

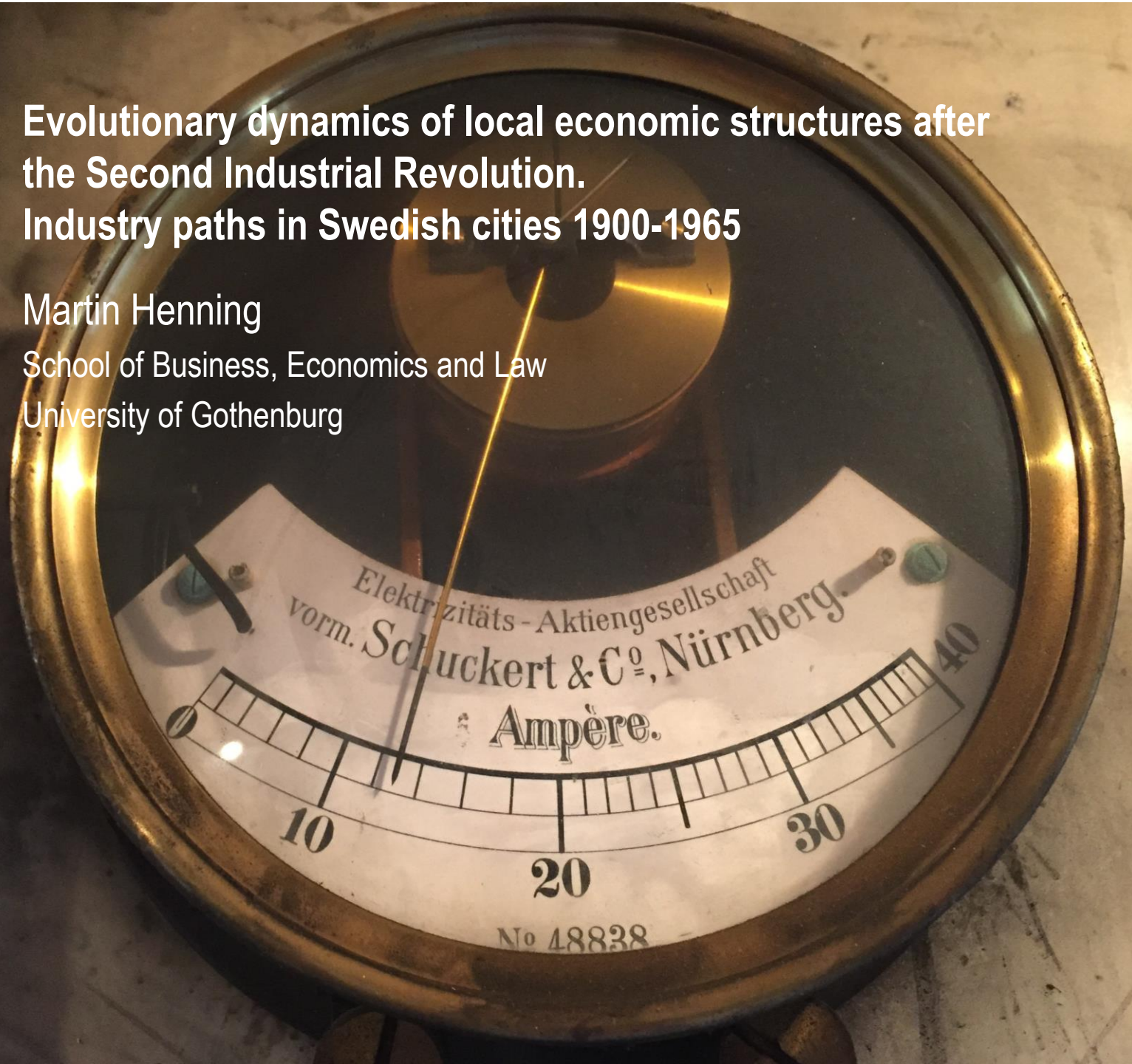


# Evolutionary dynamics of local economic structures after the Second Industrial Revolution. Industry paths in Swedish cities 1900-1965

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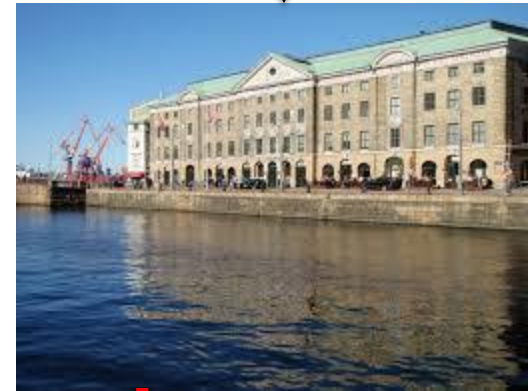
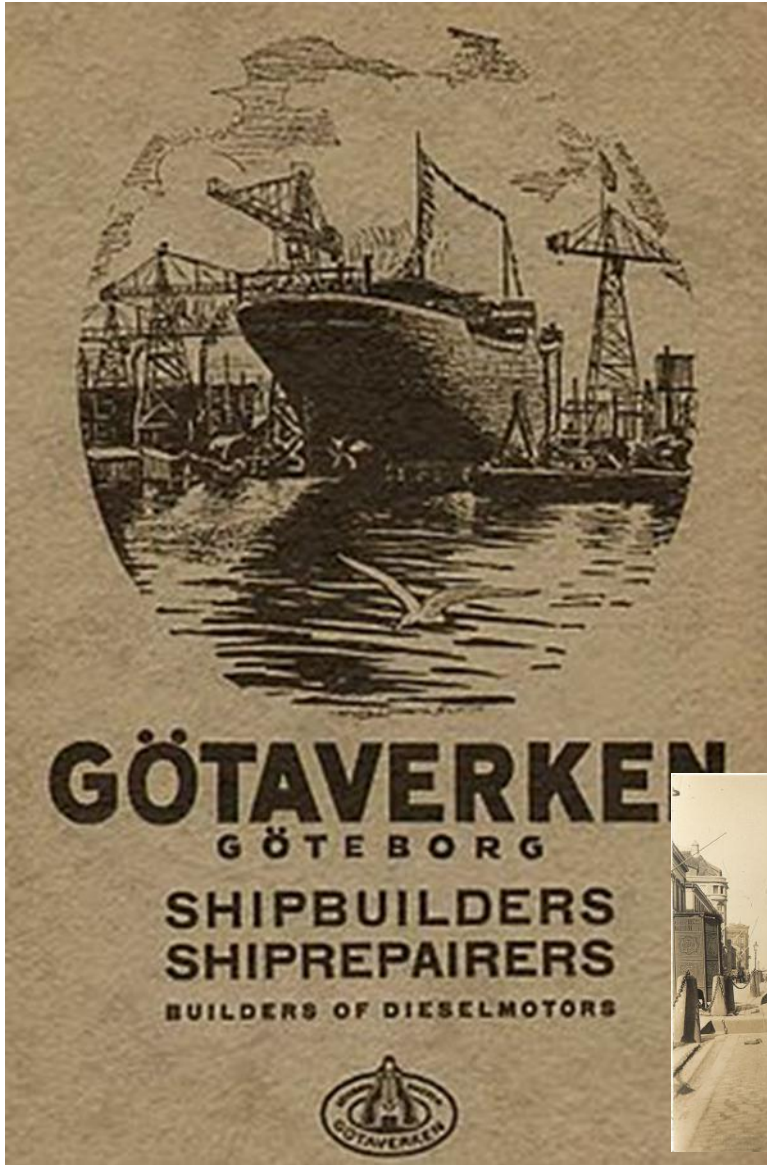
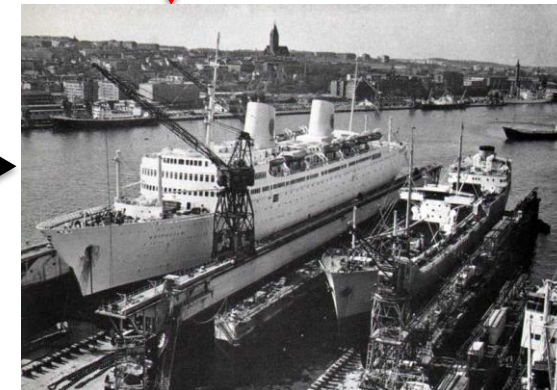


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Wikipedia





Stability

Incremental  
change

Radical change





## Dynamic view:

1. How important is co-location at different points in time?
2. How do regions develop new varieties of work in the longer run?



## Time-varying agglomeration benefits

Nursery cities (Duranton and Puga 2001)  
ILC (Neffke et al. 2011)  
Cluster life cycles (Hervas-Oliver 2014)



## EG and regional economics: externalities and agglomeration economies

Industrial districts (Asheim 2000)  
Regional clusters (Porter 2000)  
Cities (Glaeser 2000)  
Externalities (Henderson 1997)

## Geography of long-term development

WLO (Storper and Walker 1989, Boschma 1997)  
Growth eras (Enflo and Henning 2016)  
Cycles of regional growth (Henning et al. 2016,  
Lundquist, Martynovich and Olander 2017)



## Economic history

Pollard (1997)  
Schön (2010)  
Magnusson (2000)





- "...new goods and services [...] do not come out of thin air. New work arises upon existing work; it requires "parent" work." (Jacobs 1970)
- Regional branching (Boschma and Frenken 2011)
- Regional path dependency (Martin and Sunley 2006, 2010)
- Suggestions fall into two categories (Jacobs 1970)
  - ideas suggested by the materials or skills already being used
  - ideas that arise from particular problems in the course of the work
- Regional resources/capabilities (Lawson 1999, Neffke et al. 2018)



(Wikipedia)



- Swedish regions (1969-2002): coherence, entry, exit  
(Neffke, Henning and Boschma 2011)
- Spain 1988-2008 (Boschma, Minondo and Navarro 2013)
- US cities 1975-1997 (Essletzbichler 2013)
- Technologies in US cities 1975-2005 (Rigby 2013)
- China 1998-2008 (He, Yan and Rigby 2015)
- ...and others...
  
- As many relatednesses as there are resources (Neffke and Henning 2013)
- Tension: Windows of locational opportunity (Storper and Walker 1989, Boschma 1997)
- Logics may differ in different "eras" of economic development (Enflo and Henning, 2016)



# Sweden after the Second Industrial Revolution

- Second Industrial Revolution: later part of the 1800s
- Rapid growth of mechanical and chemical industries
- Spatially dispersed compared to other European countries; urbanized later
- Diffusion of manufacturing industries 1900-1965 (Berger, Enflo and Henning, 2012)
- Electrical grid, better and cheaper transportation (Enflo and Henning 2016, Enflo and Berger 2017)
- Localized links of early manufacturing debated (Schön 1982)



# Data

## • Industrial activities in Swedish cities 1900-1965

- Collaboration with Lukas Ahlström, Thor Berger, Kerstin Enflo, Linnea Johansson-Kreuger
- Digitized for every 5th year
- City areas, 50 largest cities
- Record industry presence, entry, exit
- Remove industries obviously dependent on localized factors: mining, electricity, water

## – Classification-based relatedness (inspired by Frenken et al. (1997); 68 industries)

- 8 groups of related industries: (1) metals and machinery, (2) earth and clay, (3) wood, (4) paper, pulp and graphical, (5) food, (6) textiles and clothing, (7) leather, hair and rubber, (8) chemicals.

## – Occupation-based relatedness (inspired by Farjoun (1998); 31 industries)

- Correlation of occupational profiles of American industries, census 1900 (IPUMS-USA data)
- Translation to the Swedish industry codes: binary relatedness (positively corr/ not)

|  | År 1874.        |            |   |         |  |                       |                    |           | År 1875.        |            |   |         |  |                       |                    |            | Aantal Fabriker |   |
|--|-----------------|------------|---|---------|--|-----------------------|--------------------|-----------|-----------------|------------|---|---------|--|-----------------------|--------------------|------------|-----------------|---|
|  | Aantal Fabriker |            | Aantal verk, der driftkræfles består af |         | Aantal begynde mæle- og maskiner og redskab. |                       | Tilværdi af varel. |           | Aantal Fabriker |            | Aantal verk, der driftkræfles består af |         | Aantal begynde mæle- og maskiner og redskab. |                       | Tilværdi af varel. |            |                 |   |
|  | i gæng.         | ej i gæng. | kræfter.                                | valten. | høje eller værnsløst.                        | høje eller værnsløst. | Krøner.            | Krøner.   | i gæng.         | ej i gæng. | kræfter.                                | valten. | høje eller værnsløst.                        | høje eller værnsløst. | Krøner.            | Krøner.    |                 |   |
| <b>Christianstads län.</b><br><i>I städer.</i> |                 |            |   |         |  |                       |                    |           |                 |            |   |         |  |                       |                    |            |                 |   |
| Christianstad.....                             | 6               | —          | —                                       | 3       | 35   | 73                    | 636,255            | 7         | —               | —          | 3                                       | 35      | 82   | 724,683               | 7                  | —          |                 |   |
| Cimbriehamn.....                               | 7               | —          | 6                                       | —       | —  | 55                    | 74,368             | 7         | —               | 6          | —                                       | —       | —  | 61                    | 72,638             | 8          | —               |   |
| Engelholm.....                                 | 6               | —          | —                                       | —       | —  | 10                    | 2,000              | 5         | 1               | —          | —                                       | —       | —  | 10                    | 1,150              | 4          | 1               |   |
| <i>I köping.</i>                               | 19              | —          | 6                                       | —       | 3  | 25                    | 138                | 774,533   | 19              | 1          | 6                                       | —       | 3  | 36                    | 153                | 739,425    | 19              | 1 |
| Blotal.....                                    | 0               | —          | —                                       | —       | —  | —                     | 33                 | 11,300    | 11              | —          | —                                       | —       | —  | —                     | 49                 | 16,100     | 10              | — |
| På Isølet.....                                 | 45              | —          | 36                                      | 16      | 2  | 133                   | 532                | 800,507   | 37              | —          | 43                                      | 17      | 4  | 505                   | 169                | 855,864    | 45              | — |
| Tillsammans.....                               | 68              | —          | 42                                      | 16      | 5  | 208                   | 708                | 1,646,450 | 67              | 1          | 43                                      | 17      | 7  | 531                   | 371                | 1,670,300  | 75              | 1 |
| <b>Elfsborgs län.</b><br><i>I städer.</i>      |                 |            |   |         |  |                       |                    |           |                 |            |   |         |  |                       |                    |            |                 |   |
| Alingsås.....                                  | 3               | —          | —                                       | 1       | 2  | 58                    | 358                | 1,106,207 | 3               | —          | 1                                       | 1       | 58   | 373                   | 1,006,676          | 3          | —               |   |
| Boris.....                                     | 14              | —          | 2                                       | 1       | 9  | 123                   | 904                | 1,990,300 | 16              | —          | 2                                       | 1       | 11   | 168                   | 800                | 1,900,215  | 15              | — |
| Ulriehamn.....                                 | 3               | —          | —                                       | —       | —  | —                     | 8                  | 25,000    | 3               | —          | —                                       | —       | 1  | 4                     | 3                  | 20,000     | 4               | — |
| Veneberg.....                                  | 7               | —          | 6                                       | —       | 2  | 30                    | 79                 | 278,087   | 8               | —          | 5                                       | —       | 2  | 30                    | 2,042              | 350,365    | 9               | — |
| Isölet.....                                    | 28              | —          | 10                                      | 3       | 13   | 208                   | 1,411              | 3,418,964 | 37              | —          | 8                                       | 4       | 15   | 296                   | 3,407              | 3,388,831  | 38              | — |
| På Isølet.....                                 | 101             | 1          | 56                                      | 46      | 16   | 3,622                 | 8,040              | 5,887,162 | 100             | 5          | 58                                      | 52      | 13   | 3,762                 | 8,392              | 7,637,553  | 108             | 2 |
| Tillsammans.....                               | 135             | 1          | 66                                      | 49      | 28   | 3,730                 | 9,451              | 9,306,546 | 137             | 5          | 66                                      | 56      | 30   | 4,055                 | 11,739             | 11,026,354 | 146             | 2 |
| <b>Geleborgs län.</b><br><i>I städer.</i>      |                 |            |   |         |  |                       |                    |           |                 |            |   |         |  |                       |                    |            |                 |   |
| Gele.....                                      | 38              | —          | 2                                       | 1       | 18   | 365                   | 10,748             | 3,847,422 | 34              | 1          | 4                                       | 1       | 17   | 405                   | 11,694             | 4,000,829  | 31              | 4 |
| Hälsöwall.....                                 | 5               | 2          | 2                                       | —       | 4  | 28                    | 32                 | 287,229   | 6               | —          | 2                                       | —       | 6  | 47                    | 32                 | 287,501    | 7               | 2 |
| Söderhamn.....                                 | 11              | —          | 2                                       | 2       | 4  | 89                    | 77                 | 673,530   | 10              | —          | 1                                       | 3       | 43   | 33                    | 229,168            | 8          | —               |   |
|  | 54              | 2          | 6                                       | 3       | 26   | 482                   | 10,871             | 4,808,315 | 50              | 1          | 6                                       | 2       | 26   | 492                   | 11,989             | 4,657,298  | 46              | 6 |

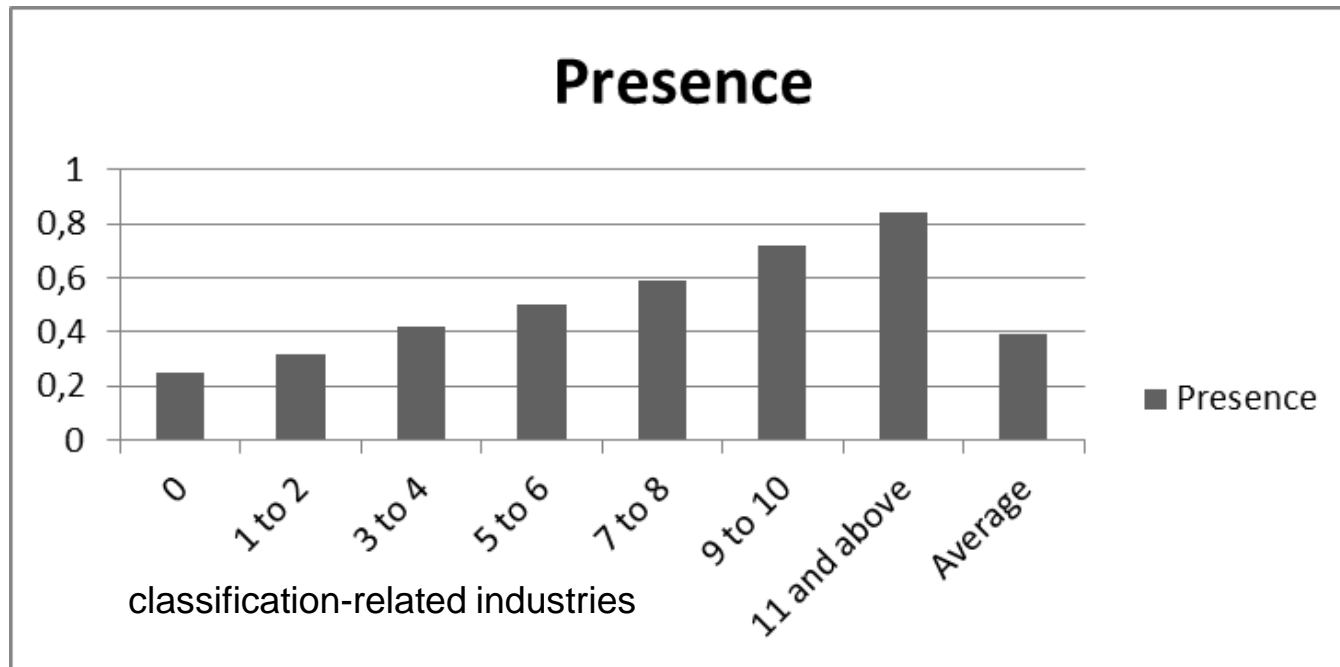






# Presence shares

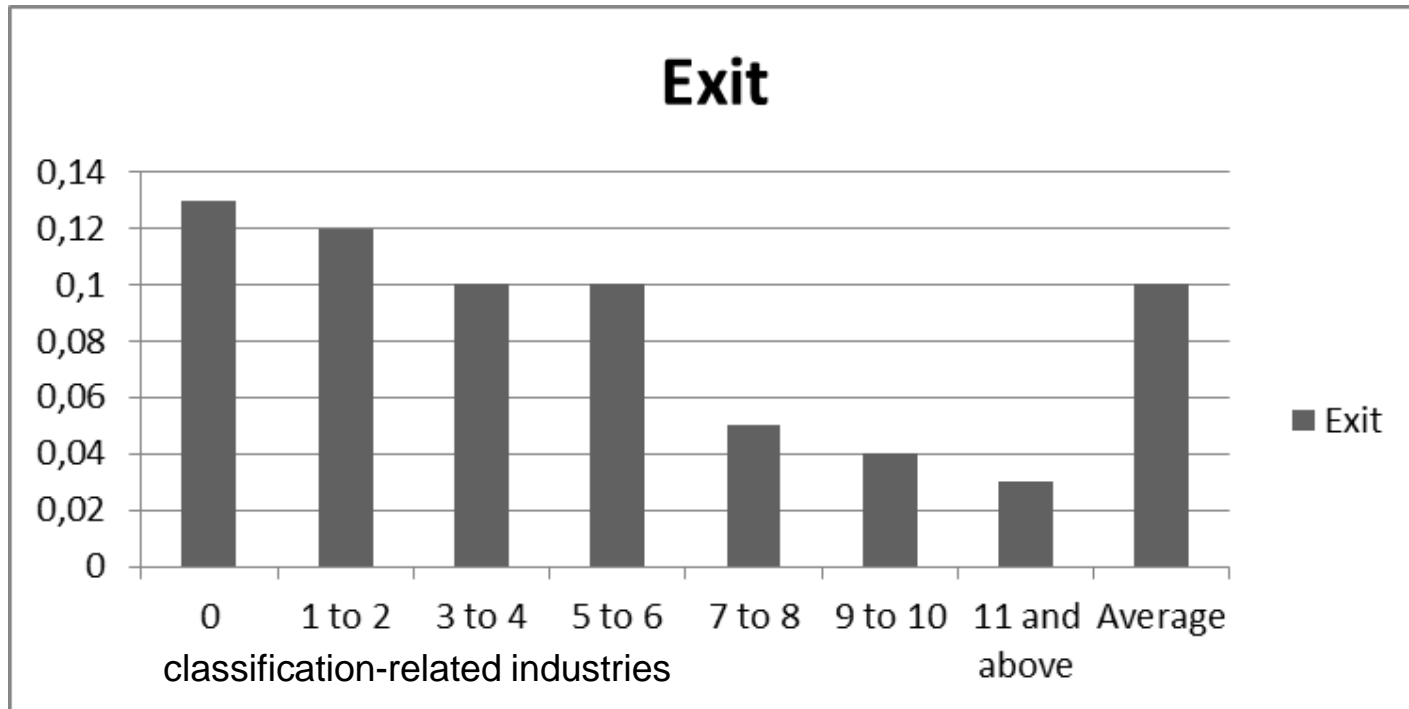
(13306 present year/city/industry combinations of 34300 possible)





# Exit shares

(1247 exits)

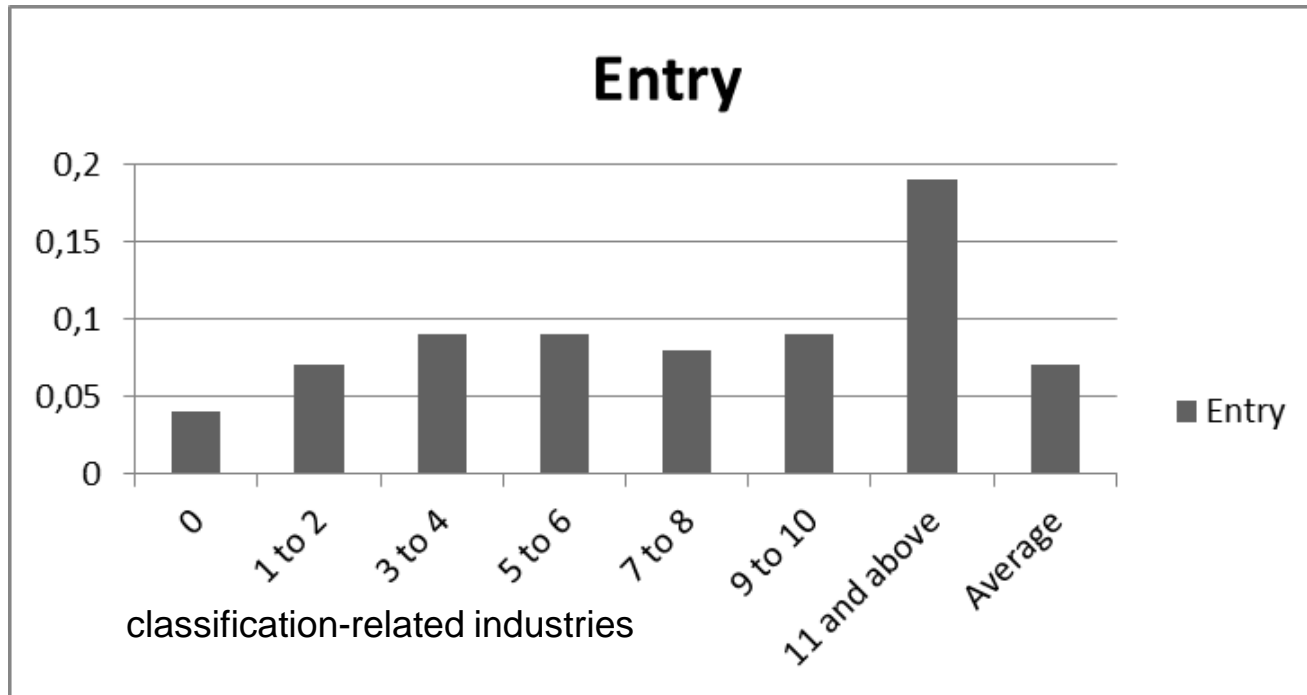






# Entry shares

(1384 entries)



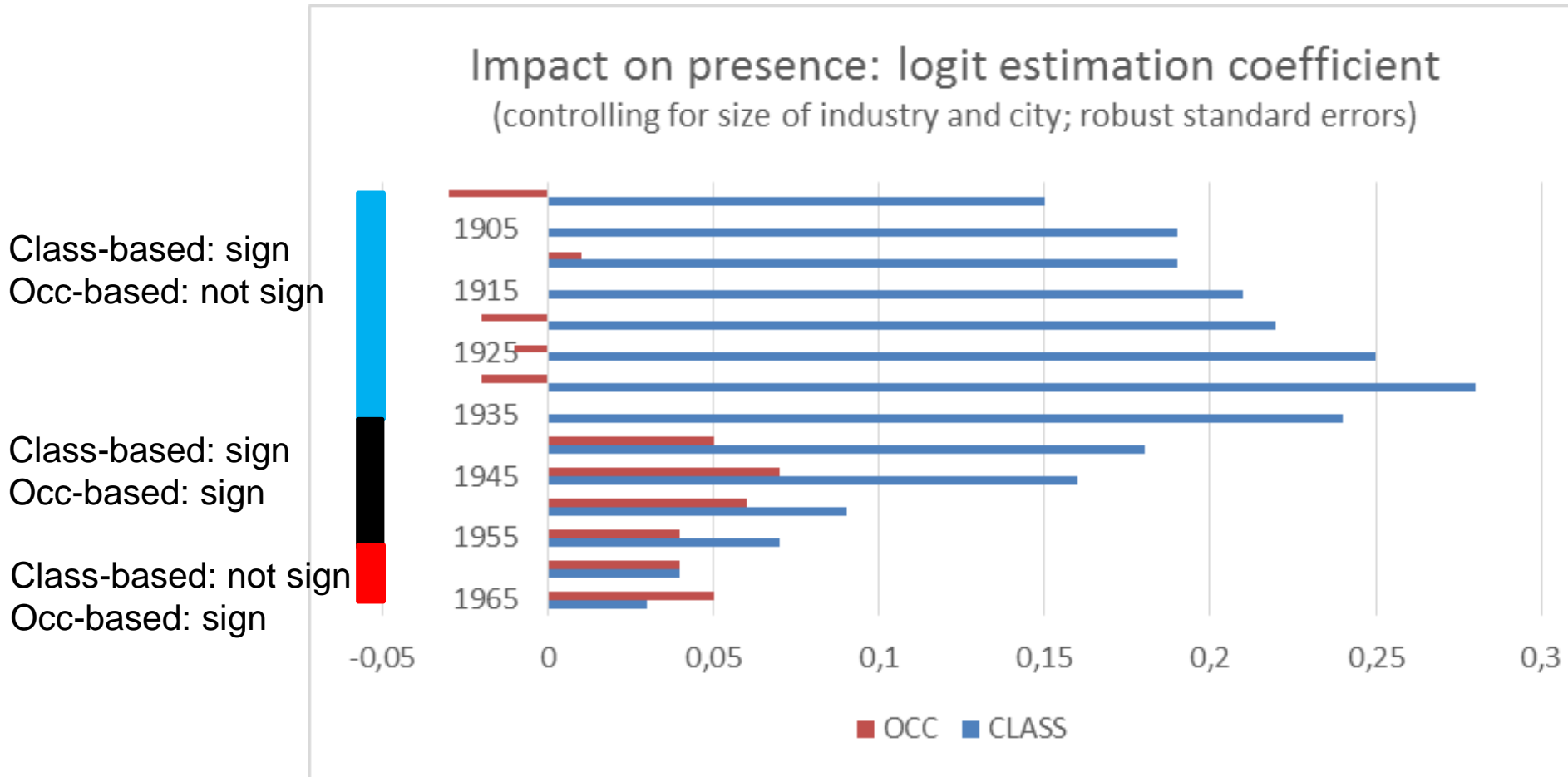


- This holds
  - Controlling for size of industry and city
  - Testing the contrafactual non-embeddedness
  - Adjusting for the fact that the possible number of related industries vary greatly between the sectors
  
- The entry variable
  - After the Second World War until 1960 (where the other studies start), there seems to be a whole lot less related entries
  - And the average embeddedness present industries increases until WWII and decreases significantly thereafter





# Growing importance of occupation-based relatedness





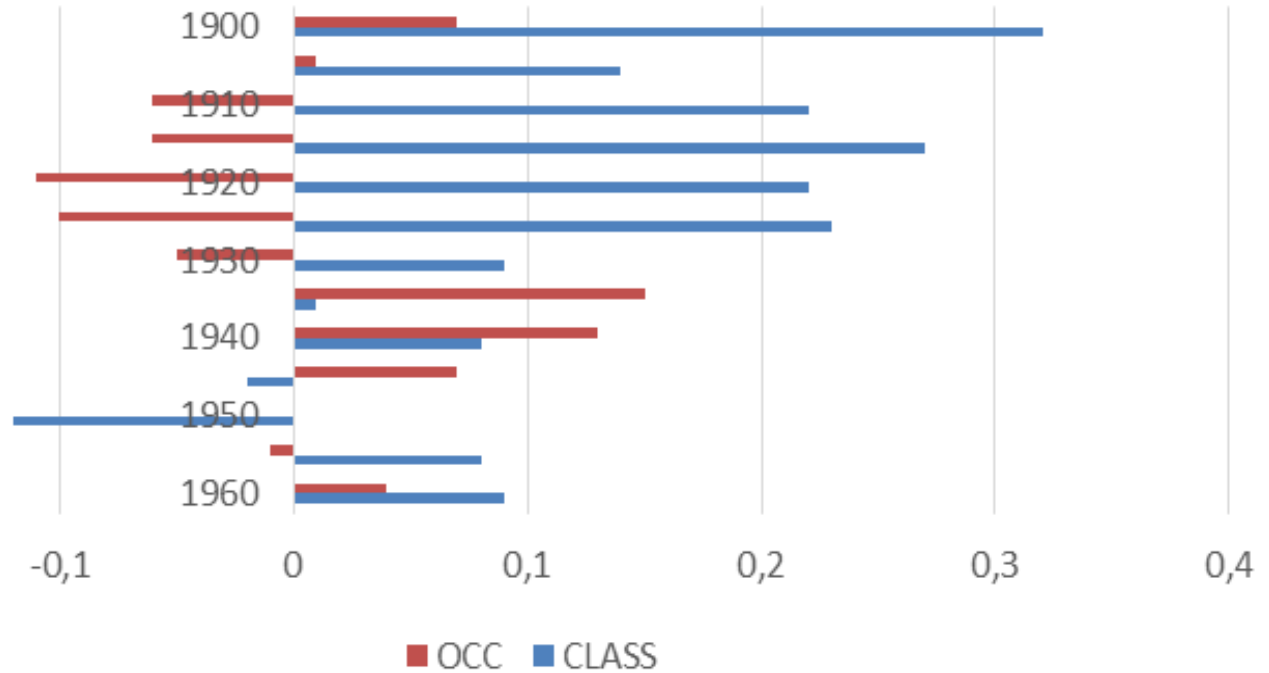
### Impact on entry: logit estimation coefficient (controlling for size of industry and city; robust standard errors)

Class-based: sign  
Occ-based: not sign

Class-based: sign  
Occ-based: sign

Class-based: not sign  
Occ-based: sign

Non sign

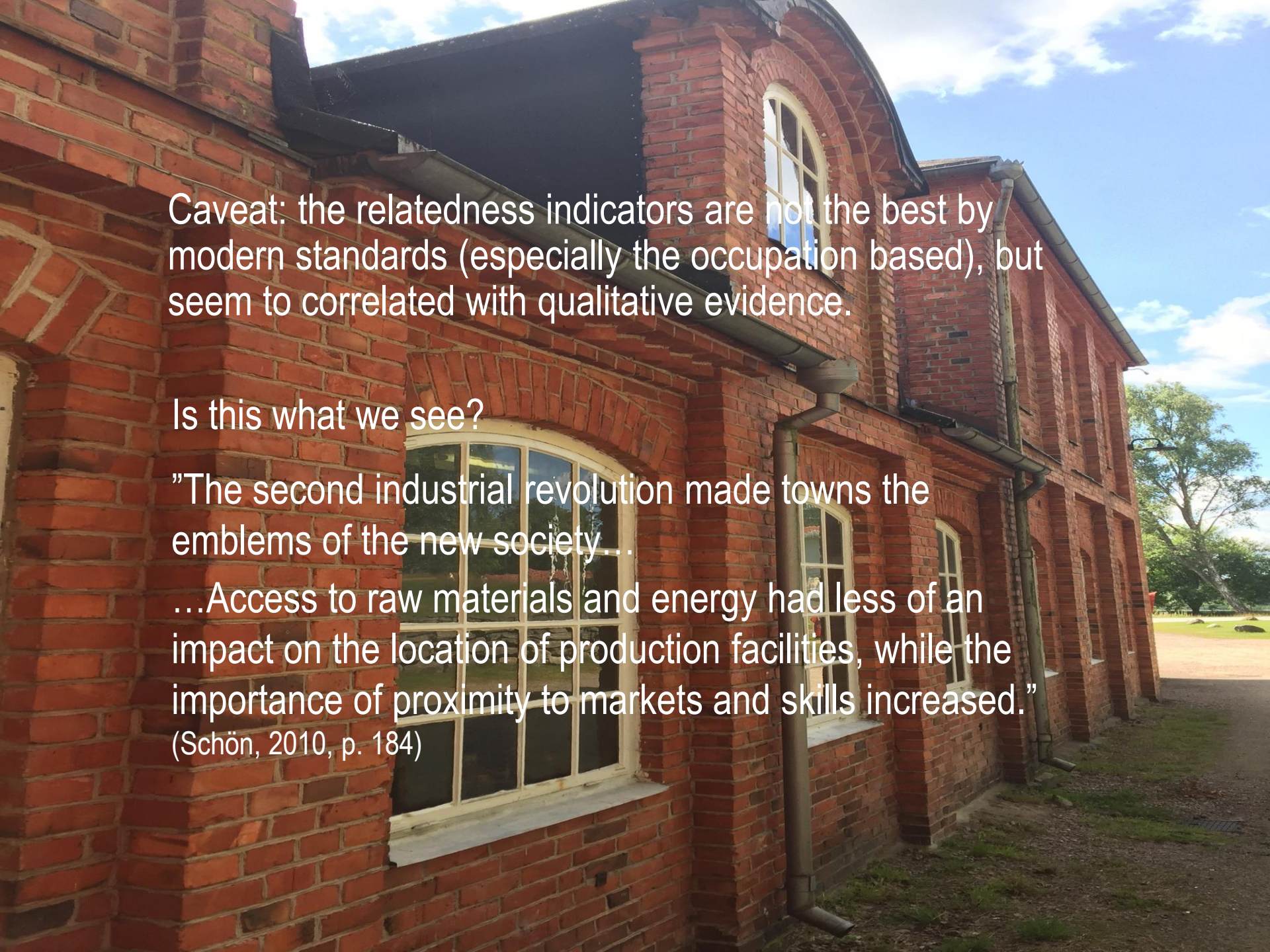






# Conclusions

- Coherent regional portfolios were established early in the Second Industrial Revolution process
- The general coherence and related branching pattern seems to hold also for the historical data
- Very consistent patterns, given that we cross-use international historical data, general patterns are also consistent with other breaking points
- There are "relatedness regimes" that also influence regional development
- Empirics-based speculation:
  - Second industrial revolution until WWII: coherence and entry based on sector-specific localized resources
  - WWII- ? : stronger focus on occupations and skills; formalization of occupations



Caveat: the relatedness indicators are not the best by modern standards (especially the occupation based), but seem to correlated with qualitative evidence.

Is this what we see?

"The second industrial revolution made towns the emblems of the new society...

...Access to raw materials and energy had less of an impact on the location of production facilities, while the importance of proximity to markets and skills increased."

(Schön, 2010, p. 184)



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Amperemeter



Voltemeter



Wattmeter



Rele



Ladung

Entladung



Ladung



Ladung

Entladung

Ab-  
schließen

