

COSMO and Capacity Output

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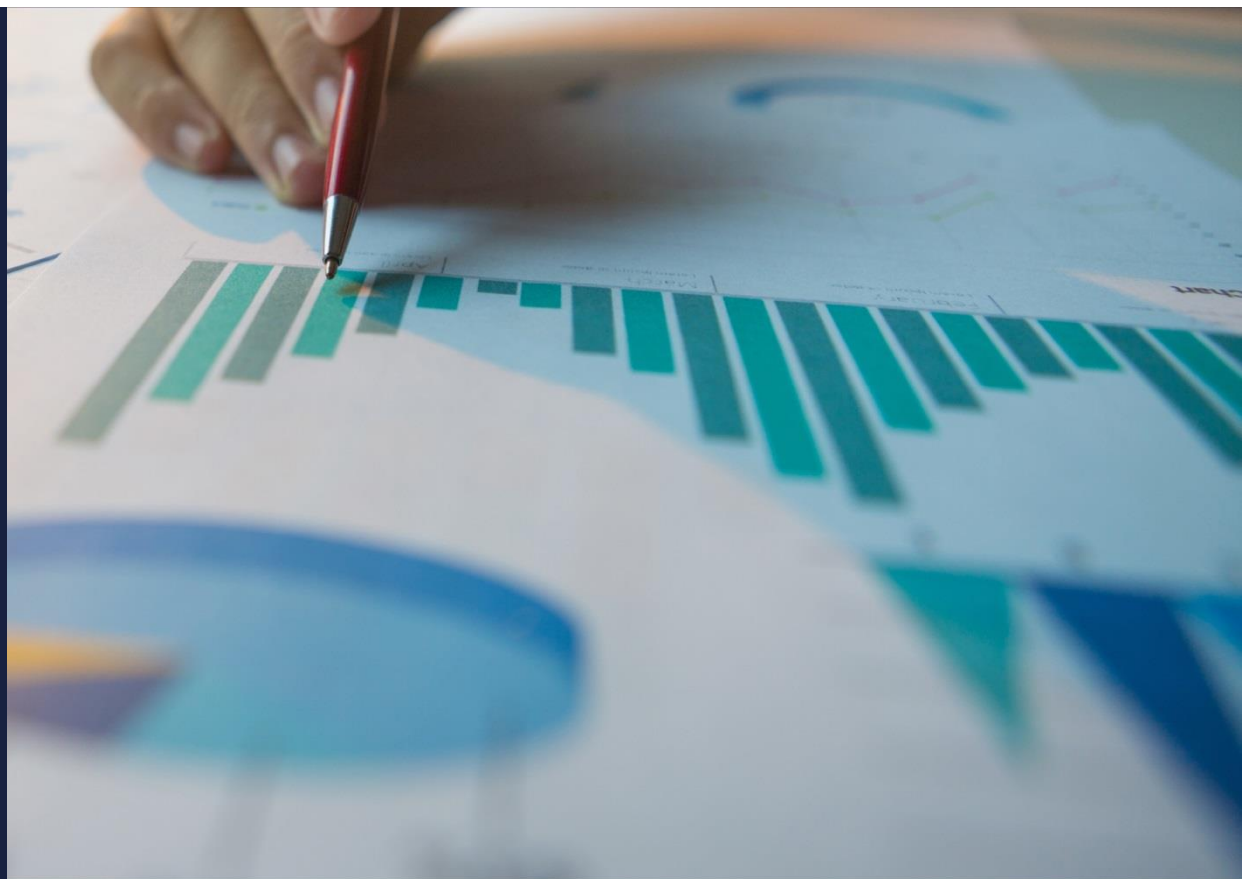
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VENUE

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Capacity Output: Approach

- Range of approaches to estimating potential output
- Our approach: use macro-model
- Advantages of a macro model-based approach:
 - Has a theoretical structure (with econometrically estimated parameters and dynamics)
 - Economy returns to long-run equilibrium
 - Sustainability: need to consider all key markets in economy
 - Can take account of specific features of Irish economy
 - e.g. openness of labour market

COSMO Structure – Sector Composition

- Sector definitions derived from Supply and Use tables
 - Traded: at least 50% of Total final uses (excluding change in stocks) exported
 - Manufacturing (C, 10-33), Information and communication (J, 58-63), Financial and insurance activities (K, 64-66), Legal etc, Scientific R&D, Advertising etc (M, 69-75), Admin and support (N, 77-82)
 - Government: at least 50% of Total final uses (excluding change in stocks) used as government consumption
 - Public admin and defence (O, 84), Education (P, 85), Human health and social work (Q, 86-88)
- Non-traded is everything else

COSMO Structure – Capacity

- Underlying production function drives medium-term growth
- Productive capacity in each sector is described by a 3-factor normalised nested (KE) L CES production function with constant returns to scale and labour augmenting technical progress:

$$Y_i = \gamma_{1i} [\delta_{1i} Z_i^{-\rho_{1i}} + (1 - \delta_{1i}) (L_i e^{\lambda_i t})^{-\rho_{1i}}]^{-1/\rho_{1i}}$$

$$Z_i = \gamma_{2i} [\delta_{2i} K_i^{-\rho_{2i}} + (1 - \delta_{2i}) E_i^{-\rho_{2i}}]^{-1/\rho_{2i}}$$

- Sectors (i): Traded, Non-Traded, Government
- Three factors (K, E, L): Net productive capital stock, fossil fuel consumption and total hours
- Two-levels (Z, L): capital/energy composite and labour

Estimation of Production Function

- Estimate key parameters of the production function *indirectly* from the factor demand system (Barrell and Pain, 1997)
- Factor demands derived from FOC of sectoral production function profit max condition
- Labour Demand:
$$\ln L_i = c + \ln y_i - \frac{1}{1 + \rho_{1i}} \ln \frac{w_i}{p_i} - \frac{\rho_{1i}}{1 + \rho_{1i}} \lambda_i t$$
$$= c + \ln y_i - \sigma_{1i} \ln \frac{w_i}{p_i} + (\sigma_{1i} - 1) \lambda_i t$$
- Identify elasticity of substitution through labour demand side, testing for differences across sectors
- Test constant returns to scale assumption

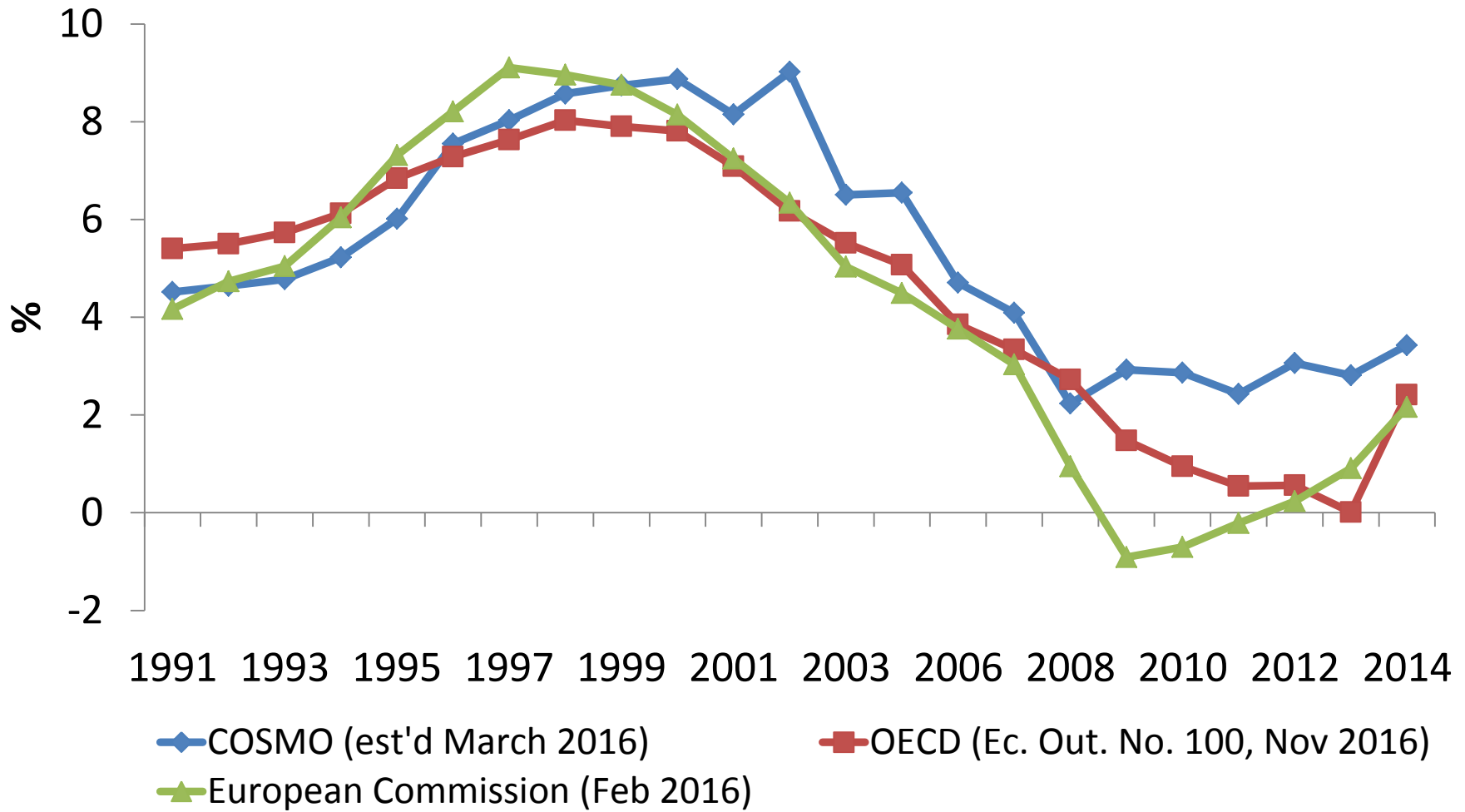
Estimation of Production Function

- Want lambda to vary over time. Invert labour demand equation and solve for lambda (assume $\sigma_{1i}=0.5$, if final estimate is different we can iterate). Gives a series for labour productivity adjusted for wage growth.
- Estimate of σ_{1i} is around 0.5
- Desired Capital/Energy ratio (substitute investment)

$$\ln \frac{I_i}{E_i} = c_{2i} - \frac{1}{1 + \rho_{2i}} \ln \frac{R_i}{POE}$$

- Rest is calibrated from data – dependent on sample period

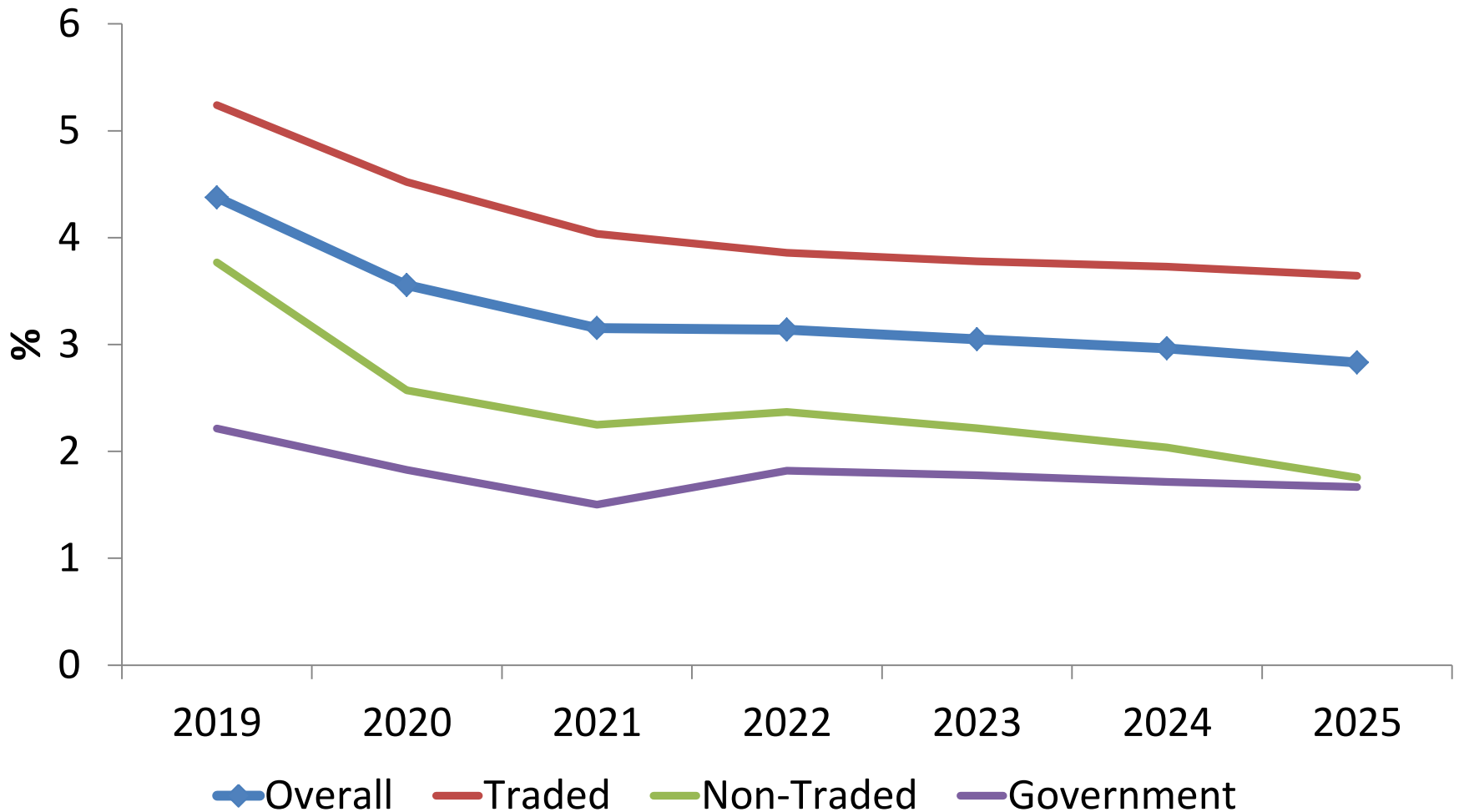
Potential Output Growth Estimates



Adjustment towards capacity

- Model both demand and supply sides of output
 - Traded production = $f(\text{external demand, competitiveness})$
 - Non-traded production = $f(\text{domestic demand})$
 - Government production = policy choice
- Tensions between supply and demand feed back into prices (incl. wages) to guide output towards capacity
- Role of migration in an open labour market

Projections of Capacity Output Growth



Projections of Capacity Output Growth

		2018	2019	2020	2021	2022
COSMO	<i>Economic Outlook, 2016</i>	4.9%	4.4%	3.6%	3.2%	3.1%
Dept. of Finance	<i>Economic and Fiscal Outlook, Budget 2018</i>	4.5%	4.4%	3.6%	3.1%	
European Commission	<i>Autumn 2017</i>	4.9%	4.7%	4.1%	3.5%	3.2%
OECD	<i>Economic Outlook, No. 102, Nov 2017</i>	2.2%	2.3%			

Modelling the Impact of Brexit

- COSMO uses external projections from NiGEM
- NIESRs three long term Brexit scenarios provide three alternative international environments for Ireland
- We compare these scenarios to a ‘no-Brexit’ baseline to isolate the effects on the Irish economy
- Do not impose any balanced budget/solvency rules
- Ignore potential migration impacts, investment uncertainty or relocations, focus on trade

Long-run impact of Brexit on the Irish economy

	EEA	EFTA	WTO
<u>Percent deviation from Baseline Level:</u>			
Gross value added	-2.3	-2.7	-3.8
Gross value added, Traded sector	-2.6	-3.0	-4.3
Gross value added, Non-traded sector	-2.3	-2.7	-3.6
Exports	-3.0	-3.5	-4.9
Personal consumption	-2.2	-2.5	-3.4
Employed persons	-1.2	-1.4	-2.0
Average wage €	-2.2	-2.5	-3.6
<u>Deviation from Baseline:</u>			
Personal Consumption Deflator, %	-0.2	-0.2	-0.3
Personal savings rate, %	-0.3	-0.3	-0.5
Unemployment rate, %	1.2	1.4	1.9
General Government Balance, % GDP	-0.6	-0.8	-1.0

From Bergin et al. "Modelling the Medium- to Long-Term Potential Macroeconomic Impact of Brexit on Ireland". *The Economic and Social Review*, Vol 48, No 3, Autumn (2017)

The impact of Brexit on potential output

	After 10 years
<i>% deviation from baseline:</i>	
GDP	-3.7
Potential Output (Total)	-3.2
Potential Output (Non-traded)	-3.1
Potential Output (Traded)	-3.6

	After 10 years
<i>Contributions:</i>	
Potential Output (Total)	-3.2
of which:	
- Traded sector	-2.3
- Non-traded sector	-0.8
- Government sector	-0.1

- Focus on WTO scenario
- Larger fall on GDP than on potential output
- All sectors impacted
- Largest hit on the traded sector, as the main impact is loss of trade
- Importance of traded sector magnifies its impact on total loss

Potential output in the traded sector

	After 5 years	After 10 years
<i>% deviation from baseline:</i>		
Potential Output (Traded)	-2.8	-3.6
Energy (Traded)	-0.5	-1.6
Capital (Traded)	-1.8	-3.4
Labour (Traded)	-4.5	-4.6

	After 5 years	After 10 years
<i>Contributions:</i>		
Potential Output (Traded)	-2.8	-3.6
of which:		
- Energy (Traded)	0.0	-0.2
- Capital (Traded)	-1.1	-2.0
- Labour (Traded)	-1.6	-1.5

- Output is produced as a combination of three factors: net productive capital stock, fossil fuel consumption and total hours
- More intense decline of employment on the first five years
- Progressive contraction of capital due to reduced investment
- After 10 years, fall in capital is responsible of 55% of total decline, labour 41%