



INNODRIVE: Firm-Level Production of Intangible Assets

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Contents

- Some accountancy stuff
- Features of intangible assets
- The INNODRIVE expenditure approach



Definition of Production (Value added)

Source: *ESA95*

- Sales (minus intermediate consumption)
- Changes in inventories
- Own account production
 - Tangible
 - Intangible

May contain purchased assets, not capitalized correctly in the balance sheet.

Not dealt with in
INNODRIVE Micro

Unobserved
because of
accountancy rules
and measurement
problems



Making the Unobserved Observable

- Changes in the accounts

(*H = hidden, O = observed*)

- Value added

$$Y = Y_o + Y_H$$

- Investment

$$I = I_o + I_H \quad \text{with } I_H = Y_H$$

- Depreciation

$$D = D_o + D_H$$

- Wages

$$W = W_o$$

- Operating surplus

$$P = P_o - (I_H - D_H)$$

- Value added is higher now because so far hidden production of intangibles is included.
- Value added does not “increase” – the coverage of measurement increases



Features of Own Account Production

- Production == Investment
- Two (or more) production functions
 - Conventional production in line with the i
 - Own account production of assets = Investment
- No market valuation
 - Valuation at cost of production
- Cost of own account production
 - Wages
 - Intermediate consumption
 - Capital user cost

Valid for
tangible
and
intangible
production



Intangible Production

⇒ *CHS approach*

- Output not directly observable
 - Measured in using input values
 - Different from Valuation with input cost

Physical output can be measured. No market valuation.

➤ Wages

- Key to make output of intangible assets observable
- Conventional production
 - All personnel engaged in current production
- Intangible investment = production
 - Expenditures made in the expectation of future returns
 - Wages of the firm's personnel that is not engaged in current production



Intangible Production

⇒ *INNODRIVE approach*

- Cost in producing intangibles
 - Wages, as in CHS *plus*
 - Intermediate consumption
 - Material used in R&D,
 - Energy consumption, transport,
 - Rent for office space, research sites, etc.
 - Capital user cost
 - Office space and research sites if owned by the firm
 - Machinery in R&D, ICT equipment, etc.
- Not treated in INNODRIVE:
 - Capital user cost for Intangible capital
 - e.g. R&D production is using R&D capital



Can we live twice?

- We exclude that the same amount of input is used in both
 - Conventional production, and
 - Intangible production
- Labour and other input used to produce intangible assets is not any more available for current production
- It contributes to current production only via the asset it has produced and which becomes part of the stock of intangibles



Features of additional input

- Intermediate consumption and capital user cost
 - “Normal” expenditures made
 - No direct relation with intangibles needed
 - Put together with other input to produce intangibles
 - Fully observable but no a priori separable



Two different models in Innodrive

- Expenditure approach
 - Applies a production function derived from an external source (EU KLEMS)
- Performance approach
 - Tries an endogenous explanation of intangible investment based on the explained productivity – wage gap in the micro data (*my interpretation!*)
 - Work still in progress



Expenditure Approach

- Standard assumptions
 - Most perfect of all economic universes
 - CD production function (several others would generate similar results)
- Cost structure of market production is representative also for own account production
- EU KLEMS cost structures are applied to determine the production function



EU KLEMS industry proxies

- ICT goods
 - Nace 72: Computer and related activities
- R&D goods
 - Nace 73: Research and development
- OC goods
 - Nace 74: Other business activities



Intermediate Consumption per € of Labour Cost

Source: EU KLEMS 2000

Type of intangible Industry proxy	<i>ICT</i> Nace 72	<i>R&D</i> Nace 73	<i>OC</i> Nace 74
Related intermediate consumption - Labour costs = 1			
Germany	0.74	1.72	1.13
UK	1.04	0.82	1.19
Finland	0.91	0.68	1.22
Czech Republic	1.68	1.12	3.26
Slovenia	1.05	0.70	1.70



INNODRIVE Multiplier

Source: EU KLEMS 2000, own calculations

Type of intangible Industry proxy	ICT Nace 72	R&D Nace 73	OC Nace 74
Related total cost ² (intermediate consumption and capital user cost) - Labour cost = 1			
Germany	1.32	2.31	1.72
UK	1.31	1.10	1.47
Finland	1.08	0.84	1.38
Czech Republic	2.17	1.62	3.76
Slovenia	1.05	0.70	1.70
Assumptions in INNODRIVE			
Share of labour cost dedicated to the production of intangible	0.50	0.70	0.15
INNODRIVE combined multiplier			
Germany	0.66	1.62	0.26
UK	0.66	0.77	0.22
Finland	0.54	0.59	0.21
Czech Republic	1.09	1.14	0.56
Slovenia	0.53	0.49	0.26
Weighted³ average	0.7	1.1	0.3



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Thank you for listening
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