Work Schedule Changes in an Overworking Country

Sequence Analysis on Korean Time Use Survey between 1999 and 2014

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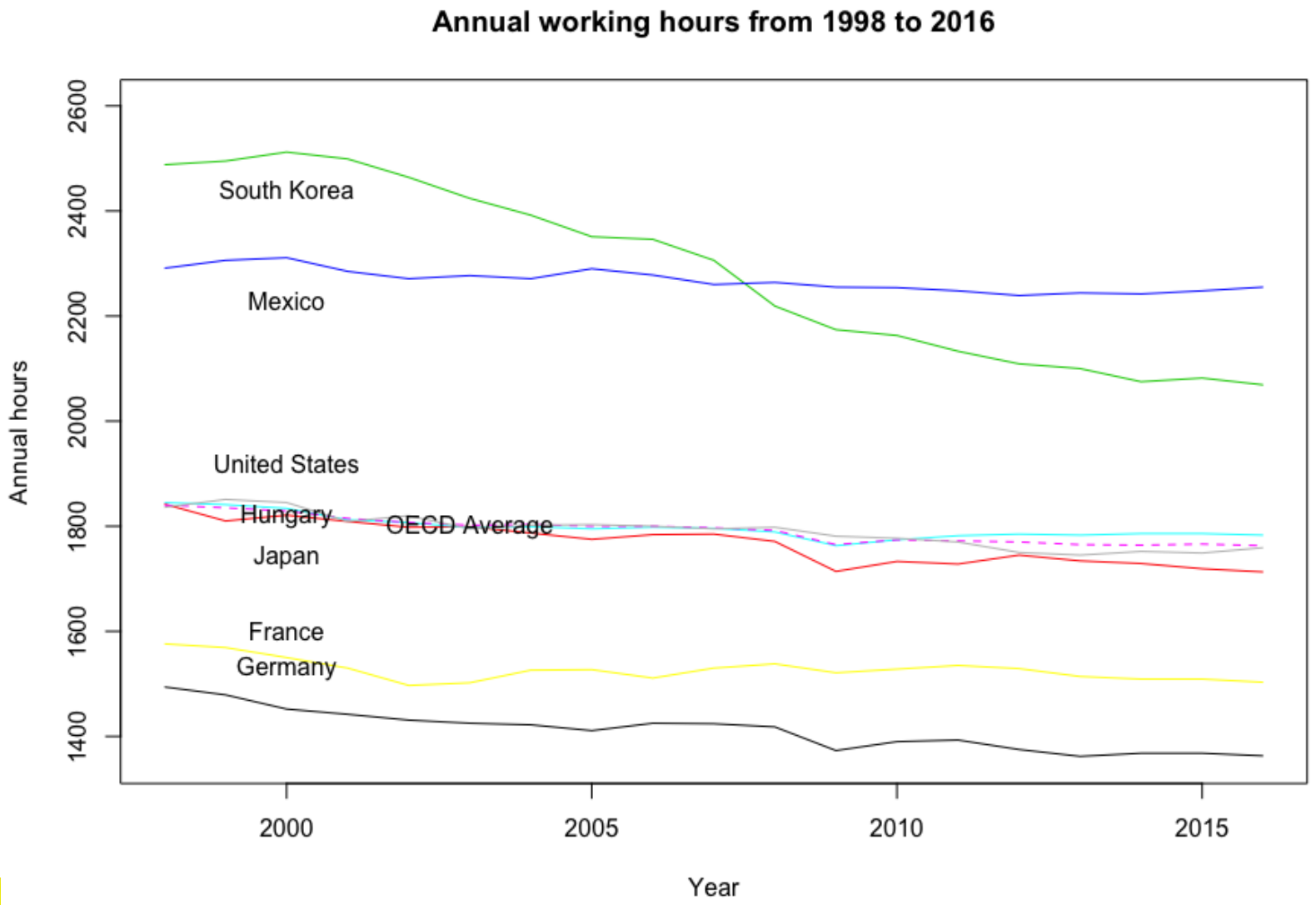
Background

- South Korea: one of the busiest country
- Annually work 2069 hours
  (305 hours more than OECD average)
- Condensed industrialization between 1960 and 1980
- However..
  Gradual reduction of working hours since 1990

Background


Annual working hours from 1998 to 2016
Annual hours
2600
2400
2200
2000
1800
1600
1400
South Korea
Mexico
United States
Hungary
OECD Average
Japan
France
Germany
2000
2005
2010
2015
Year

Background

- **Research Question**

  How does the Korean work schedule have changed?

- Marginal decrease or De-standardization?

- Changes of the work schedule distribution correlated with the reduction in the amount of working hours

Literature

- **Working hours reduction in post-industrial society**

  1) Industrial change

  2) Demographic change

  3) Policy intervention

  4) Labor power

Literature

- **Working hours reduction in post-industrial society**

  1) Industrial change

  1-1) Enlargement of service and sales sector

  1-2) Diversification of labor management

  1-3) Outsourced working hours

Literature

- **Working hours reduction in post-industrial society**

  2) Demographic change

  2-1) Dual earning family

  2-2) Aging society

Literature

- **Working hours reduction in post-industrial society**

  3) Policy intervention

  3-1) Direct and indirect intervention of working hours

- **4) Labor power**

  4-1) Labor movement

Literature

- **Working hours reduction in post-industrial society**

  1) Industrial change > **De-standardization**

  2) Demographic change > **De-standardization**

  3) Policy intervention > **Mixed**

  4) Labor power > **Mixed**

Design

- Data

  Korean Time-Use Survey (KTUS)
  1999, 2004, 2009, 2014

- Method

  Sequence analysis
  Dynamic Hamming Distance (Lesnard, 2004)
  Ward's method (Ward, 1963)

Design

- **Data**
  KTUS: 1999, 2004, 2009, 2014

- Investigated with 2 days in a week
  > First day
  > Weekday
  > At least 10 minutes of work

- Total cases: 42,815
  1999: 14,328, 2004: 10,430, 2009: 6323, 2014: 11,734

Design

- **Method**
  Sequence analysis

  Cost assignment:
  Dynamic Hamming Distance (Lesnard, 2004)

  Clustering:
  Ward's method (Ward, 1963)

Design

- **Method**
  Dynamic Hamming Distance (Lesnard, 2004; 2011)

$$S_P(W,N) = 4 - [p(X_P = W|X_{P-1} = N) + p(X_P = N|X_{P-1} = W) + p(X_{P+1} = W|X_P = N) + p(X_{P+1} = N|X_P = W)]$$

$$(S_P: substitution\ cost, p: position\ in\ the\ sequence, X_P: the\ element\ at\ the\ p_{th}\ position\ of\ a\ sequnce)$$

$$S_s(W,N) = 4 - 2[p(X_2 = W|X_1 = N) + p(X_2 = N|X_1 = W)]$$

$$S_E(W,N) = 4 - 2[p(X_{144} = W|X_{143} = N) + p(X_{144} = N|X_{143} = W)]$$

$$(S_S: substitution\ cost\ at\ point\ 1, S_E: substitution\ cost\ at\ point\ 144)$$

Ward's Method (Ward, 1963)

$$d_{ij} = d(\{X_i\}, \{X_j\}) = \|X_i - X_j\|^2$$

Result

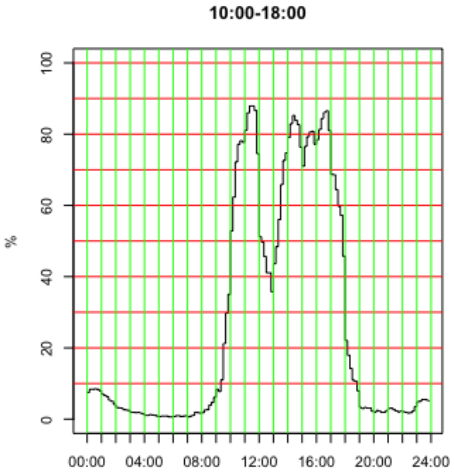
- Sequence analysis
- Trend analysis

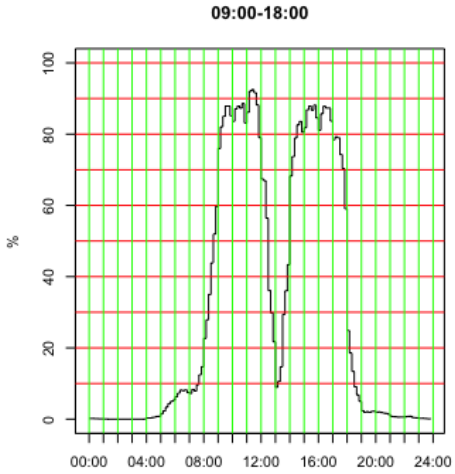
  1) Overall distribution

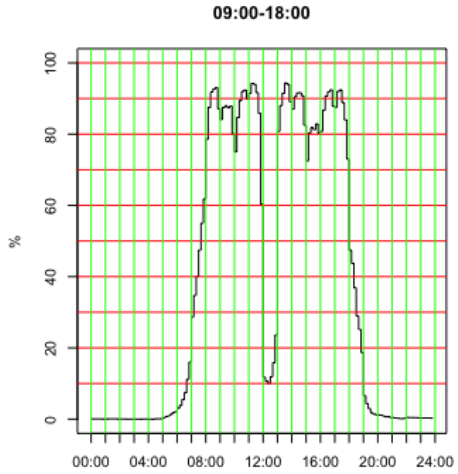
  2) Status of schedule

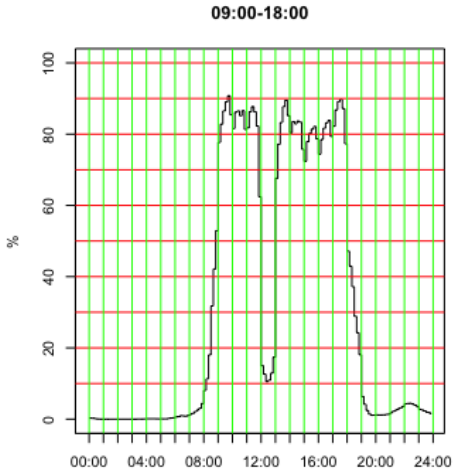
Result: Sequence Analysis

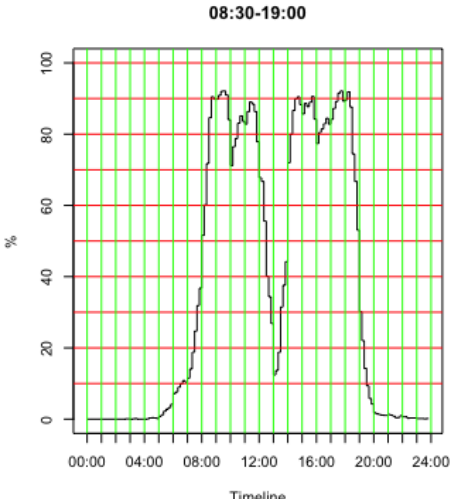
- Standard

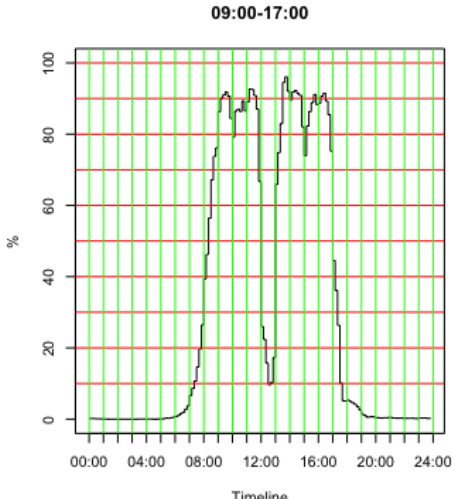


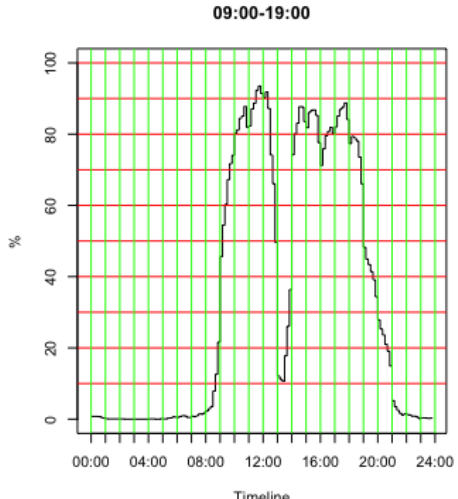


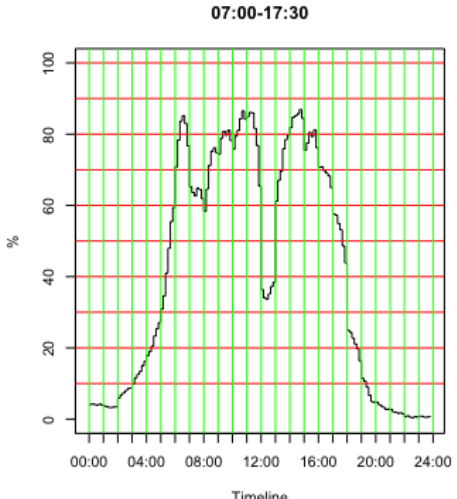






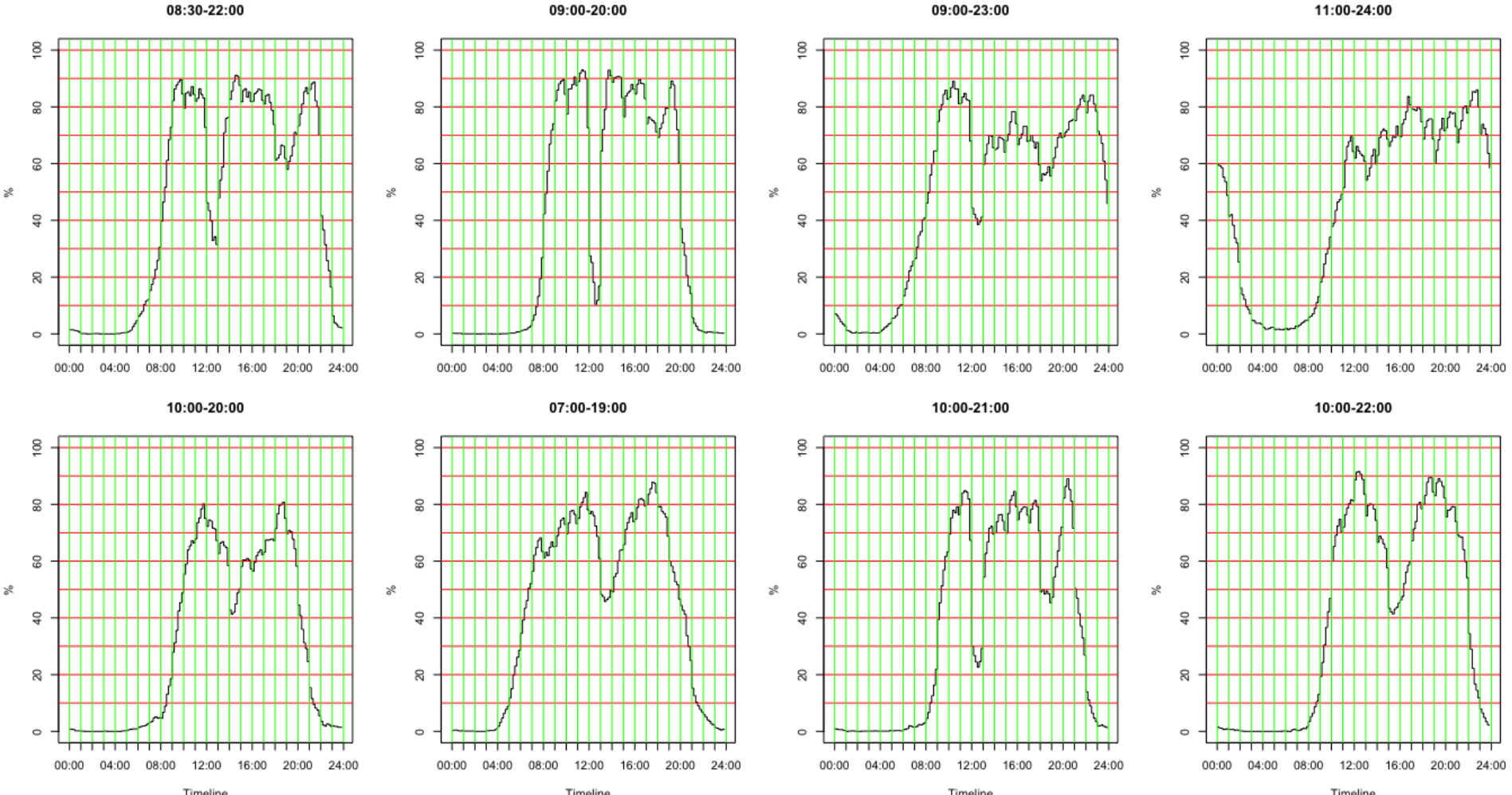






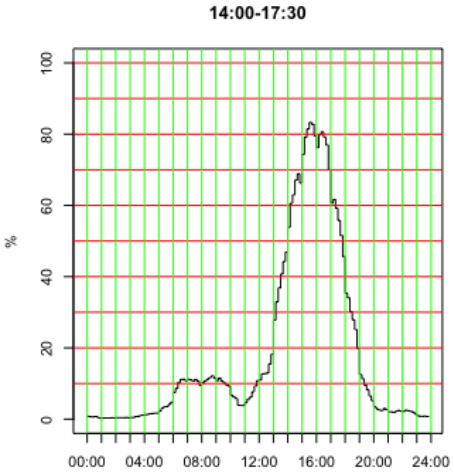
Result: Sequence Analysis

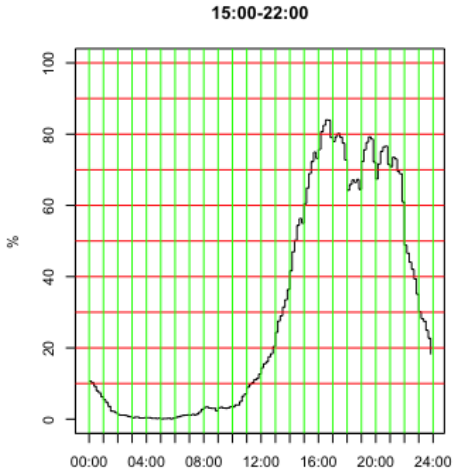
- Long

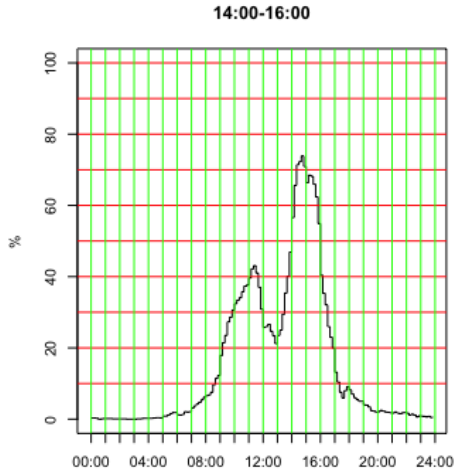


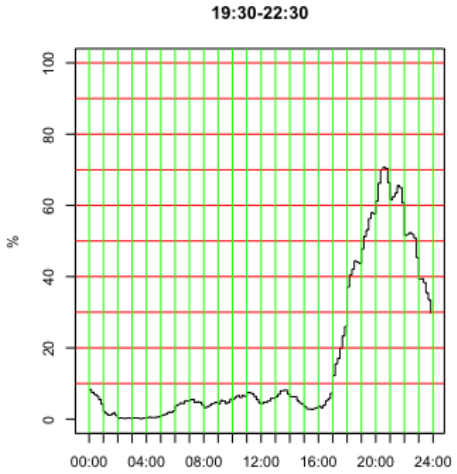
Result: Sequence Analysis

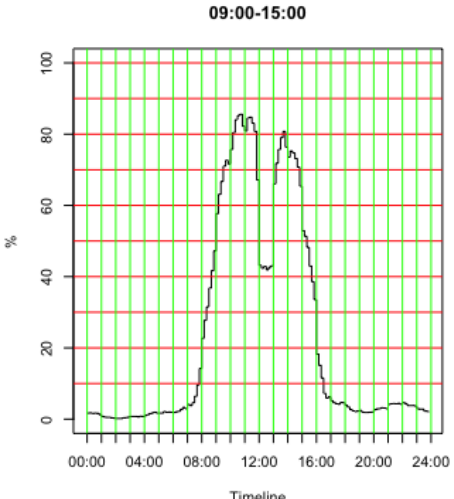
- Part

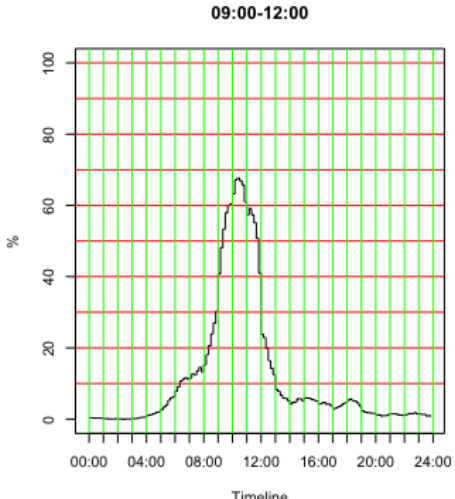


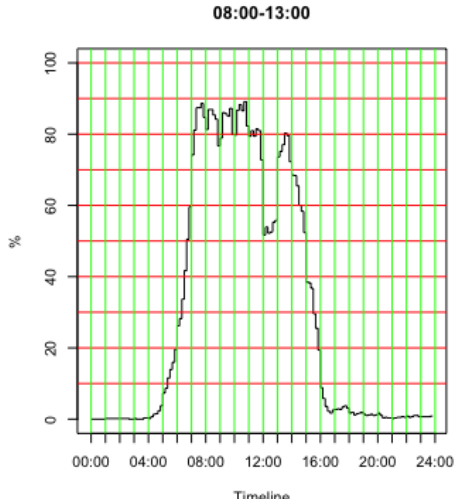






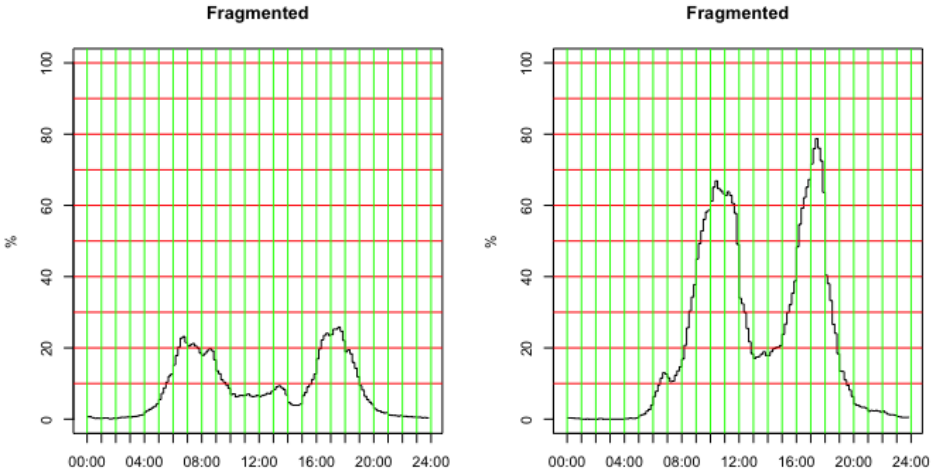


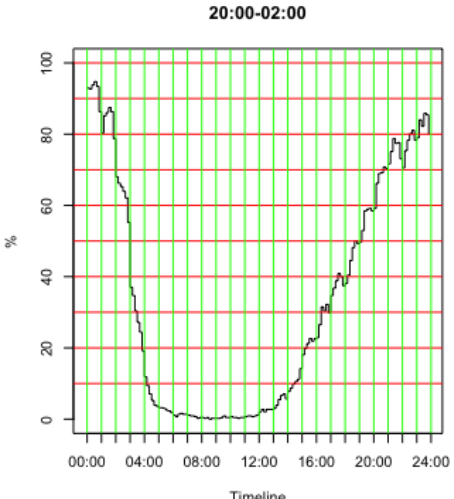


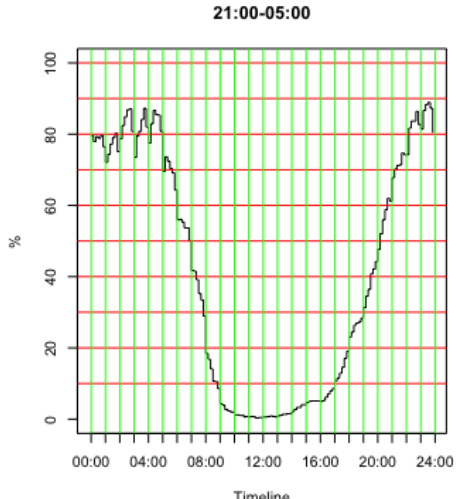


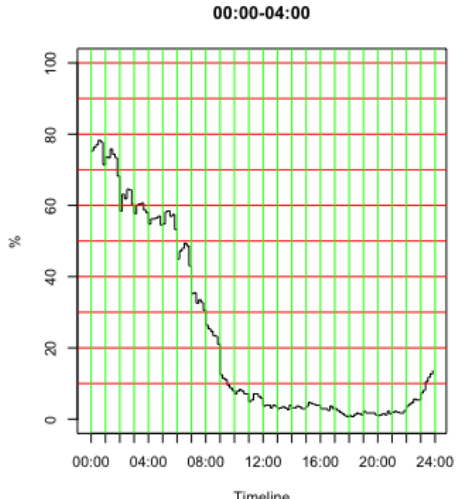
Result: Sequence Analysis

- Fragmented, Night



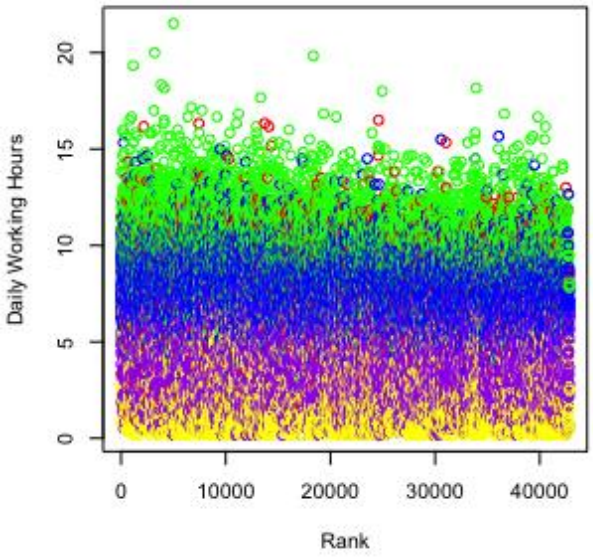


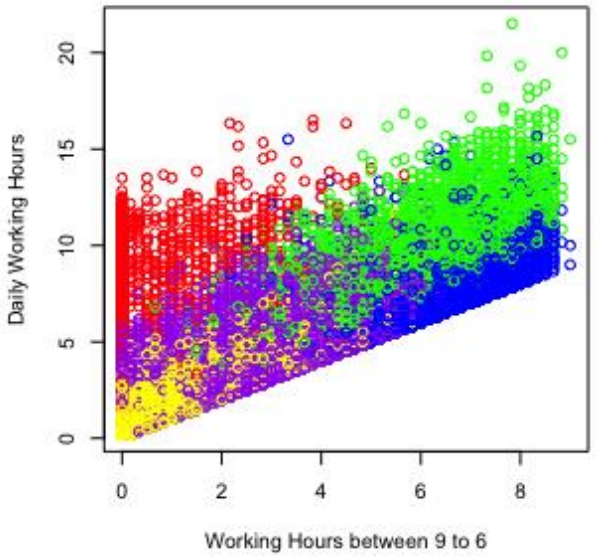




Result: Overall Distribution

- **Standard**, **Long**, **Part**, **Fragmented**, **Night** Categories plotted

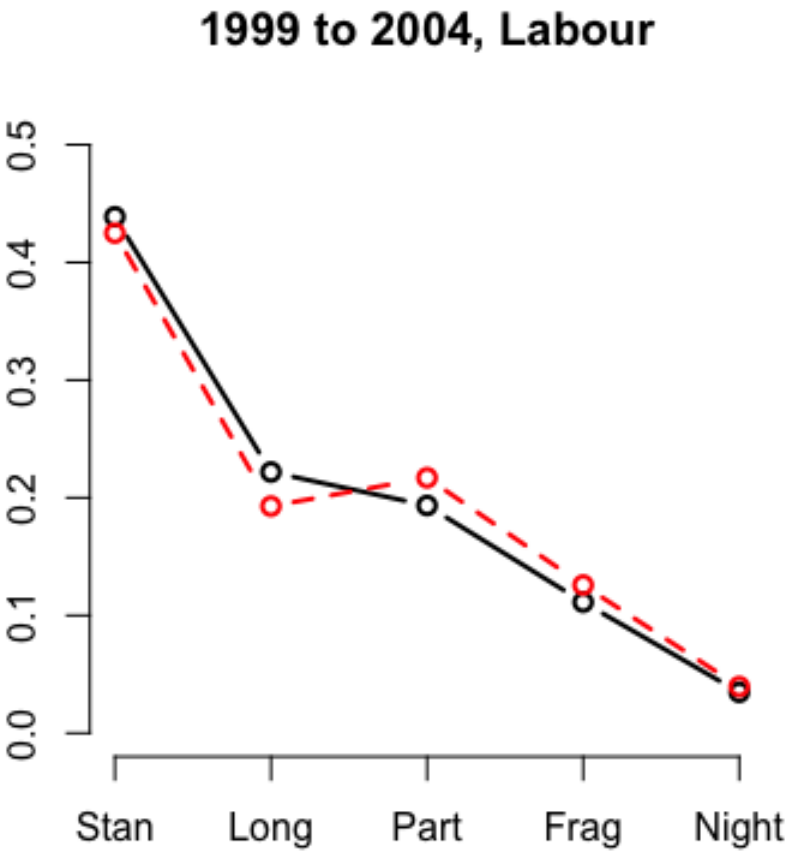


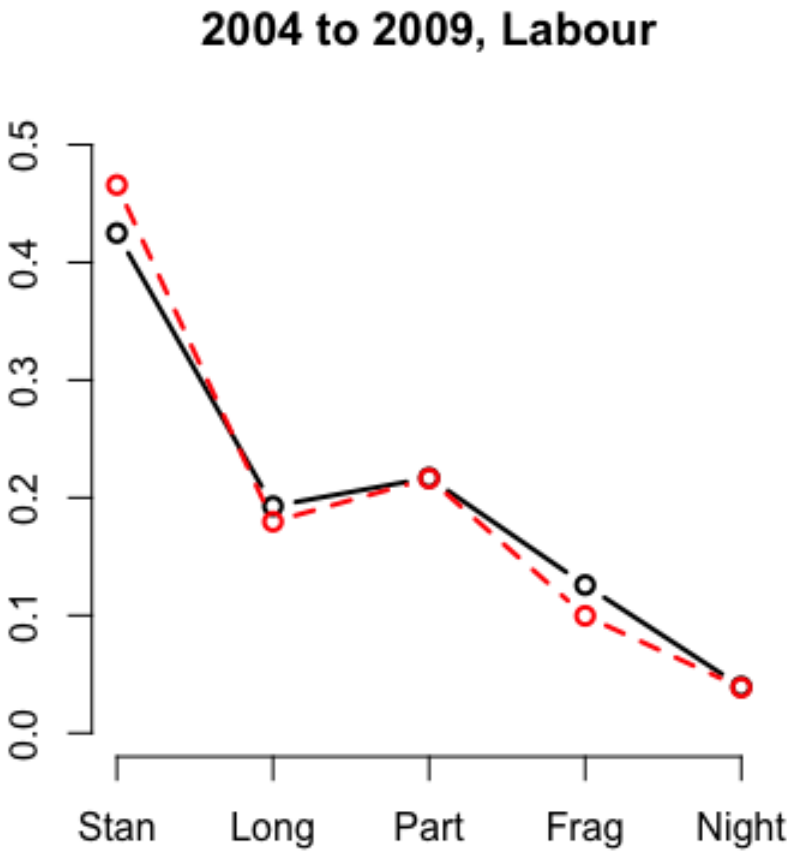


Max: 24	Standard	Long	Part	Fragmented	Night
Av. Daily work hours	7.9	9.7	4.6	2.9	8.1

Result: Overall Distribution

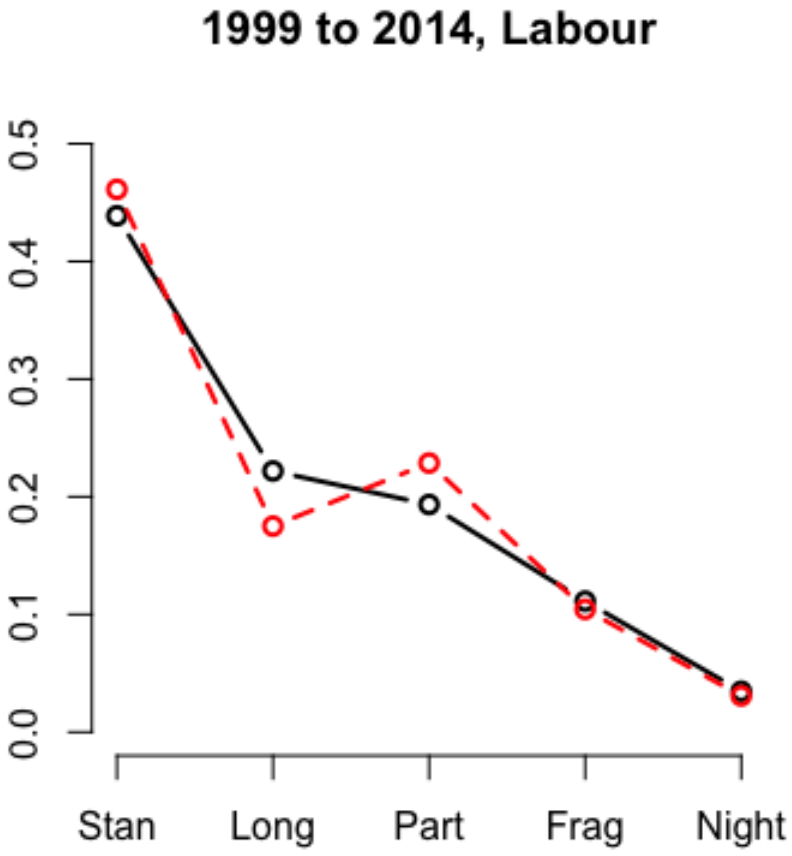
- Overall distribution (**Before**, **After**)





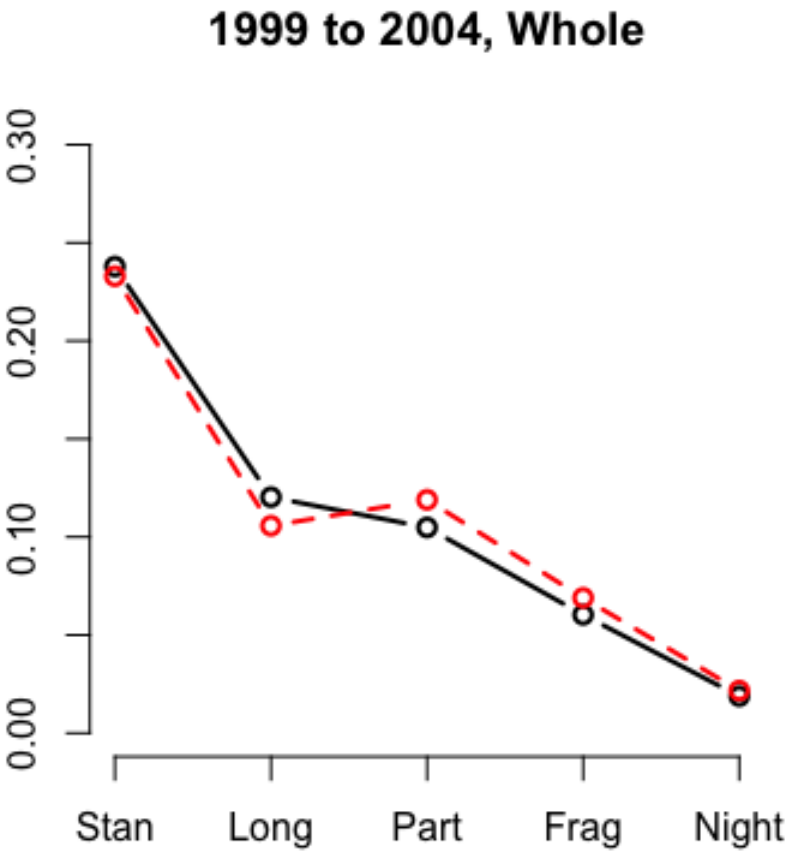
Result: Overall Distribution

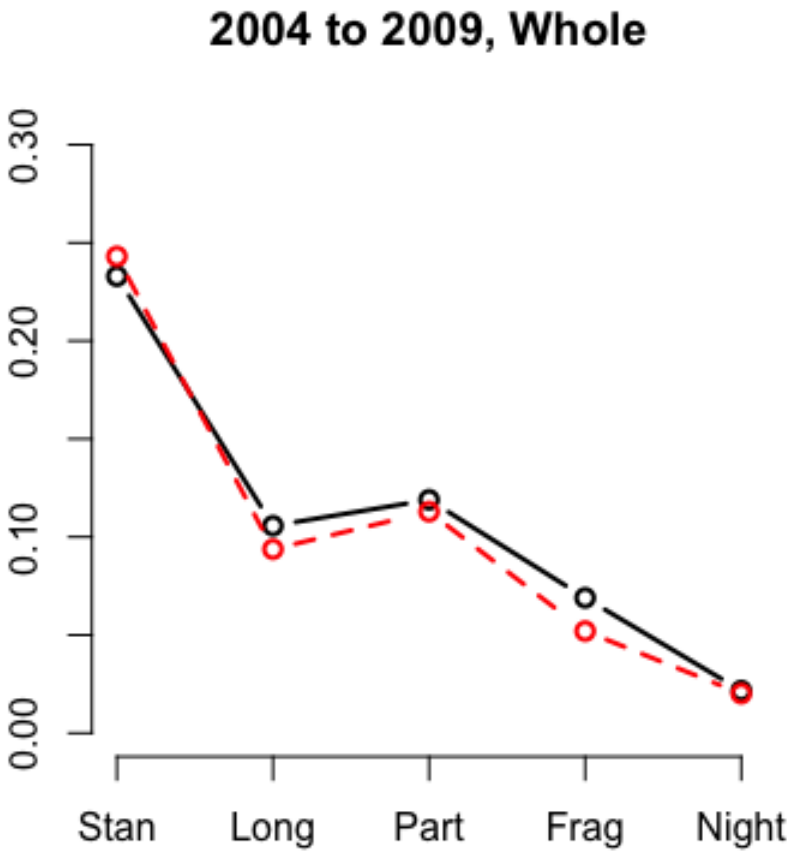
- Overall distribution (**Before**, **After**)



Result: Overall Distribution

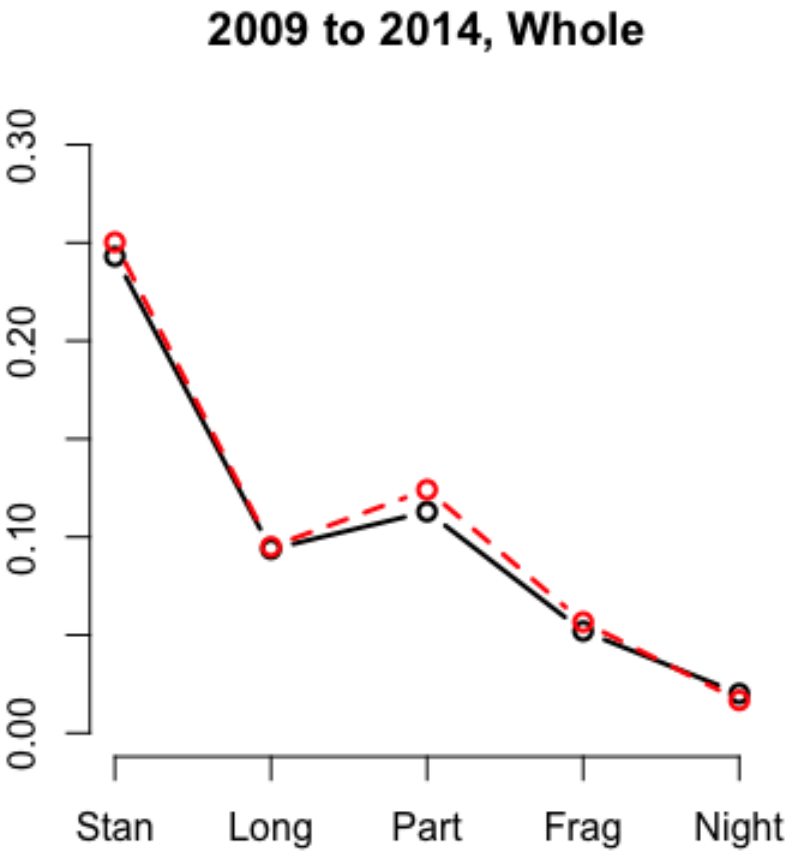
- Overall distribution (**Before**, **After**)

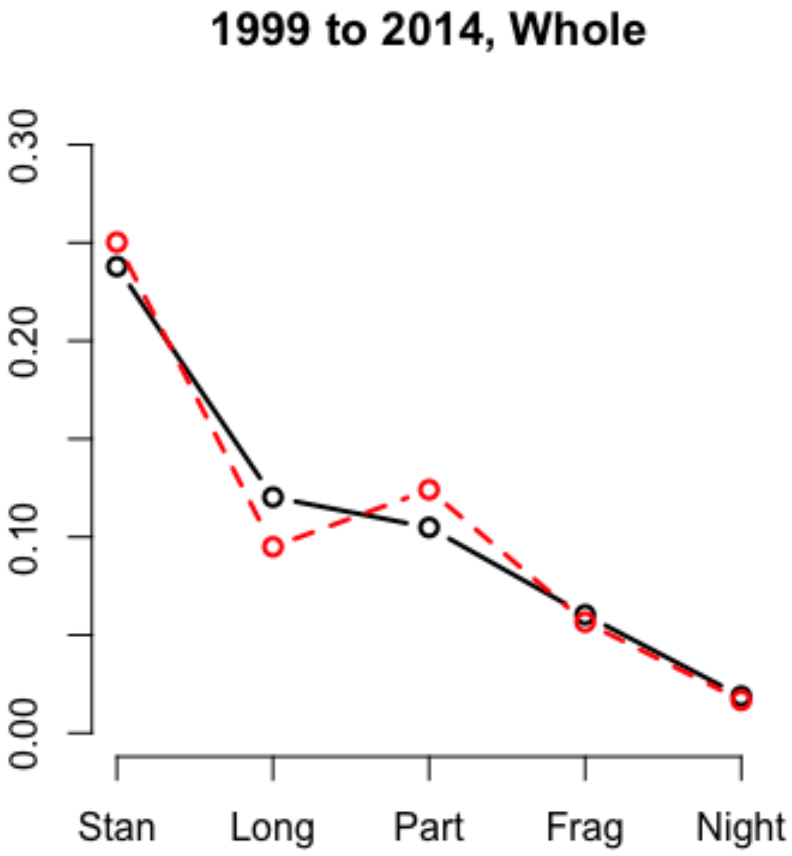




Result: Overall Distribution

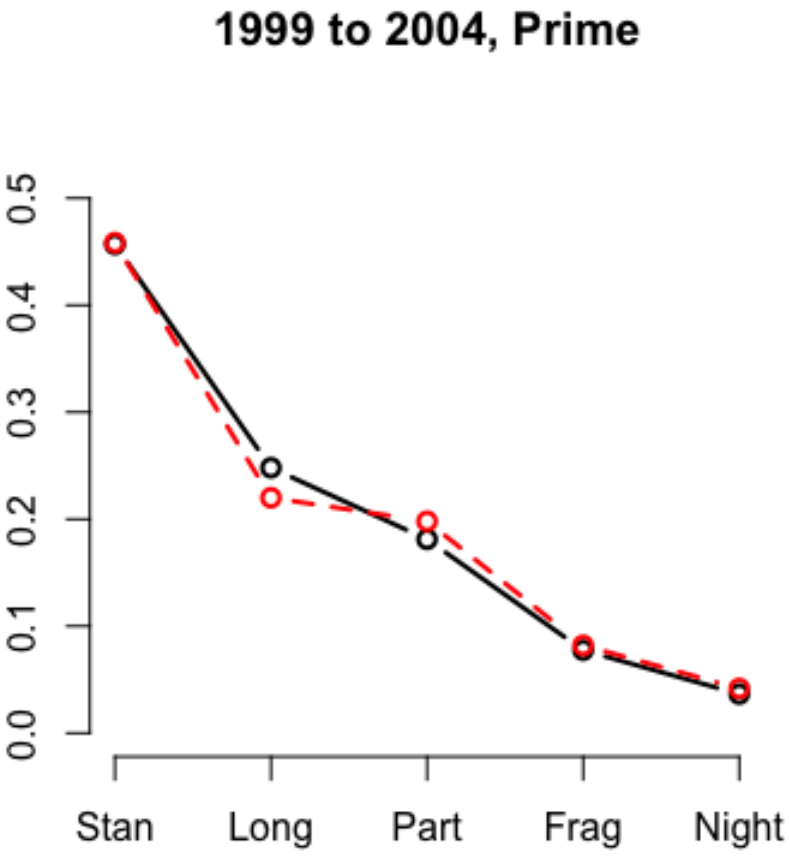
- Overall distribution (**Before**, **After**)

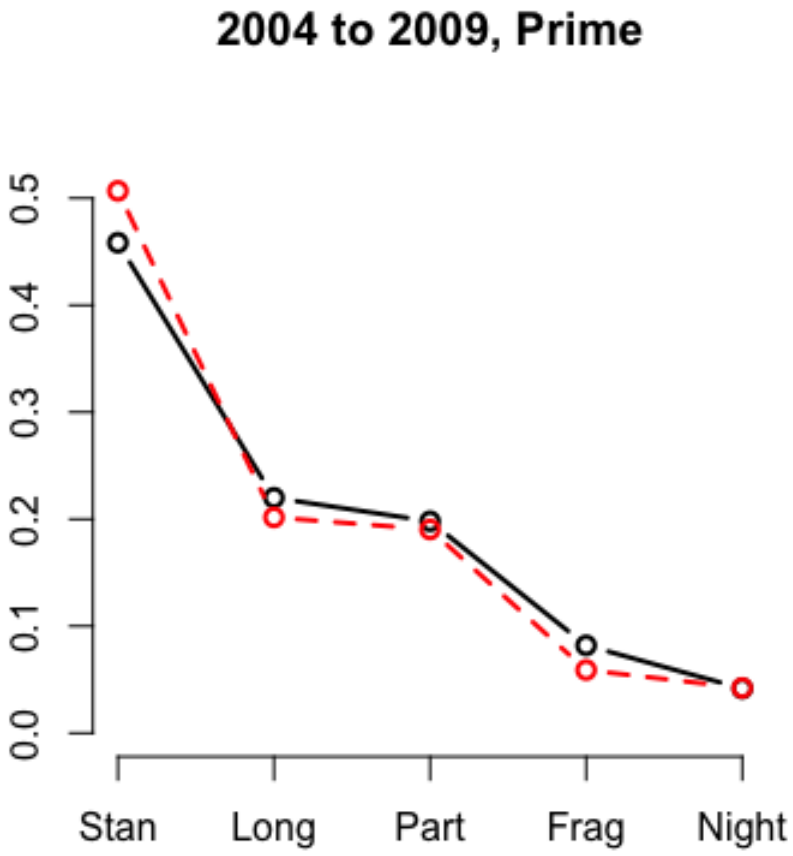




Result: Overall Distribution

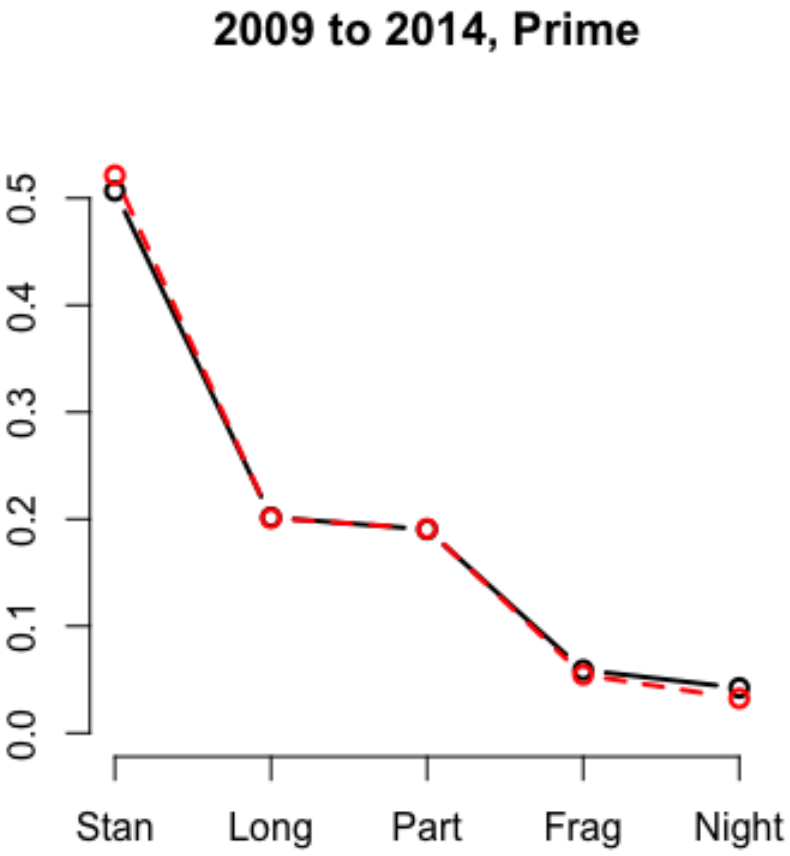
- Prime earning age (**Before**, **After**)

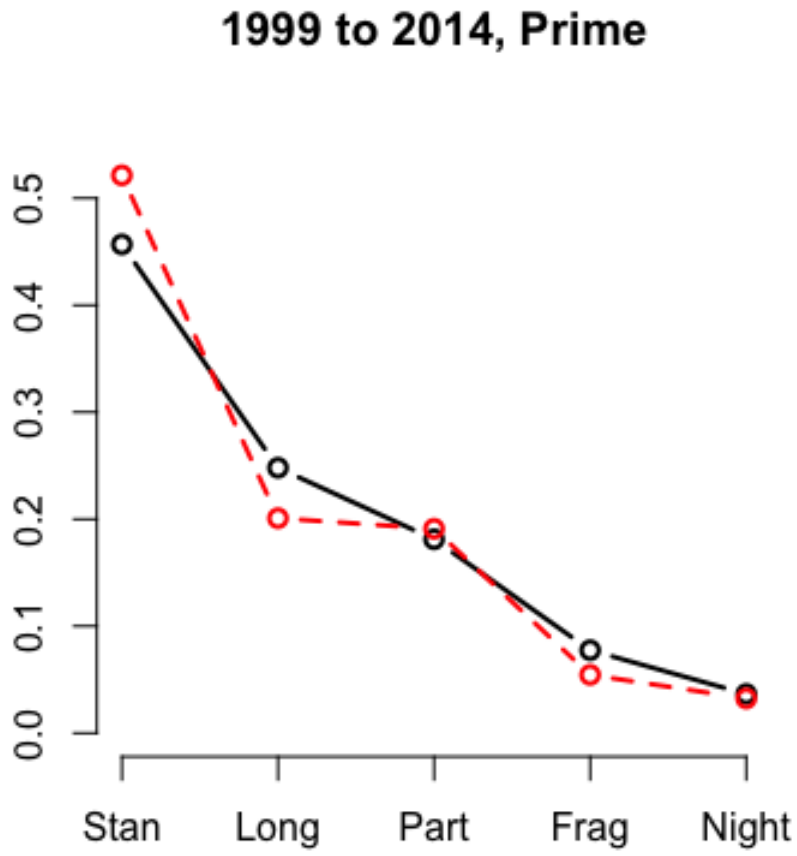




Result: Overall Distribution

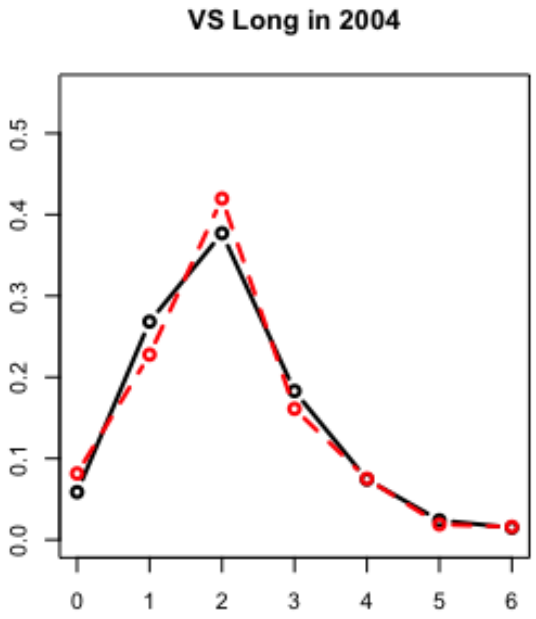
- Prime earning age (**Before**, **After**)

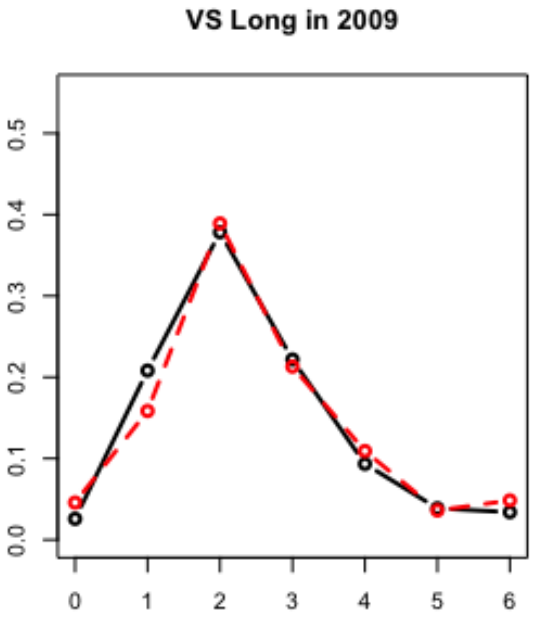


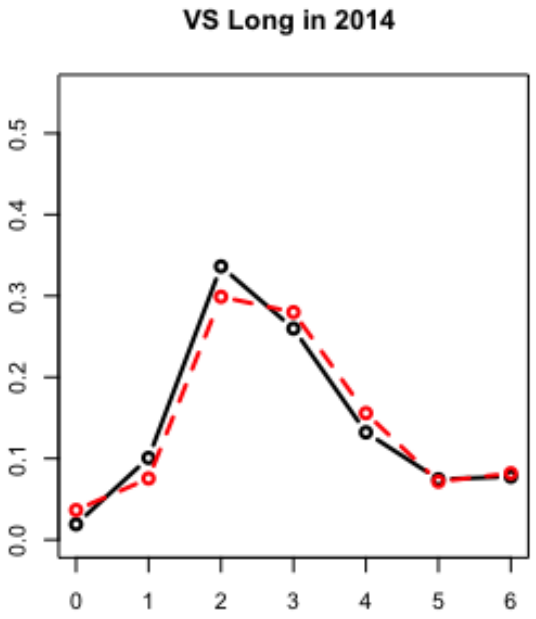


Result: Status of Schedule

- Income level (**Standard** vs **Long**)



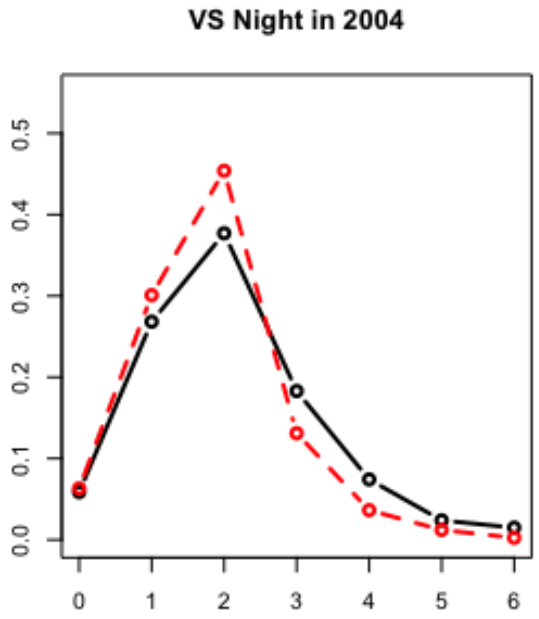


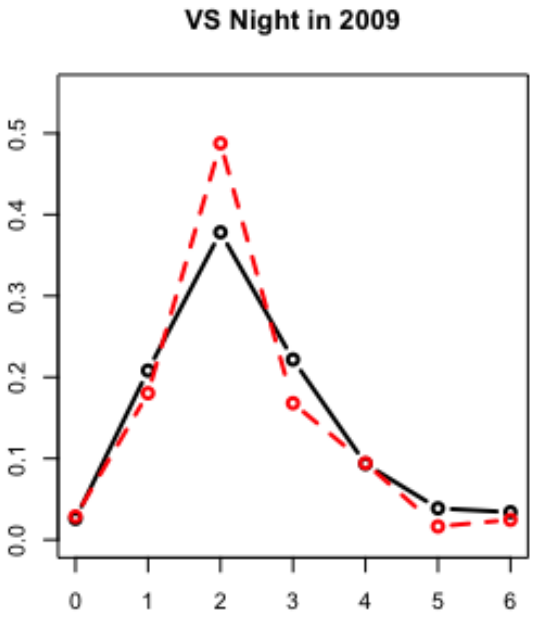


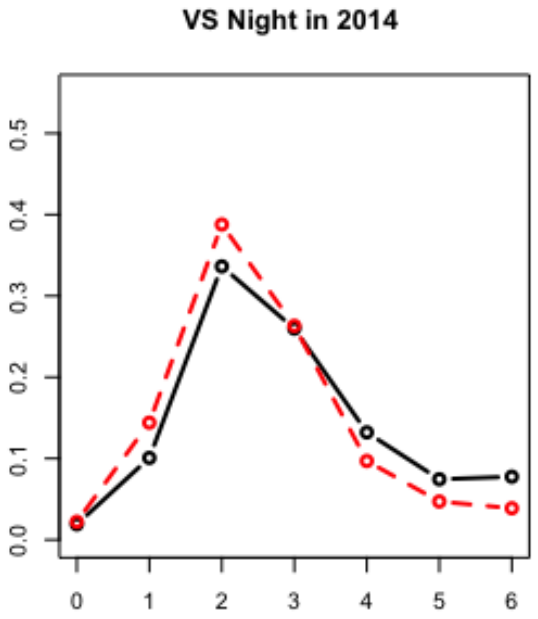
Income Level	0	1	2	3	4	5	6
Won	[0, 100)	[100, 200)	[200, 300)	[300, 400)	[400, 500)	[500, 600)	[700,)

Result: Status of Schedule

- Income level (**Standard** vs **Night**)



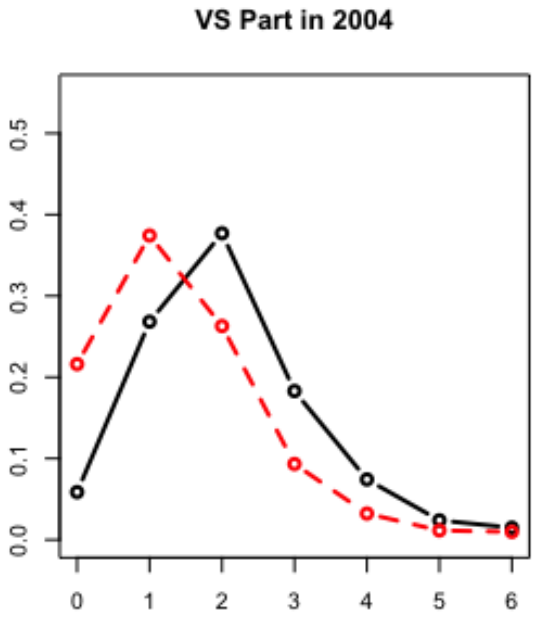


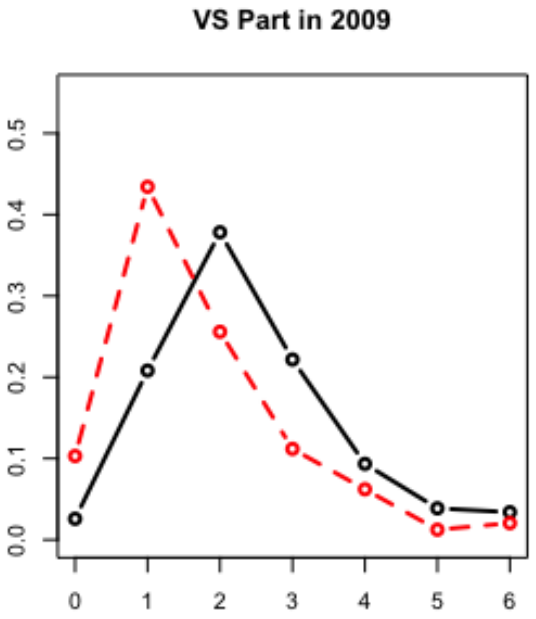


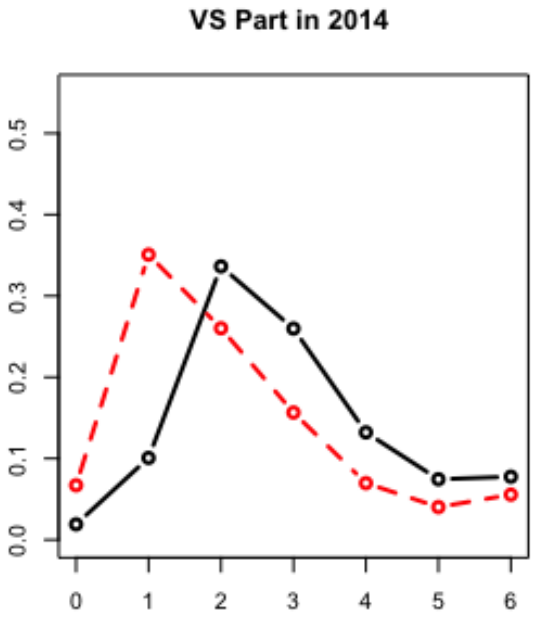
Income Level	0	1	2	3	4	5	6
Won	[0, 100)	[100, 200)	[200, 300)	[300, 400)	[400, 500)	[500, 600)	[700,)

Result: Status of Schedule

- Income level (**Standard** vs **Part**)



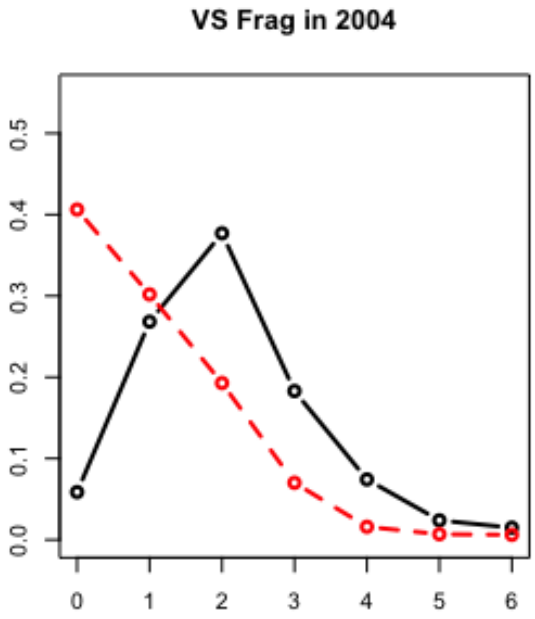


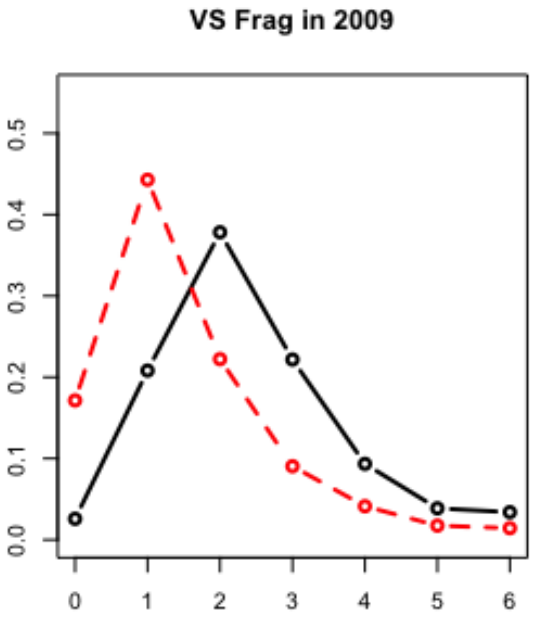


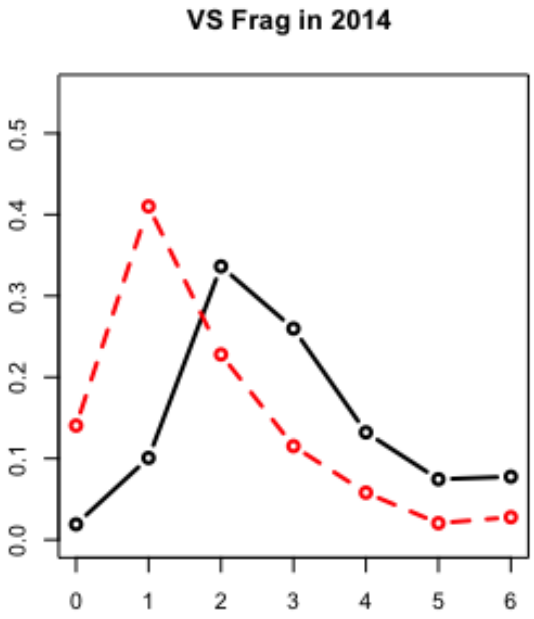
Income Level	0	1	2	3	4	5	6
Won	[0, 100)	[100, 200)	[200, 300)	[300, 400)	[400, 500)	[500, 600)	[700,)

Result: Status of Schedule

- Income level (**Standard** vs **Fragmented**)



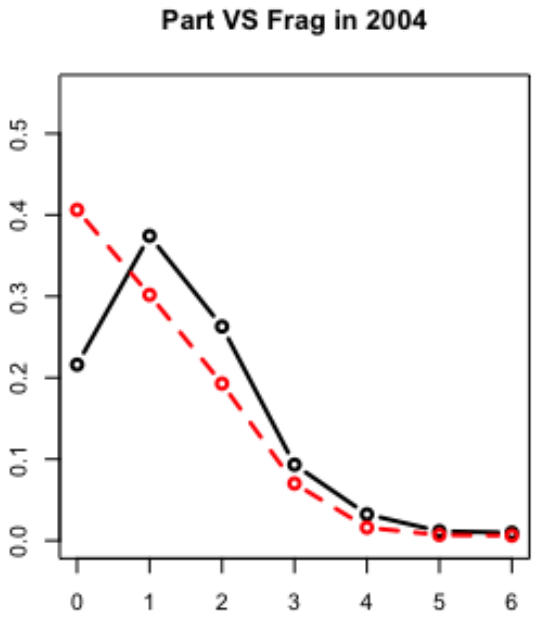


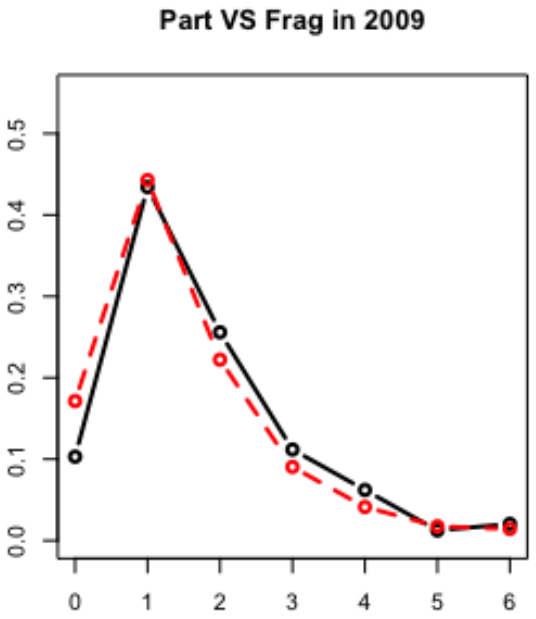


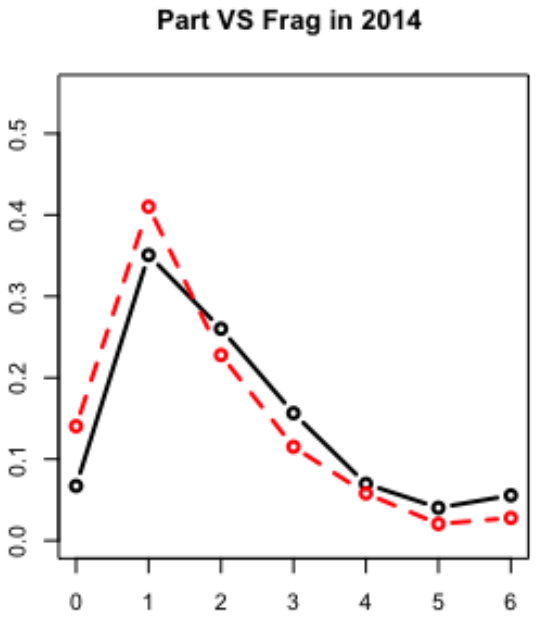
Income Level	0	1	2	3	4	5	6
Won	[0, 100)	[100, 200)	[200, 300)	[300, 400)	[400, 500)	[500, 600)	[700,)

Result: Status of Schedule

- Income level (**Part** vs **Fragmented**)



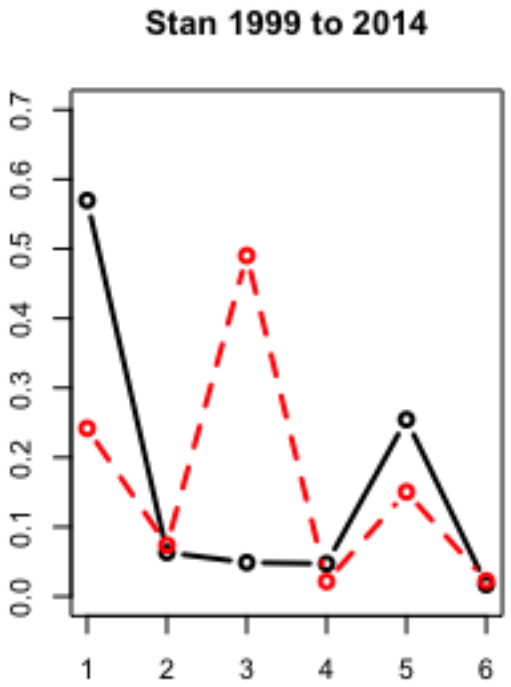


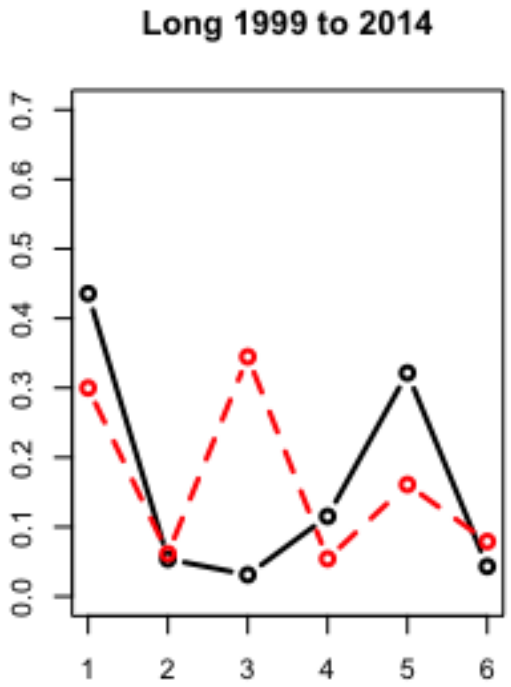


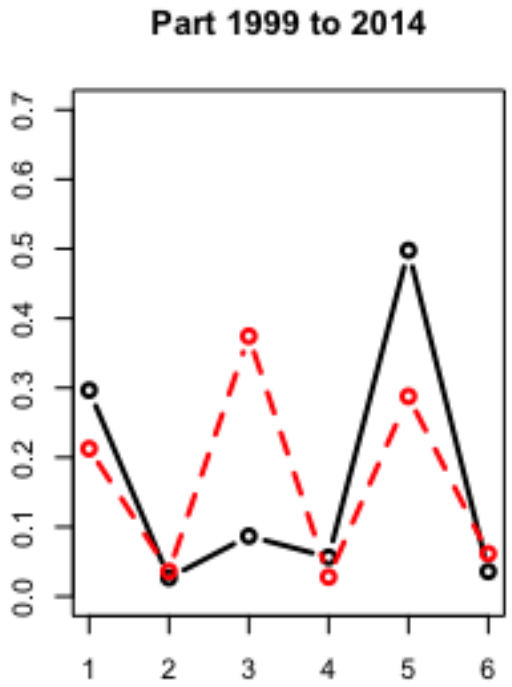
Income Level	0	1	2	3	4	5	6
Won	[0, 100)	[100, 200)	[200, 300)	[300, 400)	[400, 500)	[500, 600)	[700,)

Result: Status of Schedule

- Day-off type change of Fragmented, Night (**Before, After**)



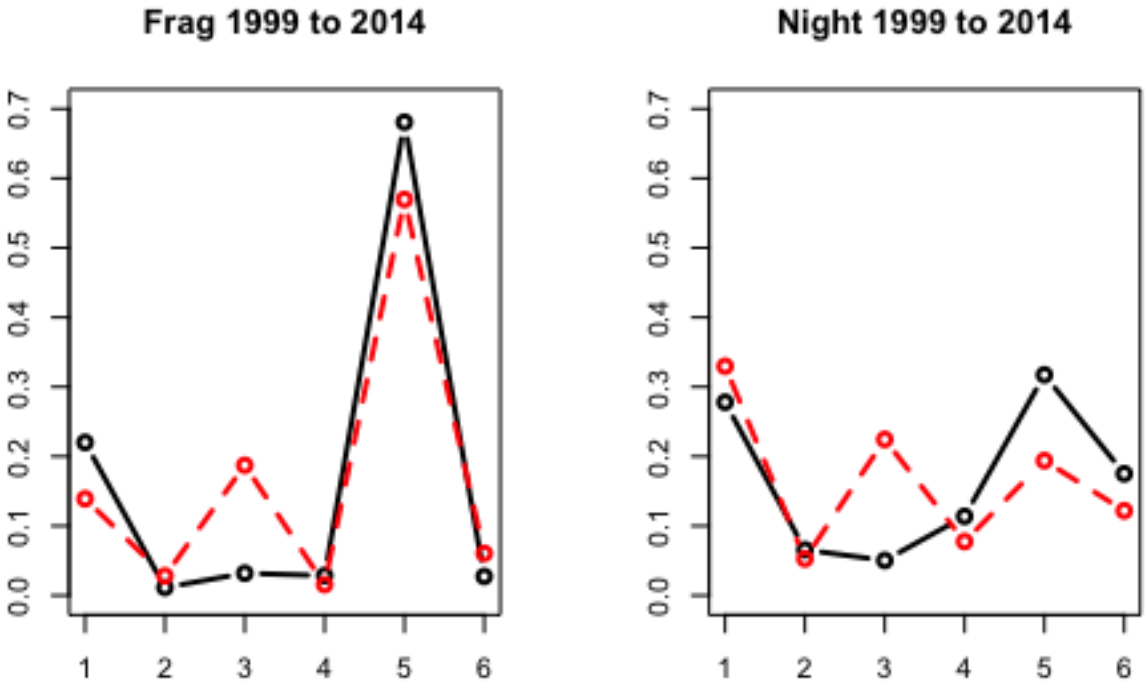




Day-off type	1	2	3	4	5	6
Contents	6 days	6 days + α	5 days	1 in 2 weeks	Time by time	Etc

Result: Status of Schedule

- Day-off type change of Standard, Long, Part (**Before, After**)



Day-off type	1	2	3	4	5	6
Contents	6 days	6 days + α	5 days	1 in 2 weeks	Time by time	Etc

Result: Summary

- **Trend between years**

  1999-2004: De-standardization

  2004-2009: Standardization

  2009-2014: Bifurcation (Standard & Part)

Result: Summary

- **1999-2004: De-standardization**

  Standard and Long typology decreased

  'Five days a week' increased

  Sole breadwinner increased

Result: Summary

- **2004-2009: Standardization**

  Only Standard typology increased

  'Five days a week' increased

  Sole breadwinner increased

Result: Summary

- **2009-2014: Bifurcation**

  Slight increase of Standard & Part

  ‘Five days a week’ increased

  Dual earning family increased

Result: Summary

- **Job-specific change**

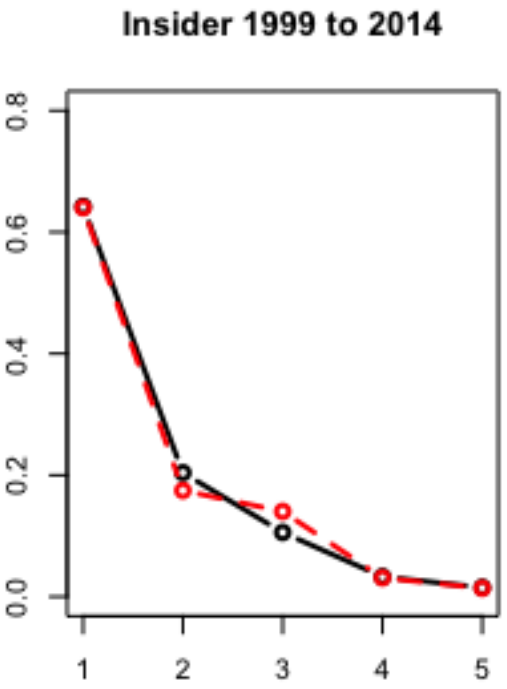
  White collar and Skilled Blue collar job:
  No change

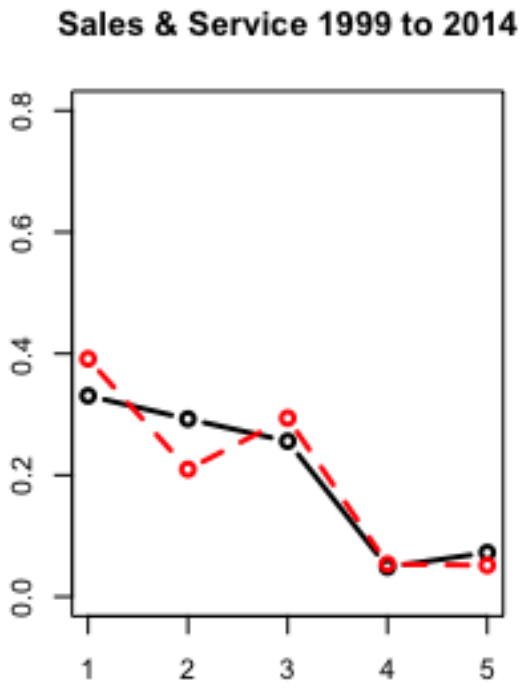
  Sales and service:
  Bifurcation: Long ↓ Standard ↑ Part ↑

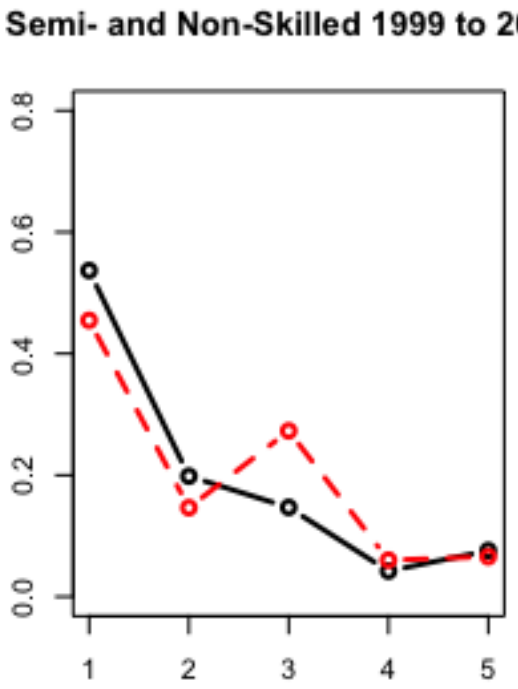
  Semi- and Non-skilled Blue collar job:
  De-standardization: Long ↓ Standard ↓ Part ↑

Result: Summary

- **Job-specific change (Employee) (Before, After)**

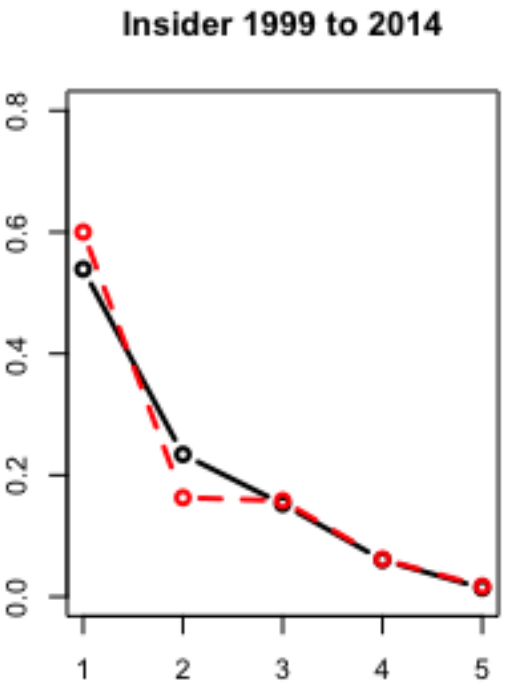


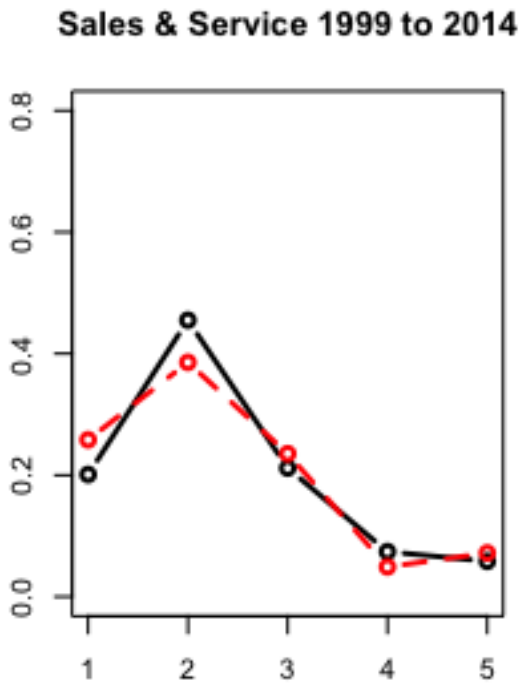


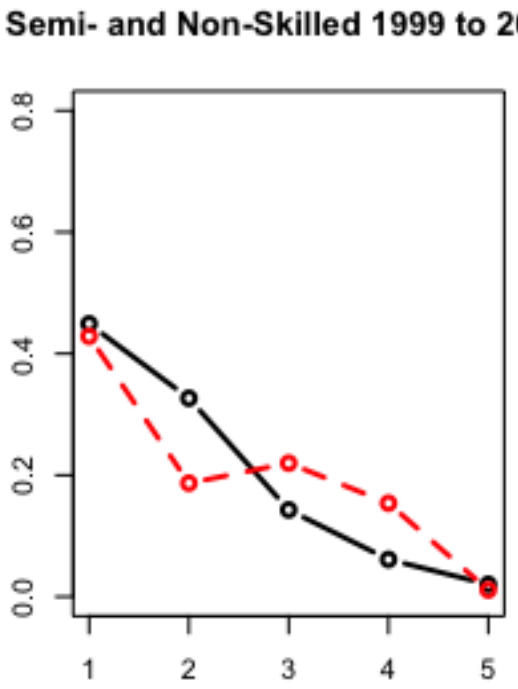


Result: Summary

- **Job-specific change (Employer) (Before, After)**







Discussion

- 24/7 economy of post-industrial society
  : Half right half wrong
- National working hours reduction policy (2004) led to both marginal decrease and de-standardization
- Implications about policy and politics

Discussion: Policy

- National policy in 2004 reduced the working hours. However, job-specific reaction was different.

- Stable work schedule of Insider
  Differentiated work schedule of Outsider

- Who's work schedule is mobilized?
  - Which tasks could be split and which are not?
  - What made the different organizational reactions?

Discussion: Politics

- Pareto's law and '20 vs 80' society: Worsened inequality leads to the solidarity of majority
- '50 vs 50' society: The coalition of upper strata interfering the welfare state (Lee 2017)
- How will the working hours politics between Standard and Non-standard schedules change?