t. foreign demand ➢ Strong investment cycle leads to relatively strong negative GDP effect towards the end of the simulation horizon

Table 3: General Comments on Simulation Properties

General Comments	IHS	OENB	WIFO
	➢ Effects instantaneous, richer dynamics would be more reasonable, especially when used for forecasting ➢ Income effect not corresponding to wage / employment developments ➢ Consumption departing from income path ➢ Output has strong impact on wages ➢ No steady-state consistency, e.g. no long-run homogeneity or unit elasticities where necessary ➢ Non-unit elasticities lead sometimes to permanent effects of shocks ➢ Productivity doesn't enter wage equation?	➢ Strong employment reaction seems to be entirely demand-driven. The supply-side effect through wages / ULC seems to be weak ➢ Employment reaction also distorts picture of price effects through ULC	➢ Why are imports not following the GDP path? ➢ How does import equation fit data with unit elasticity and no inclusion of a trend?