
Labour markets, vocational training and national innovation systems

- In Lecture 1 I provided evidence of differences in how work is organised and how employees learn across national systems. The evidence also suggested that these differences are systemically related to differences in innovation performance and form.
 - In this lecture I focus on the institution level and on how different configurations of institutions across national systems affect innovation. Two key concepts I will develop are ‘institutional complementarities’ and ‘comparative institutional advantage’.
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The need for widening the scope of innovation systems research

- Much of the core research on national innovation systems has focused on the institutions and organisations responsible for the production and diffusion of formal scientific and technical knowledge. At the level of innovation policies these emphases can be seen in the continuing importance attached to increasing national R&D intensity.
 - In parallel with the argument that work organisation and organisational design are important determinants of enterprise innovation performance here I will argue that labour market institutions and labour market structures are important determinants of national innovation performance.
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- I begin with an overview and critical assessment of the Varieties of Capitalism approach (VoC) which has developed novel hypotheses on the relation of labour market systems and innovation style.
 - I then turn the notion of ‘flexicurity’ which has figured prominently in EU policy debates and which at the conceptual level constitutes the a challenge to the institutional analysis developed in the VoC literature.
 - The lecture concluded with the presentation of empirical work characterising European labour market systems and their relation to innovation performance
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Defining labour market systems

- For the purposes of the lecture labour market systems are defined in terms of three interrelated institutions: vocational training systems, labour market structure including mobility and, and systems of labour market protection
 - The development of vocational training systems reflect the importance attached to applied and practical skills and knowledge in relation to academic or abstract knowledge and they affect the balance between firm-specific, industry-specific and more general skills.
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Defining labour market systems

- Labour market structure impacts on how fluid the labour market is and the degree of inter-firm mobility of labour. Occupational labour markets tend to be characterised by high levels of mobility while systems built around internal labour market have lower levels of mobility.
 - Systems of labour market protection can be distinguished between the relative importance attached to employment protection and unemployment protection. A further aspect is the importance attached to active labour market policies including further training directed at the unemployed or those at risk of unemployment.
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Why do labour market systems affect learning and innovation?

- Labour market mobility impacts on the transfer of knowledge and skills across firms and may increase related variety of knowledge which can support learning and innovation.
 - The vocational training system impacts directly on the ability of employees to learn and solve problem on the job. It also affects how narrow and firm-specific skills are, which may impact on the ability of firms to adapt to novel innovations and technologies.
 - Systems of labour market protection provide incentives for the acquisition of knowledge and skills and they affect its accumulation and preservation. Employment protection systems tend to favour the accumulation of firm-specific skills while systems of unemployment protection may support the accumulation of wider industry-specific knowledge and skills.
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Overview of the VoC approach

- The VoC literature (Hall and Soskice, 2001) is a remarkable synthesis and development of different strands of research in comparative national systems research over a period of 2 decades. A few key contributions include:
 - Aoki (1986 and 1994)
 - Streeck and Schmitter (1986)
 - Dore (1986)
 - Hollingsworth and Boyer (1997)
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Two core ideas in the VoC literature

- **Institutional complementarities:** following Aoki (1994) two institutions may be said to be complimentary if the presence of one increases the returns from or the efficiency of another. Classic examples include the complementarities developed in Aoki's analysis of the J-firm between decentralised organisational structures requiring employee initiative and discretion and life-time employment guarantees providing incentives for the employee commitment and on-going acquisition of firm-specific skills.
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Two core ideas in the VoC literature

- **Comparative institutional advantage:** the basic idea is that a nation's institutional structure provides firms with a comparative advantage in certain types of activities. Firms can perform certain types of activities more efficiently than others because of the support that is specific to their economy's institutions. These institutional arrangements are not distributed evenly across nations.
 - This is linked to the idea of institutional complementarities that are specific to a nation or set of nations.
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Core VoC hypothesis regarding innovation style

- The VoC perspective draws a broad distinction between liberal market economies (LMEs) such as the US and the UK, and coordinated market economies (CMEs) such as Germany and the Scandinavian nations.
 - The hypothesis is that the institutional arrangements of different nations will be more or less suited to different styles of innovation, with CMEs excelling in incremental innovation and LMEs excelling in more radical innovation.
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Complementarities and comparative advantage of LMCs and CMCs

	Liberal Market Economies	Coordinated Market Economies
Labour market	Deregulated, few restrictions on hiring and firing, high levels of mobility. Weak employment protection legislation	Regulated, developed internal labour markets, low mobility, insider/outsider cleavages reinforced by employment protection legislation
Vocational education and training	Weak initial and continuing vocational education and training, favours investments in general skills	Strong initial and continuing vocational training favouring acquisition of firms specific skills
Employee relations	Hierarchical, top-down decision making, little or no employee representation, low trust	Decentralised system of work organisation, consensual decision-making, high trust
Institutional complementarities	Complementarities between fluid labour markets and investments in general skill associated with weak vocational training system	Complementarities between internal labour markets, investments in firm-specific skills and consensual decision making.
Comparative Institutional advantage	Comparative advantage in more radical innovation due to higher capacity for retraining and implementing new business strategies.	Comparative advantage in incremental innovation due to strong and continuous investments in firm-specific skills and high trust relations
Systemic weaknesses	Problems in accumulating and preserving tacit knowledge associated with high level of employee turn-over	Problems in adapting to radical innovations due to highly firm-specific nature of skills and inability to bring in new knowledge from outside the organisation

Some limitations of the VoC approach to innovation: empirical

- Empirical tests using patent citations show that most nations are characterised by a mix of radical and incremental innovation and that the only nation to really stand out for its specialisation in more radical innovation is the US. (See Taylor (2004) and Akkermans et al. (2009))
 - Within the EU some of the most highly performing nations in new technology sectors characterised by rapid change in technology and products are the Scandinavian nations. (example, Finland and Sweden in ICT)
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Some limitations of the VoC approach to innovation: conceptual

- The Voc approach is fundamentally built around a classic distinction between deregulated and regulated labour market with former associated with hierarchical firm structures and the latter associated with flat or horizontal structures
 - The main conceptual challenge to the VoC approach has come from work on the nature of institutional complementarities in systems of flexicurity which combine flexible or fluid labour markets with strong systems of unemployment protection and active labour market policies
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Flexicurity systems: the Danish model

- Flexicurity has been defined in various ways. In the context of the European policy debate one important source of inspiration has come from the Danish model and what (Madsen, (2006) refers to as the 'golden triangle'. This 'triangle' is composed of three complementary institutional or regulatory arrangements: (i) low dismissal protection making it easy to dismiss workers and hence creating flexibility; (ii) extensive unemployment benefits providing income security to the unemployed; and (iii) active labour market policies aimed at employability and activation of the unemployed, helping them to return to employment as soon as possible and producing the labour supply the market demands.
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Flexicurity systems

- The idea is that unemployment protection offsets the insecurity due to weak employment protection while active labour market policies including broad based systems of further education assure the continuous renewal of skills and competences thus making the system dynamic and competitive.
 - Flexicurity seeks to create a win win situation from the perspective of both employers and employees. However there is considerable debate about the obstacles to implementing such systems in countries marked either by low levels of trust and strong systems of employment protection creating insider/outsider cleavages.
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Complementarities and comparative advantage of flexicurity systems

Flexicurity (Denmark, the Netherlands)	
Labour market	Deregulated, few restrictions on hiring and firing, high levels of mobility, relatively weak employment protection legislation balanced by relatively strong unemployment protection.
Vocational education and training	Strong initial and continuing vocational education and training. Emphasis of further training and life-long learning to solve problems of unemployment and promote restructuring (Active labour market policies)
Employee relations	Decentralised work organisation, consensual decision making, systems of employee representation, high trust
Institutional complementarities	Complementarities between fluid labour markets, continuing vocational education, strong systems of unemployment protection favouring the development and accumulation of industry-specific skills with local/regional labour markets
Comparative Institutional advantage	Strong capacity for knowledge accumulation including novel knowledge based on related variety of knowledge.
Systemic weaknesses?	Flexicurity systems are credited with overcoming the two types of systemic weaknesses referred to above: problems of accumulating tacit knowledge and problems of adapting to novelty. Key policy issues concern the costs and possible social/political obstacles to implementing flexicurity.

Empirical strategy: multi-level econometric analysis of labour markets, flexicurity and enterprise innovation performance

- Use of aggregate indicators and factor analysis for characterizing national labour market systems for the 27 EU member nations in 2007. Use of harmonised data available of Eurostat's website.
 - Use of micro-data from Innobarometer Survey carried out in the EU-27 and in Norway and Switzerland in October 2007 to develop a measure of firm-level innovation performance for enterprise in the EU-27.
 - Multi-level regression analysis to analyse the relation between the development of national 'flexicurity systems' and enterprise innovation performance
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Five national labour market indicators

- LLL is defined as the percent of the population, both active and inactive, between the ages of 24 and 65 that received education or training in the four weeks preceding the survey in 2007.
 - CVTC, which is based on the 2005 Continuing Vocational Training Survey, is defined as the percentage of employees in all enterprises receiving continuing vocational training courses, either on or off the premises of the enterprise. Capture formal vocational training
 - OJT, based on the results of the 2005 Continuing Vocational Training Survey, provides a measure of the acquisition of more tacit and experience-based knowledge. It is defined as the percentage of all enterprises that provide their employees with on-the-job training
 - FLEX is defined as the share of persons aged 15 and over whose job started within the last three months and the figures presented in Table 2 are for the 2nd quarter of 2007. A measure of labour market mobility
 - LMP is defined as total active and passive expenditures per registered unemployed person in 2007. A measure of the protection and support received by unemployed or those at risk of unemployment
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Labour market indicators: EU-27

	FLEX	LLL	CVTC	OJT	LMP
AT	4.6	12.8	33	32	25537
BE	3.7	7.2	40	41	26532
BG	5.2	1.3	15	17	473
CY	5.4	8.4	30	19	6152
CZ	2.5	5.7	59	42	1102
DE	4.2	7.8	30	48	12710
DK	8	29.2	35	30	59193
EE	4.6	7	24	31	433
ES	7.3	10.4	33	26	10666
FI	9.1	23.4	39	35	19774
FR	6.3	7.5	46	29	15302
GR	2.6	2.1	14	6	2559
HU	3.1	3.6	16	18	1562
IE	5.1	7.6	49	43	24779
IT	3.7	6.2	29	11	10708
LT	4.7	5.3	15	18	810
LU	2.3	7	49	44	34370
LV	6.5	7.1	15	9	971
MT	3.3	6	32	31	2151
NL	5.1*	16.6	34	31	39826
PL	4.8	5.1	21	17	1244
PT	3.5	4.4	28	22	6130
RO	3.1	1.3	17	19	506
SE	8.9	18.6	46	34	19544
SI	4.4	14.8	50	28	2850
SK	2.6	3.9	38	32	604
UK	4.2	20	33	75	2710

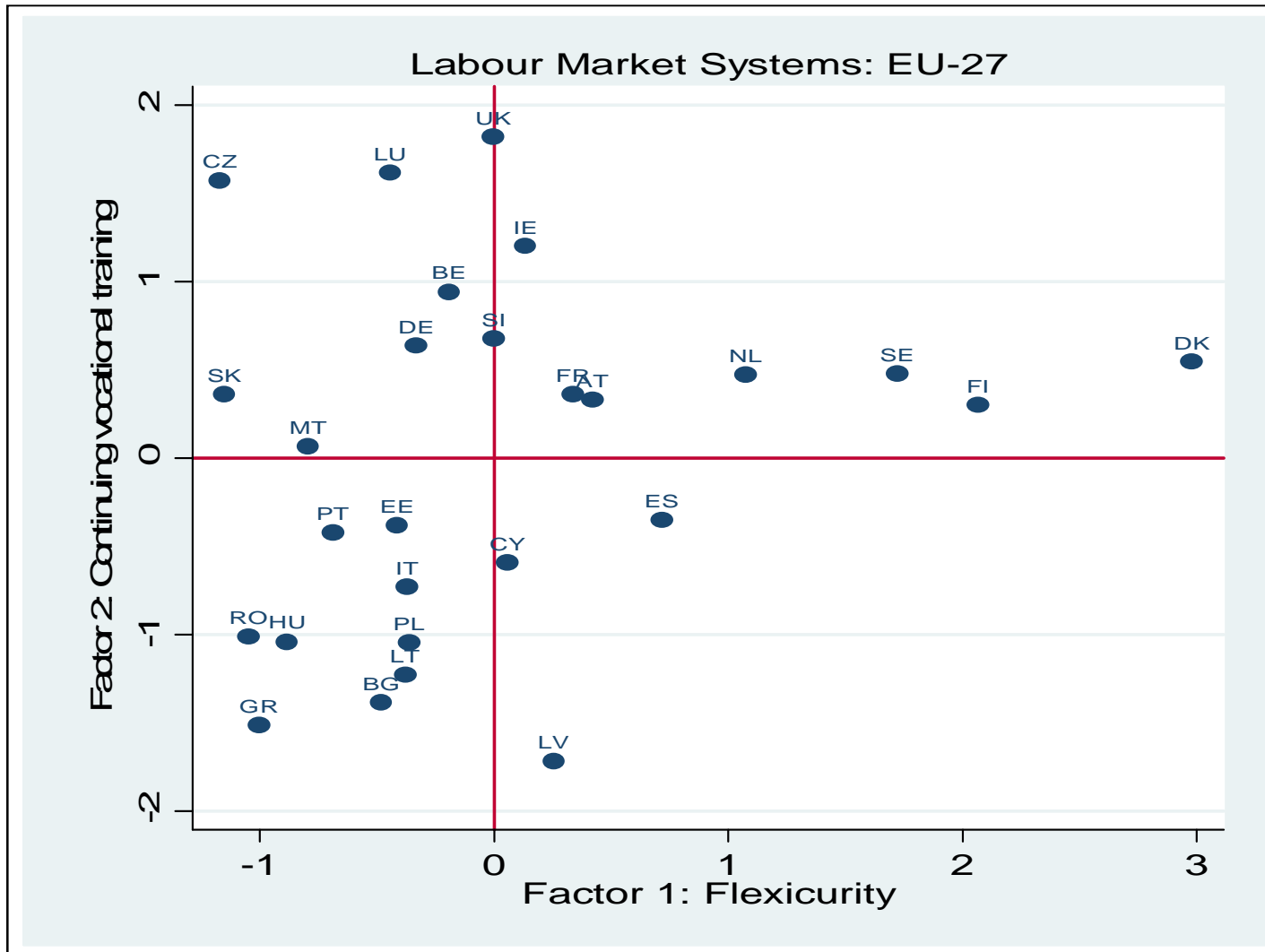
Results of factor analysis:
Rotated factor loadings and unique variances

variable	Factor 1	Factor 2	Uniqueness
FLEX	.934	-.0235	.167
LLL	.829	.291	.125
OJT	-.048	.900	.207
CVTC	.064	.851	.248
LMP	.652	.325	.379

Interpreting the factors

- Factor 1 can be interpreted as an indicator of **flexicurity**. It indicates that EU member nations can be scored on a scale measuring the extent to which they have developed institutional set-up combining what are often described as the three core components of flexicurity systems: generous unemployment protection including expenditures on active labour market policies, high levels of labour market flexibility, and well developed systems of lifelong learning
 - Factor 2, referred to as **continuing vocational training**, shows that EU member nations can be scored along a scale measuring the importance of their investments in further vocational training, both formal and on-the-job.
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Using the factors to map EU labour market systems



Characterising European labour market systems

- The Scandinavia nations and the Netherlands rank highest on the ‘flexicurity’ scale.
 - The continental nations as well as the Anglo-Saxon nations have intermediate positions.
 - Most of the Southern and new member nations rank low on the ‘flexicurity’ scale. Many have very weak or almost non-existent systems of social protection.
 - The exceptions are Spain, Slovenia, Cyprus and Latvia which have average or above average position on the scale. In the case of Slovenian Cyprus and Latvia this is due to above average levels of FLEX or LLL. These three nation have relatively weak systems of unemployment protection.
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Enterprise innovation performance

- Micro-data from the Innobarometer Survey carried out in 2007. The survey was designed in part to capture the importance of firms' in-house innovative capabilities.
 - The measure of innovation performance used here is a three level ordered variable corresponding to different degrees of in-house innovative capacity. Similar but different from the taxonomy used in Lecture 1
 - Lead innovators: Has developed over last 2 years entirely new or significant improved products (goods or services) in-house or in cooperation with other organisations or firms.
 - Modifiers: Has Customised or modified products that were originally developed by other companies, organisations or individuals
 - Non-innovators: Either has introduced new products developed by other companies, organizations or individuals with little or no modification, or has not introduced any new products
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Innovation modes for the EU-27

	Lead innovators	Modifiers	Non-innovators
Belgium	27.6	19.7	52.7
Czech Republic	21.3	16.2	62.5
Denmark	42.0	30.1	27.9
Germany	43.0	22.9	34.2
Estonia	37.9	10.0	52.1
Greece	34.7	28.2	37.1
Spain	23.3	17.4	59.3
France	42.5	15.0	42.5
Ireland	38.8	37.1	24.1
Italy	54.6	13.8	31.6
Cyprus	26.3	36.2	37.4
Latvia	47.3	23.8	28.8
Lithuania	31.6	31.6	36.8
Luxembourg	25.0	9.9	65.1
Hungary	13.5	24.1	62.5
Malta	36.6	28.7	34.7
Netherlands	35.7	16.7	47.6
Austria	37.2	22.7	40.2
Poland	50.3	17.1	32.7
Portugal	40.1	27.5	32.4
Slovenia	45.7	24.1	30.3
Slovakia	24.5	40.1	35.4
Finland	48.9	21.3	29.8
Sweden	47.0	20.5	32.5
UK	32.3	26.9	40.9
Bulgaria	33.2	25.9	41.0
Romania	40.5	29.6	29.9
EU-27	39.8	20.4	39.8

Advantages of multi-level regression analysis

- In single-level models with clustered data (by nation for example) national effects are measured using nation dummies. This remains a ‘black-box’ providing no insight into the source of national diversity and variation
 - In multi-level modelling it is possible develop a simple measure of how much of the unexplained variance in the data set is explained by national-level context conditions (as opposed to individual level characteristics) and then determine how much of the national variance is explained by specific institutions or factors for which the are aggregate measures.
 - In an extension of the approach (not done here) one can show how firm-level characteristics (e.g. size, skill profile, R&D expenditures) impact firm performance differently depending on the national institutional context.
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Multi-level ordered logistic regression with random intercepts: Determinants of innovation mode

	Model 1	Model 2
Enterprise-level fixed effects	Odds ratios	
<i>Manufacturing</i>	2.760***	2.761***
<i>Construction, utilities</i>	Reference	
<i>Retail and other services</i>	1.660***	1.660***
<i>Business and financial services</i>	2.825***	2.817***
<i>Other</i>	2.463***	2.467***
<i>20 – 49 employees</i>	Reference	
<i>50 – 249 employees</i>	1.435***	1.437***
<i>250 – 499 employees</i>	2.228***	2.232***
<i>>499 employees</i>	2.834***	2.858***
<i>Increase in annual income > 10 percent</i>	1.355***	1.349***
Country-level fixed effects		
<i>Factor1 (flexicurity)</i>		1.175**
<i>Factor2 (continuing vocational training)</i>		.882
Random effects		
<i>Intercept</i>	.148 (.049)	.124 (.041)

High growth manufacturing firms: probability of innovation mode by size

