

# Fuzzy Sets Analysis and Institutional Diversity: Applications for Comparative Corporate Governance

Gregory Jackson  
King's College London

Presentation at  
University of Cambridge  
Law School  
30 November 2006

# Roadmap

- Why use fuzzy sets to study corporate governance?
- Application 1: Why do employees have rights to representation within corporate boards in some countries, but not in others?
  - 22 OECD countries
- Then (perhaps) briefly...Application 2:
  - What factors explain differences in ownership dispersion vs. concentration across these countries?

# Corporate Governance

- Corporate governance
  - Corporate governance consists of the rules and beliefs that shape the relationships among stakeholders in the decision-making and control over firm resources.
- Comparative research
  - What differences in corporate governance exist across countries or groups of firms?
  - Why did diverse sets of institutions emerge historically, and change over time?
  - How does institutional diversity impact firm strategy and structure, performance and power of different stakeholders?

# How good are conventional explanations of the diversity of corporate governance?

- Concepts of diversity
  - Only two models? Anglo-American centred debate
  - But not all non-Anglo systems are alike! Many dimensions and diverse configurations (Aguilera and Jackson 2003, AMR article)
  - Differences between Germany and Japan (Jackson 2001, 2003)
  - But also UK Codes vs. US law (e.g. takeovers)
- Explanations of diversity
  - Correlational approach, but based on the fact that Anglo-Saxon countries are strongly “market-oriented” across most dimensions....
  - Patterns of organization co-vary with regulatory regimes

# Methodological Issues

- Large number of variables, but small N
  - Places strong limits placed on conventional statistical models
- Variable vs. Case-Based Explanation
  - Impact of one variable “all things being equal”
  - But to what extent does this help explain cases?
- Cases as configurations
  - conjunctions of different causal factors
  - multiple paths to same outcome possible
- **Most work in this area largely ignores these issues!**

# QCA

- qualitative comparative analysis (QCA)
  - Bridges cases studies with statistical analysis
  - small-N research designs (5-50 cases)
- QCA methods are tools for making inferences about necessary and sufficient conditions for an outcome based on Boolean algebra (Ragin 2000).
- Containment Rule
  - Test for Necessity –
    - All cases of Y (investor protection) also have X (common law)
    - outcome is a subset of the cause,  $x \leq y$
  - Test for Sufficiency –
    - All cases of X (common law) also have Y (investor protection)
    - the cause is a subset of the outcome,  $y \geq x$

# Fs/QCA approach

- Extension of the QCA method using fuzzy sets
- Fuzzy sets allow for *different degrees of membership* within an ordered property space.
  - London is not a hot city
  - Tokyo is a *very hot and humid* city.
- Fuzzy-sets overcome the limitations of Boolean sets to situations where cases display different degrees of property.
  - empirical indicators are scored between 0 and 1 according to the degree of membership in the conceptual category.
  - A membership score of 1 represents a case that is ‘fully in’ the category and 0 is ‘fully out.’ 0.5 represents the transition point where a case is ‘neither in, nor out.’

# Application

- Employee representation on corporate boards
- Jackson, Gregory, "Employee Representation in the Board Compared: A Fuzzy Sets Analysis of Corporate Governance, Unionism, and Political Institutions" . *Industrielle Beziehungen*, Vol. 12, No. 3, pp. 1-28, 2005  
Available at SSRN:  
<http://ssrn.com/abstract=800525>

# Dimensions of Employee Representation

- Regulations regarding employee representation differ in several ways:
  - the scope of firms covered, such as public or private sector firms, as well as the size of firms.
  - the strength of the rights extended, ranging from rights to information, consultation, and codetermination,
  - and the types of decisions to which they apply.
- The structure of board representation may differ in terms of:
  - the proportion of employee members
  - the manner in which they are elected.
  - and whether the board itself has a one-tier or two-tier structure

# How common is employee representation?

- Employee representation in the board has received very little attention in academic literature or codes of corporate governance
- Of 22 OECD countries?
  - Employees have the right to board representation to various degrees in eight countries
- Of 25 European Union countries?
  - Employees have the right to board representation to various degrees in *eighteen* countries

**Table 1 Codetermination Rights in 22 OECD Countries:  
Fuzzy-set Memberships**

<b>Fuzzy Score</b>	<b>Characteristics</b>	<b>Countries</b>
0	No constitutional rights, and no statutory or tri-partite regulation	Australia, Canada, Japan, New Zealand, South Korea, Switzerland, United Kingdom, United States
0.1	Constitutional rights, but no statutory or tri-partite regulation	Italy, Portugal
0.3	Some statutory or tri-partite regulation of public sector firms	Belgium, Greece, Ireland, Spain
0.7	Legal right to attend board at private firms.	France
0.9	Legal rights to nominate some members to the board.	Finland, Netherlands
1	Legal rights to board-level representation in private firms.	Austria, Denmark, Germany, Norway, Sweden

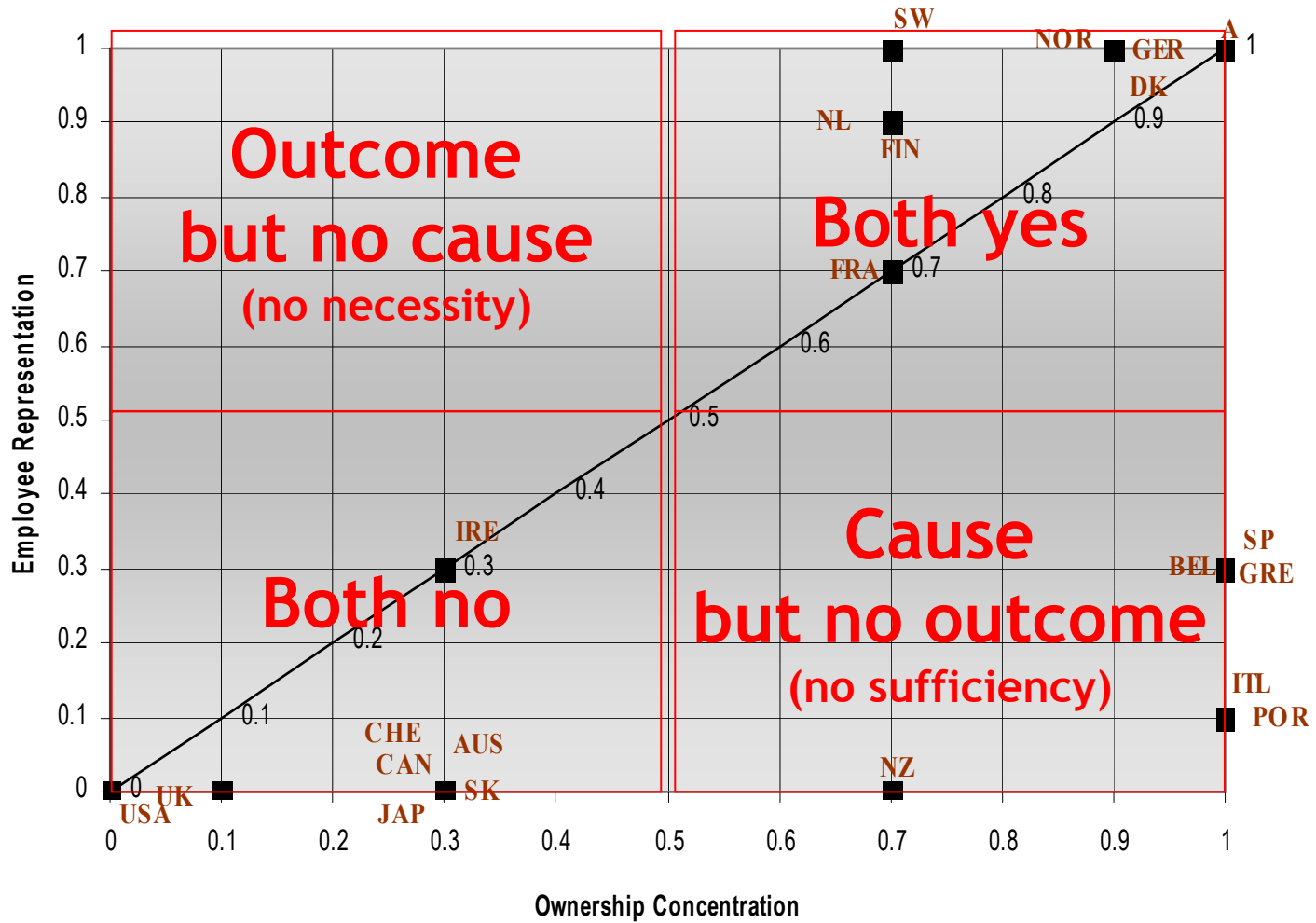
# Possible Explanations

- Industrial relations factors
  - Union density
  - centralization
- Corporate governance factors
  - Investor protection (Pagano and Volpin)
  - Stock market activity (Hall and Soskice)
  - 'patient capital' from banks
  - Ownership concentration (Roe)
- Political factors
  - Left-wing parties (Roe)
  - Consensus vs. majority rule (Gourevitch)
- Legal origin
  - Common law vs. civil law (LLSV)

**Table 3 Fuzzy Membership Scores: 22 OECD Countries**

country	empboar d	cg- market	<b>cg-legal</b>	concentration	bank	union	coordination	centre- left	consensu s	commonla w
Australia	0	0.9	0.9	0.3	0.3	0.7	0.3	0.57	0.32	1
Austria	1	0.3	0.1	1	0	0.9	1	0.41	0.55	0
Belgium	0.3	0	0	1	1	0.9	0.3	0	0.84	0
Canada	0	0.9	0.9	0.3	0	0.3	0	0.91	0.32	1
Denmark	1	0.7	0.3	0.9	0	1	1	0.91	0.95	0
Finland	0.9	0.3	0.7	0.7	1	0.9	1	1	0.95	0
France	0.7	0.3	0.7	0.7	1	0.1	0.3	0.57	0	0
Germany	1	0.3	0.1	0.9	1	0.3	0.7	0.57	0.84	0
Greece	0.3	0.1	0.1	1	0.3	0.1	0	0.41	0.32	0
Ireland	0.3	0.3	0.7	0.3	0	0.7	0.3	0	0.84	1
Italy	0.1	0	0.1	1	0	0.7	0.3	0.57	0.84	0
Japan	0	0	0.3	0.3	0.7	0.3	0.3	0	0.84	0
Netherlands	0.9	0.3	0.3	0.7	0	0.3	0.7	0.41	0.95	0
New Zealand	0	0.3	0.7	0.7	0	0.3	0.3	0.82	0	1
Norway	1	0.9	0.9	0.9	0.7	0.9	1	0.91	0.84	0
Portugal	0.1	0.1	0	1	0.7	0.3	0.3	0	0.84	0
South Korea	0	0	0.3	0.3	0	0	0.3	0.7	0	0
Spain	0.3	0.3	0.3	1	1	0	0.3	0.57	0.55	0
Sweden	1	0.7	0.7	0.7	1	1	1	1	0.84	0
Switzerland	0	0.7	0.3	0.3	0.3	0.3	0.3	0.91	0.95	0
United Kingdom	0	0.9	1	0.1	0.3	0.7	0	0.41	0.32	1
United States	0	0.9	0.7	0	0	0.1	0	0.91	0.32	1

## Employee Representation and Ownership Concentration



**Table 4 Results of Fuzzy-set Tests:  
Necessary Conditions for Board-level Employee Representation**

Variable	N Cause >= Outcome	Observed Proportion	Binomial p
cg-market	7	0.50	
CG-MARKET	3	0.21	
cg-legal	6	0.43	
CG-LEGAL	4	0.29	
concentration	1	0.07	
CONCENTRATION	8	0.57	
bank	7	0.50	
BANK	8	0.57	
union	6	0.43	
UNION	7	0.50	
coordination	7	0.50	
COORDINATION	10	0.71	0.584
centre-left	6	0.43	
CENTRE-LEFT	5	0.36	
electproportion	7	0.50	
ELECTPROPORTION	9	0.64	
parties	4	0.29	
PARTIES	8	0.57	
Consensus	5	0.36	
CONSENSUS	8	0.57	
commonlaw	13	0.93	0.047*
COMMONLAW	1	0.07	

What proportion of the 14 cases of employee representation that have each factor?

Number of Cases Tested (Outcome > 0): 14 ( 63.6% of Total)  
Test Proportion: 0.70

\*p < 0.10

# Analysis of Necessary Conditions

- Industrial Relations
  - Germany and Netherlands lack high union density and high coordination
- Corporate governance
  - Not necessary to forgo on market-oriented corporate governance, since Sweden, Finland and Norway have relatively strong investor rights and active capital markets
  - Concentrated ownership as ‘near miss’
- Politics
  - No clear party political pattern
  - France is not consensual!
- Legal Origins
  - Absence of common law is almost always necessary!
  - **But why?**

# Analysis of Sufficient Conditions

- Coverage: the sum of consistent  $X_i$  divided by the sum of  $Y_i$ .
  - "unique" coverage is the calculation of non-overlapping coverage for each solution term.
- Consistency: the sum of consistent  $X_i$  minus the sum of inconsistent  $X_i$  divided by the  $X_i$ .
  - This rewards near misses, but penalizes big misses

**Table 5 Truth Tables:  
Corporate Governance, Industrial Relations and Politics**

**A. Individual Conditions**

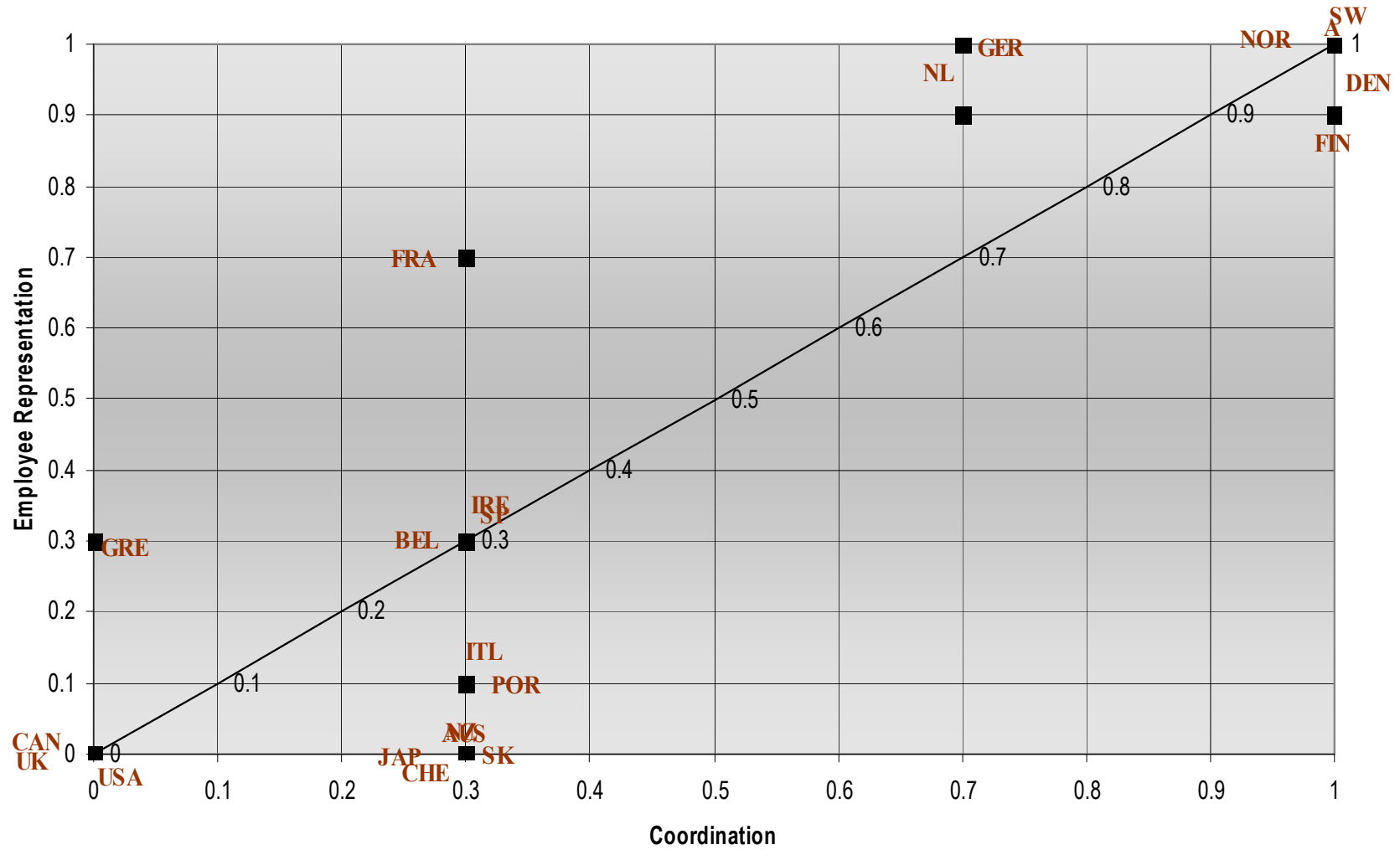
cg-legal	number	empboard	yconsist
0	12	0	0.470588
1	10	0	0.455446
cg-market	number	empboard	yconsist
0	14	0	0.4375
1	8	0	0.5
bank			
0	13	0	0.314961
1	9	0	0.569892
concentration	number	empboard	yconsist
1	14	0	0.560284
0	8	0	0.227848
union	number	empboard	yconsist
0	12	0	0.321429
1	10	0	0.583333
coordination	number	empboard	yconsist
0	15	0	0.219512
1	7	1	0.793814
centre-left	number	empboard	yconsist
1	14	0	0.507962
0	8	0	0.383475
consensus	number	empboard	yconsist
1	14	0	0.547406
0	8	0	0.33082
Common law			
0	16	0	0.537
1	6	0	0.05

No factor alone is significant, expect coordinated collective bargaining. All 7 cases of strong coordination (a score of 0.5 or above) also had board-level employee representation (a score of 0.5 or above) and achieved an overall consistency of 79.4%.

Only France is unexplained.

Thus, coordinated collective bargaining is almost always a sufficient condition and achieves very high coverage score of 0.865

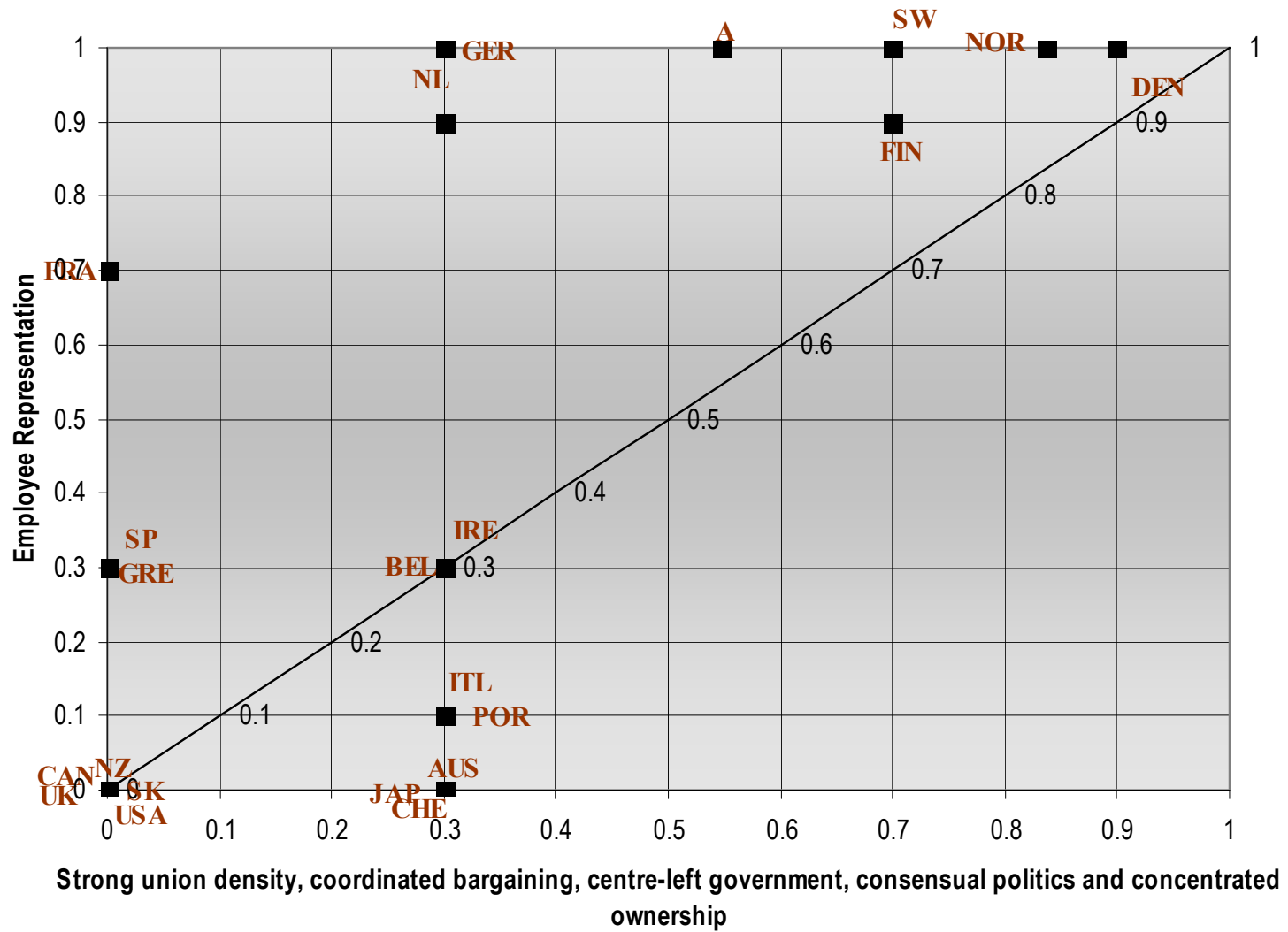
## Employee Representation and Coordination of Bargaining



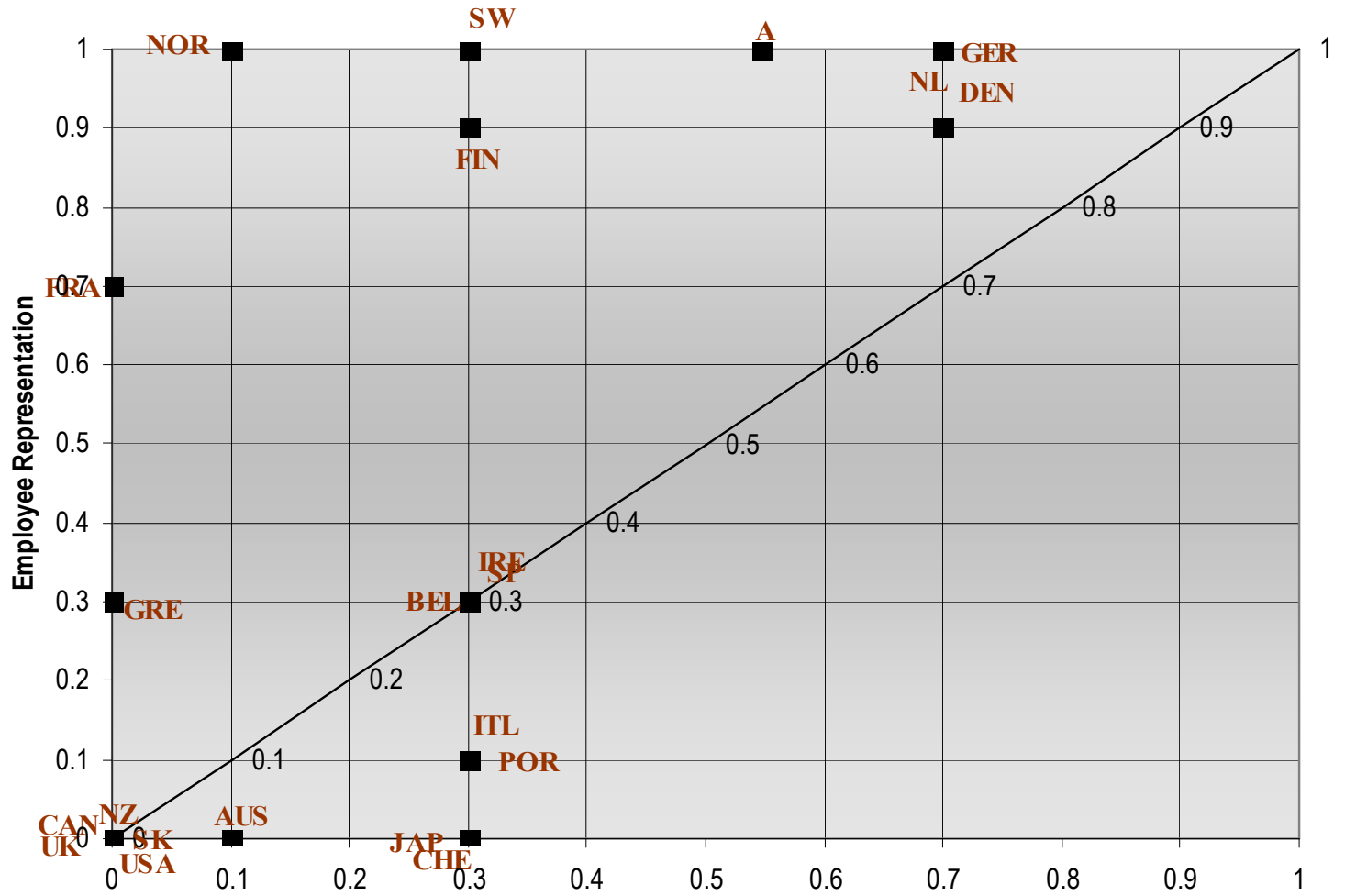
# Cases as Configurations

- **Most Parsimonious Result:**
  - **Model: EMPBOARD = UNION + COORDINATION + CENTRE-LEFT + CONSENSUS**
  - **+ CG-LEGAL + CONCENTRATION**
  - 
  - **COORDINATION**
  - (coverage: 0.865 consistency 0.793)
- **Most Complex Result:**
  - **Model: EMPBOARD = UNION + COORDINATION + CENTRE-LEFT + CONSENSUS**
  - **+ CG-LEGAL + CONCENTRATION**
  - 
  - **COORDINATION\*CONSENSUS\*cg-legal\*CONCENTRATION +**
  - (coverage: 0.517 unique coverage: 0.234 consistency: 0.812)
  - 
  - **UNION\*COORDINATION\*CENTRE-LEFT\*CONSENSUS\*CONCENTRATION**
  - (coverage: 0.461 unique coverage: 0.180 consistency: 0.891)
  - 
  - **→ EMPBOARD**
  - **solution coverage: 0.697**
  - **solution consistency: 0.861**

## Employee Representation and Scandinavian Configuration



## Employee Representation and Germanic Configuration



Strong coordinated bargaining, consensual politics, concentrated ownership and weak legal protection of investors

# Application 2: Determinants of Ownership Structure

- Corporate Ownership
  - Blockholders (families, state, inter-corporate, banks) vs. dispersed investors (individuals, institutional investors, speculators)
- Comparative Explanations
  - Legal origins (LLSV)
  - Political systems (Roe)
  - Employee power (Roe)
  - Role of banks vs. markets as alternative source of finance
  - Salience of M&A (Mayer, Franks and Rossi)

- Analysis of Necessary Conditions

- 

- Outcome variable: dispersedgj

- 

- Conditions tested:

	Consistency	Coverage
• commonlaw	0.478723	0.750000
• accounting	0.882979	0.703390
• Investor protection	0.893617	0.636364
• cg-market	0.776596	0.793478
• ~empboard	0.723404	0.519084
• ~coordination	0.787234	0.601626
• ~centre-left	0.457447	0.455508
• ~consensus	0.723404	0.596491
• privpension	0.553192	0.825397
• gini	0.606383	0.640449

**Common law is not necessary for dispersion! But strict accounting and investor protection is necessary.**



# Robustness

- Do the thresholds for being “in” a category influence the results?
  - A lower threshold for ownership concentration or coordinated bargaining might make these factors ‘necessary’
  - But both factors are common to the two configurations meeting condition of ‘sufficiency’
- ‘Missing cases’
  - eight variables yield  $2^8 = 256$  possible configurations, of which only 20 configurations have empirical cases.
  - results become less robust because cases are not sufficiently similar to falsify a particular configuration
  - Experiments with random data suggest robustness as long as a certain ratio of variables to cases (5-6 variables are ok for 22 cases) (Marx 2005)
- Parsimony vs. Complexity?
  - Best solution can cover the most cases consistently - 7 out of 8 cases explained, and the unexplained French case is much weaker<sup>26</sup>

# Conclusions

- The results confirmed importance of numerous factors from variable-based studies, but rejects their sweeping conclusions
- Back to the cases!
  - Need historical analysis of institutional origins and change
  - But disciplined historical narration that is more consistent across a greater range of cases and highlights contingency and uniqueness
- Underlines strong potential of fuzzy sets