

# Transition and Unification

## Human Capital

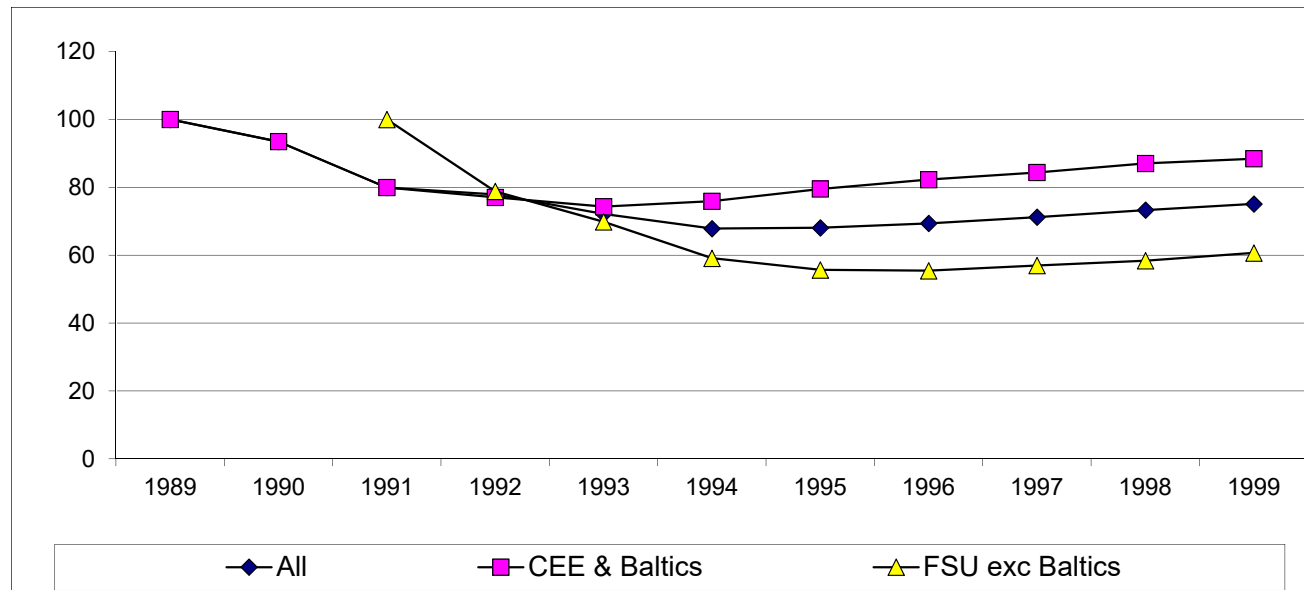
### in Unification of the Two Koreas

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# Transition recession

- During the transition period, all countries in FSU and CEE experienced transition recession.

GDP trend in Transition Countries, 1989-1999



# Causes of transition recession

- Competing hypotheses for transition recession
  - Transition strategy: Big-bang vs gradualism (Roland, 2000; Murrell, 1995)
  - Coordination failure (Murphy et al, 1992; Blanchard and Kremer, 1996)
  - Institutions (Broadman et al. 1999; Brunetti et al, 1999)
  - Initial conditions (Krueger and Ciolko, 1998; Falcetti et al, 2002)
  - Policies (Lougani, 1997; Fisher et al, 1998)
  - Political constraints (Kim and Pirtilla, 2003)

# Human capital as a cause of transition recession

- Surprisingly, human capital was largely ignored in the literature on transition recession.
- One reason for such a neglect might be that average schooling year was longer than that of countries at a similar stage of economic development.
  - Socialist countries had longer schooling year but lower GDP per capita compared to market economies.
  - Hence, human capital was not viewed as a binding constraint for transition and development of socialist countries.

# Average schooling year and GDP per capita

	Average schooling year in 1990	GDP per capita in 1990 (PPP)
Czech Republic	10.9	12,716
Poland	9.7	5,995
Romania	9.0	5,504
Russia	9.2	8,012
Kazakhstan	7.7	8,790
Finland	8.2	17,906
Italy	7.2	18,272
Greece	7.9	13,250
Turkey	4.5	4,438
Mexico	5.5	6,019

Sources: UN Human Development Reports (<http://hdr.undp.org/en/content/mean-years-schooling-adults-years>) ; World Development Indicators

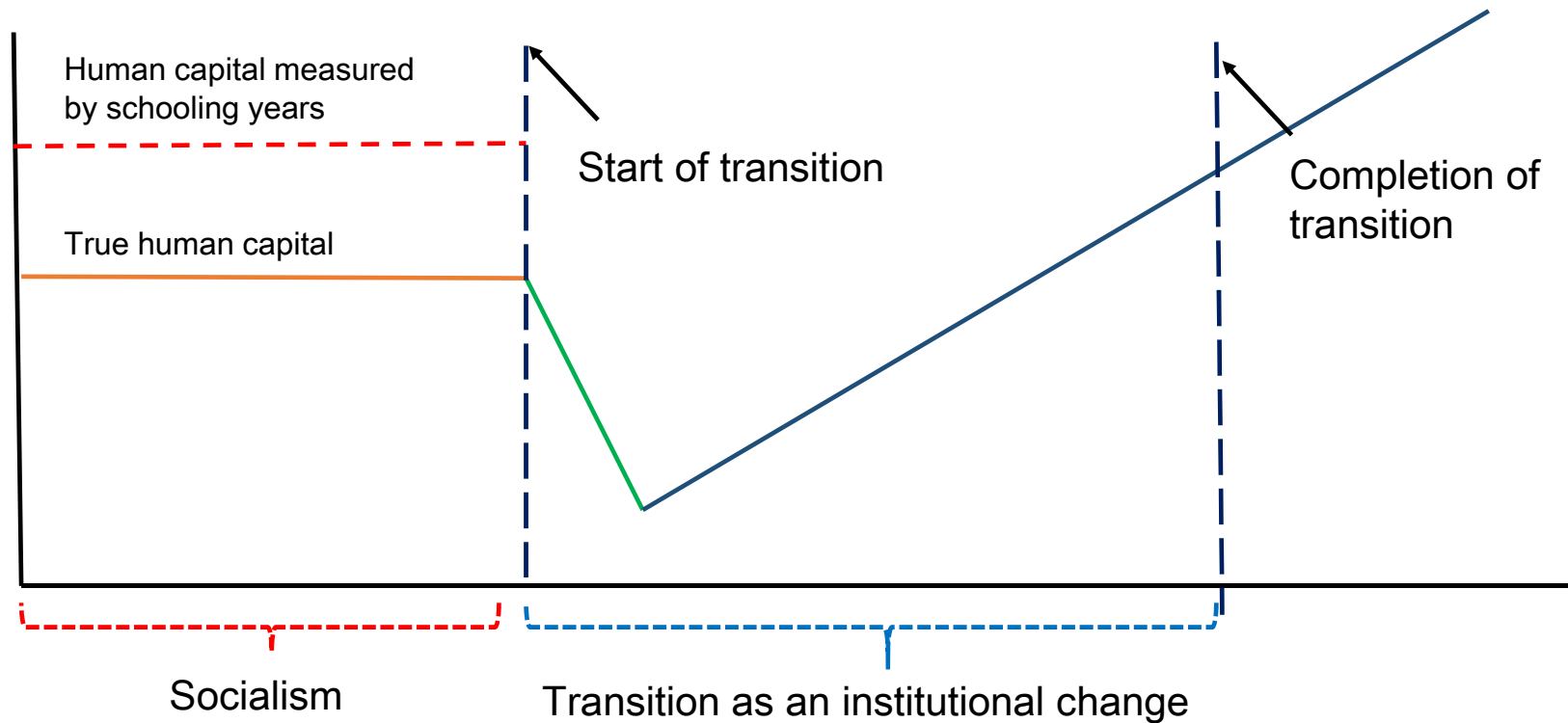
# Was human capital large in socialism?: Measurement errors

- However, human capital may be mis-measured.
- Measurement errors
  - Schooling year is an imperfect measure of human capital, especially in socialist countries.
  - Average schooling year in West and East Germany is likely to be similar but IQ for West Germans was 103 while that of East Germans is 95 (Lynn and Vanhanen, 2002).
  - Raven test score in East Germany was 50 but that in West Germany was 70 (Browsers et al. 2009).

# Was human capital large in socialism?: Institutional change

- Transition is an institutional transformation in which required human capital changes.
  - General vs specific human capital
  - Crystallized intelligence (what someone has already learned; highly practiced skills) vs fluid intelligence (ability to learn; solving unfamiliar problems)
  - Obsolete human capital because of industrial changes
- Investment to education can be sub-optimal among “the more able people” given high uncertainty over the transition.
  - Good guys finish last (Alexeev and Kaganovich, 1998).
- Social norms need to adapt to a market economy.

# Human capital in transition: A U-shape?





# Transition and unification

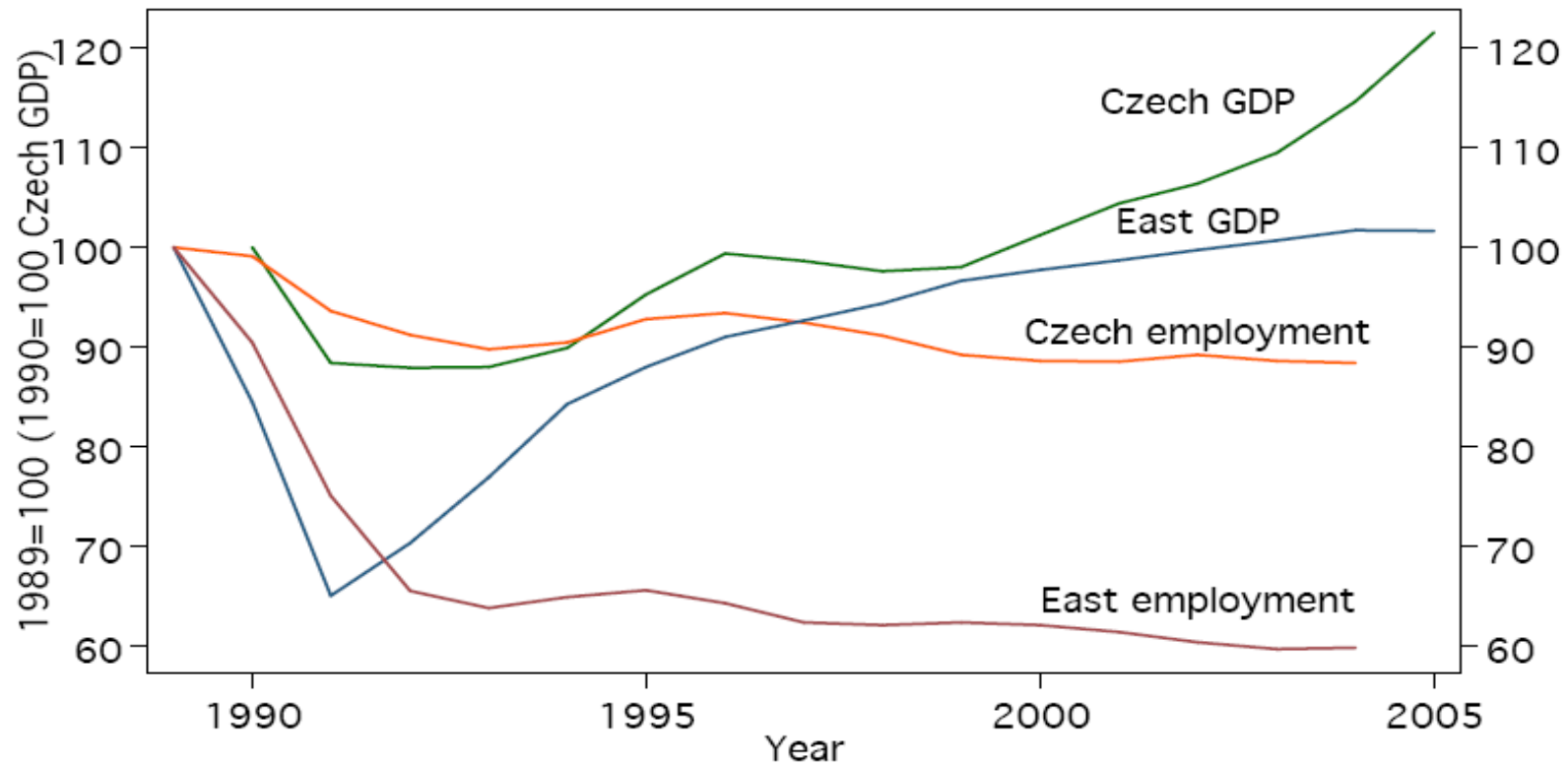
- Unification may add burden to transition when it involves countries whose productivity gap is large.
- A mismatch between industries of a more affluent country and human capital of less affluent one is the cause of such burden.
- High value-added industries require workforce of high human capital.
  - Technology frontier implies that fluid intelligence is more important than crystalized one.
  - Understanding social norms is also important.
- However, such a high quality of workforce does not exist in the less affluent country.

# German unification

- Many economists and policymakers viewed German unification as the case of guaranteed success.
  - The combination of West German technology, physical capital, and institutions with qualified labor force of East Germany appeared to be “perfect” match.
- However, East Germany experienced much larger negative shock to GDP than the other CEEs.

# German unification

Figure 1: Czech and East German Comparisons



Source: Hunt, 2006

# Why unification observes a larger fall in GDP?

- Mismatch between human capital and physical capital embedded with technology
  - Existing industries require a certain human capital. If such human capital does not exist, GDP falls.
- The East was absorbed by the West. Given asymmetry in economic size, the West German prices, technology and industries prevail.
  - Unemployment will be larger in unification than in transition.
  - This will lead to large unification costs.
- Capital needs a time to build up. Similarly, human capital requires time to educate.

# Why do we worry more about Korean unification than German one?

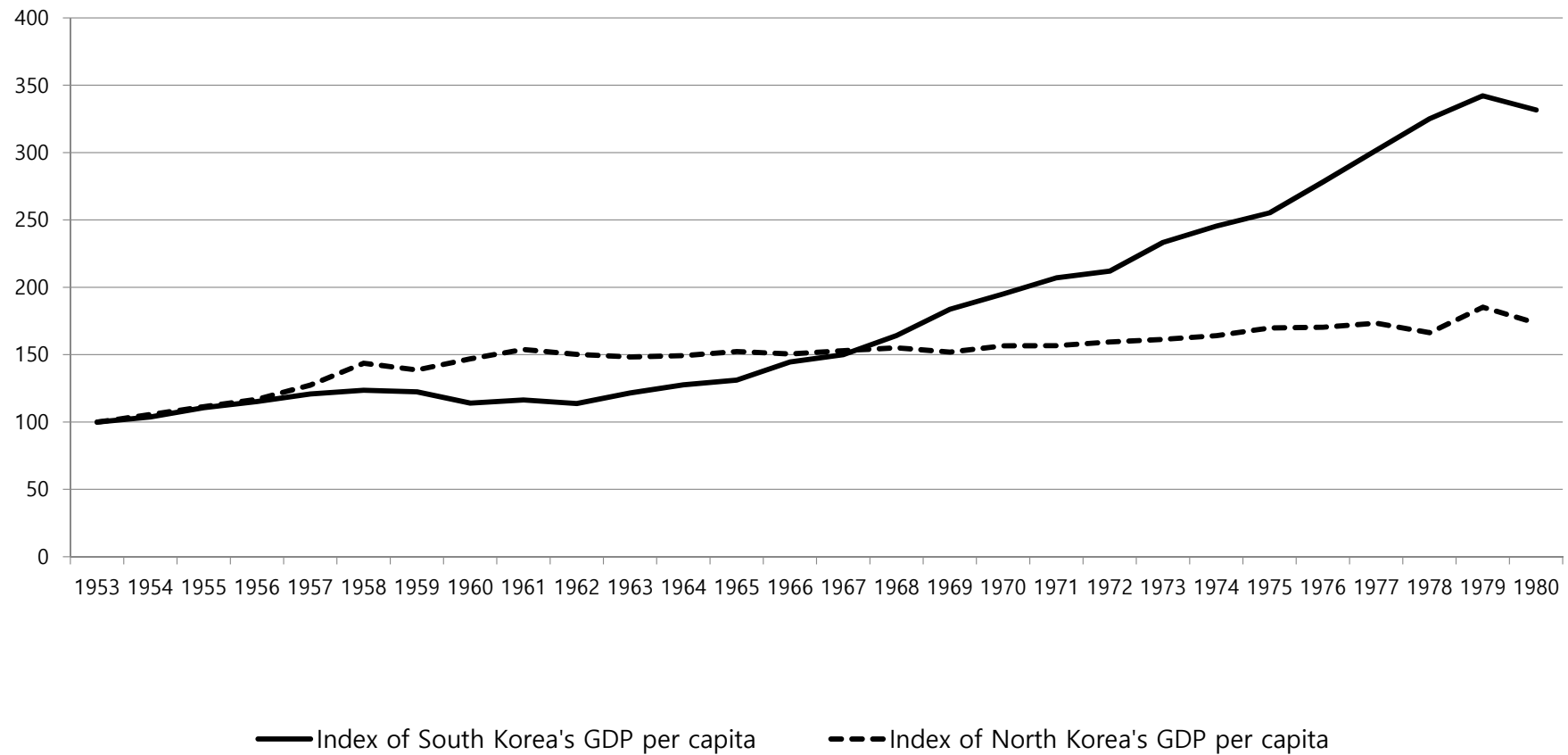
- Human capital differences between the South and the North may be larger than those between the West and the East.
  - GDP per capita is closely correlated with the level of human capital.

Comparison in GDP per capita between South Korea and North Korea

	S. Korea (2014)	N. Korea (2014)
GNI per capita (market ex. rate)	27,971	754
Ratio	100	2.7

Sources: Kim (2016); World Bank(2014)

# GDP trend in the two Koreas



Source: Kim (2016)

# Why do we worry more about Korean unification than German one?

- The period of separation under different systems is longer in Korea than in Germany.
  - The two Koreas have been divided since 1945.
- Arguably, the North Korean regime is more ideological and repressive than the East German one.
  - This may hamper the development of human capital (lack of personal autonomy; extreme form of dictatorship based on *Juche* ideology)

# North Korean Refugees in S. Korea

- We made economic experiments involving South Koreans and North Korean refugees settled in South Korea.
- The number of North Korean refugees living in S. Korea is now 30,000.

Trend of North Korean Refugees Arriving in South Korea

	~'98	~'01	'02	'03	'04	'05	'06	'07	'08
Male	831	565	510	474	626	424	515	573	608
Female	116	478	632	811	1,272	960	1,513	1,981	2,195
Sum	947	1,043	1,142	1,285	1,898	1,384	2,028	2,554	2,803
	'09	'10	'11	'12	'13	'14	15	Aug '16	Total
Male	662	591	795	404	369	305	251	181	8,684
Female	2,252	1,811	1,911	1,098	1,145	1,092	1,024	713	21,004
Sum	2,914	2,402	2,706	1,502	1,514	1,397	1,275	894	29,688



# Economic experiments of N. Korean Refugees

- A team of S. Korean researchers (Sokbae Lee, Jungmin Lee, Syngjoo Choi, and myself) have surveyed and conducted experiments involving N. Korean refugees from 2011 onwards.
- We use stratified random sampling using gender, age, and entry year from 2014 onwards.
- Human capital was measured in three ways:
  - Cognitive ability using Raven test
  - Counting the number of “0”s in a table containing “0” and “1” randomly.
  - Social norm measured by “giving behavior”.

# Selection bias in the refugee sample?

	2011 survey	Population census (2008)
Gender (male=1; female=0)	0.38	0.49
Age (median) among those aged 15 or above	32	39
Education		
Less than high school	9.0%	7.1%
High school completed	58.7%	71.9%
College, University, or above	32.3%	21.0%
Workers' Party membership (yes=1; no=0)	13.6%	16.2%*
Perceived living standard in North Korea		
Very poor (bottom 20%)	10.5%	
Poor (20%–40%)	14.9%	
Middle (40%–60%)	45.5%	
Rich (top 20%–40%)	26.1%	
Very rich (top 20%)	3.0%	
Number of survey participants	133	

# Human capital of N. Korean refugees

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# Raven Progressive Matrices Test (Raven, 1962)

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- 24 Raven Matrices Test in paper within 10 minutes.

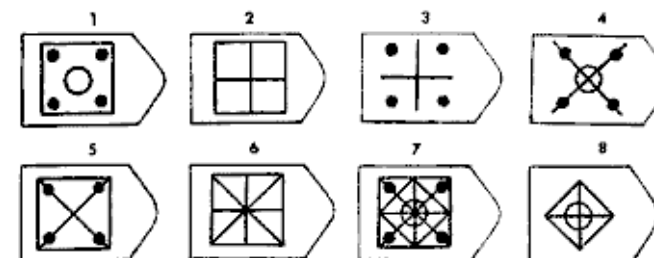
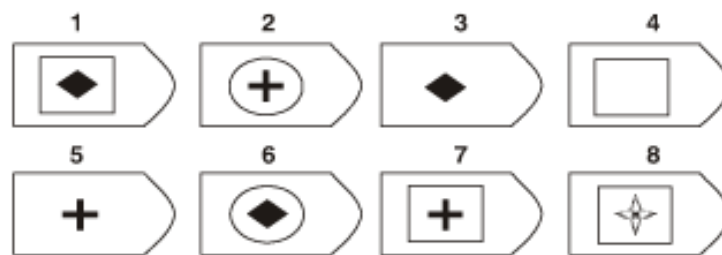
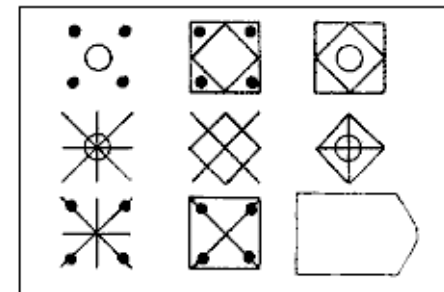
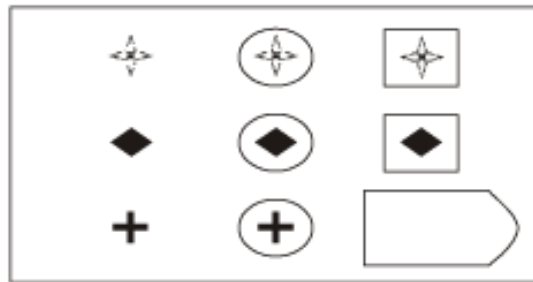


Figure 2 - Raven's progressive matrices

# Raven test results: 2014 sample

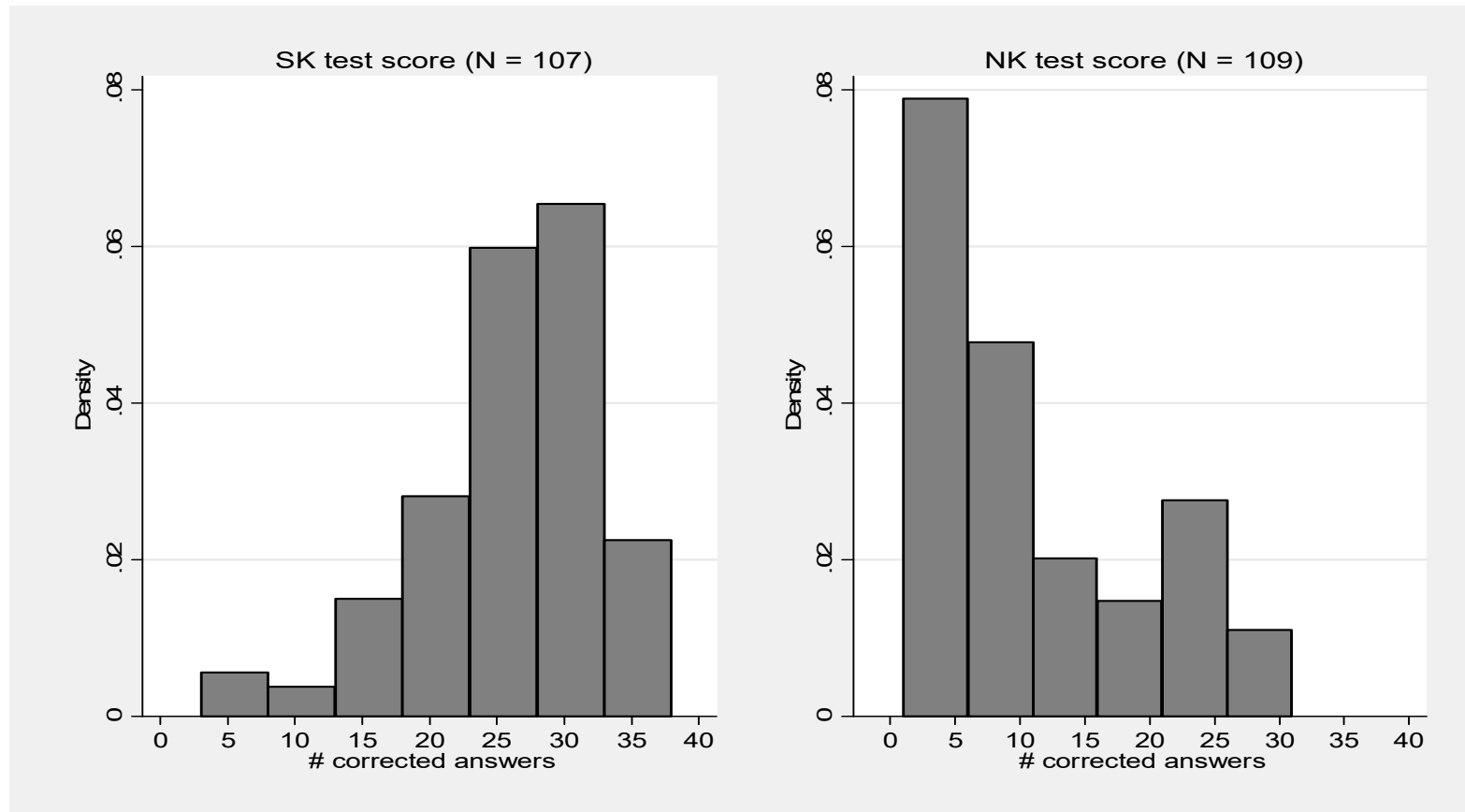
Description of Raven test results

		T1		T2	
		NK	SK	NK	SK
<b>Mean</b>		<b>9.79</b>	<b>24.83</b>	<b>11.38</b>	<b>26.06</b>
Std. Dev.		7.74	7.51	8.82	6.01
Obs.		57	54	52	53
Percentiles	Max	29	36	28	36
	95%	25	35	27	33
	90%	23	34	25	32
	75%	15	30	20.5	20
	<b>50%</b>	<b>6</b>	<b>25.5</b>	<b>7</b>	<b>28</b>
	25%	4	22	4.5	25
	10%	3	15	3	17
	5%	2	6	2	13
	Min	1	3	2	9

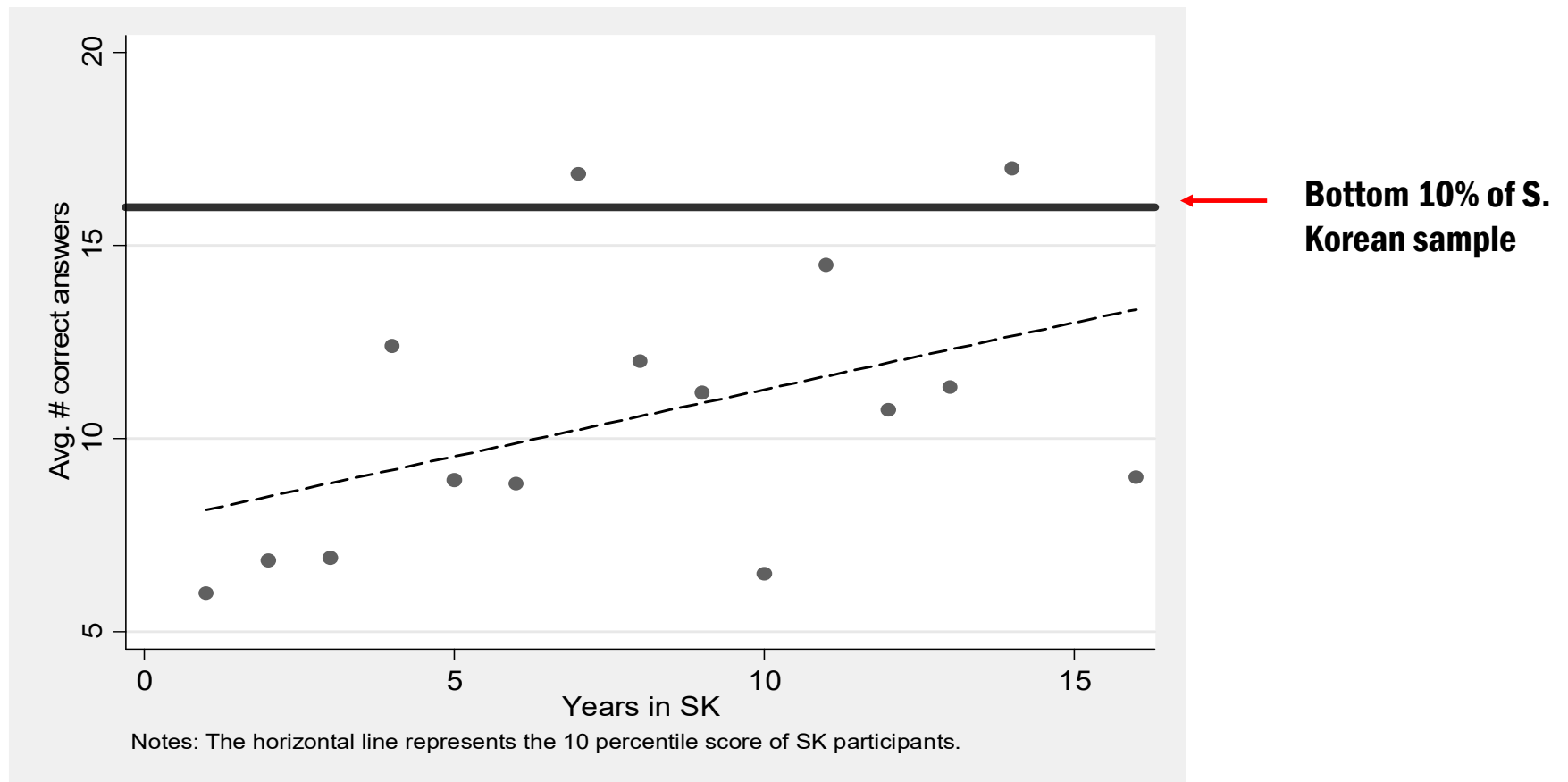
# Distribution of Raven test results

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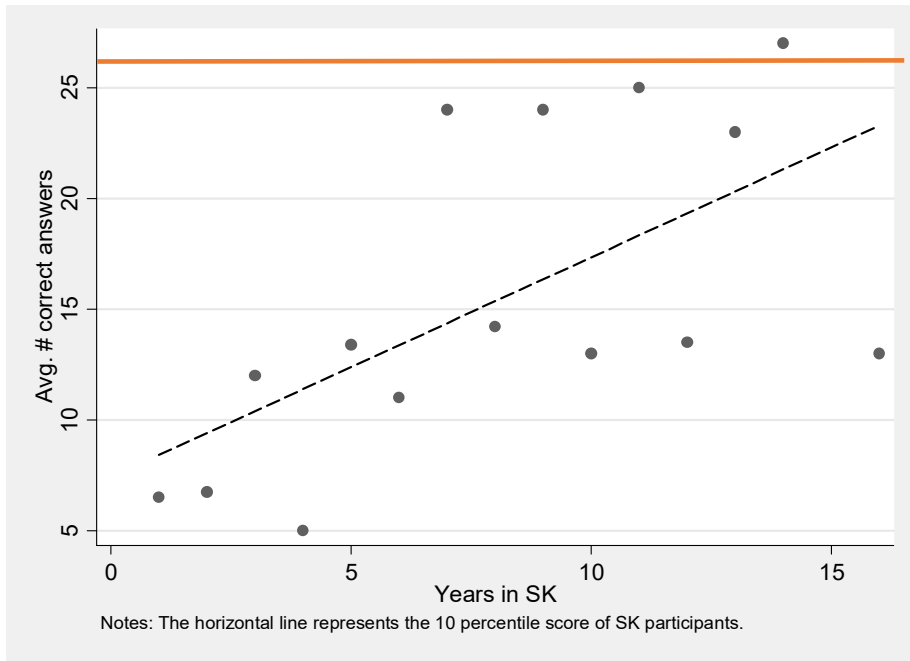
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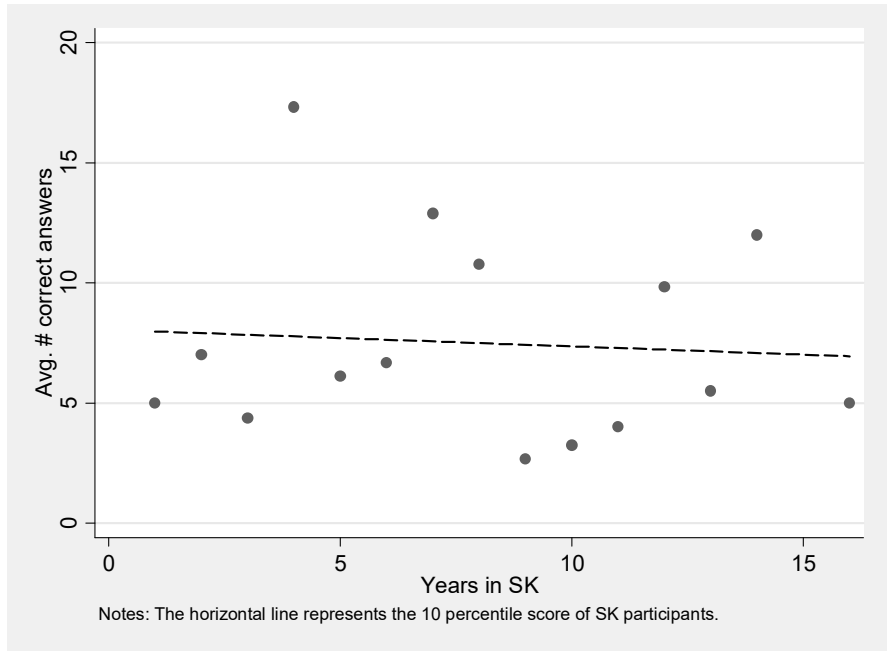
# Convergence of cognitive ability



# Convergence speed according to age



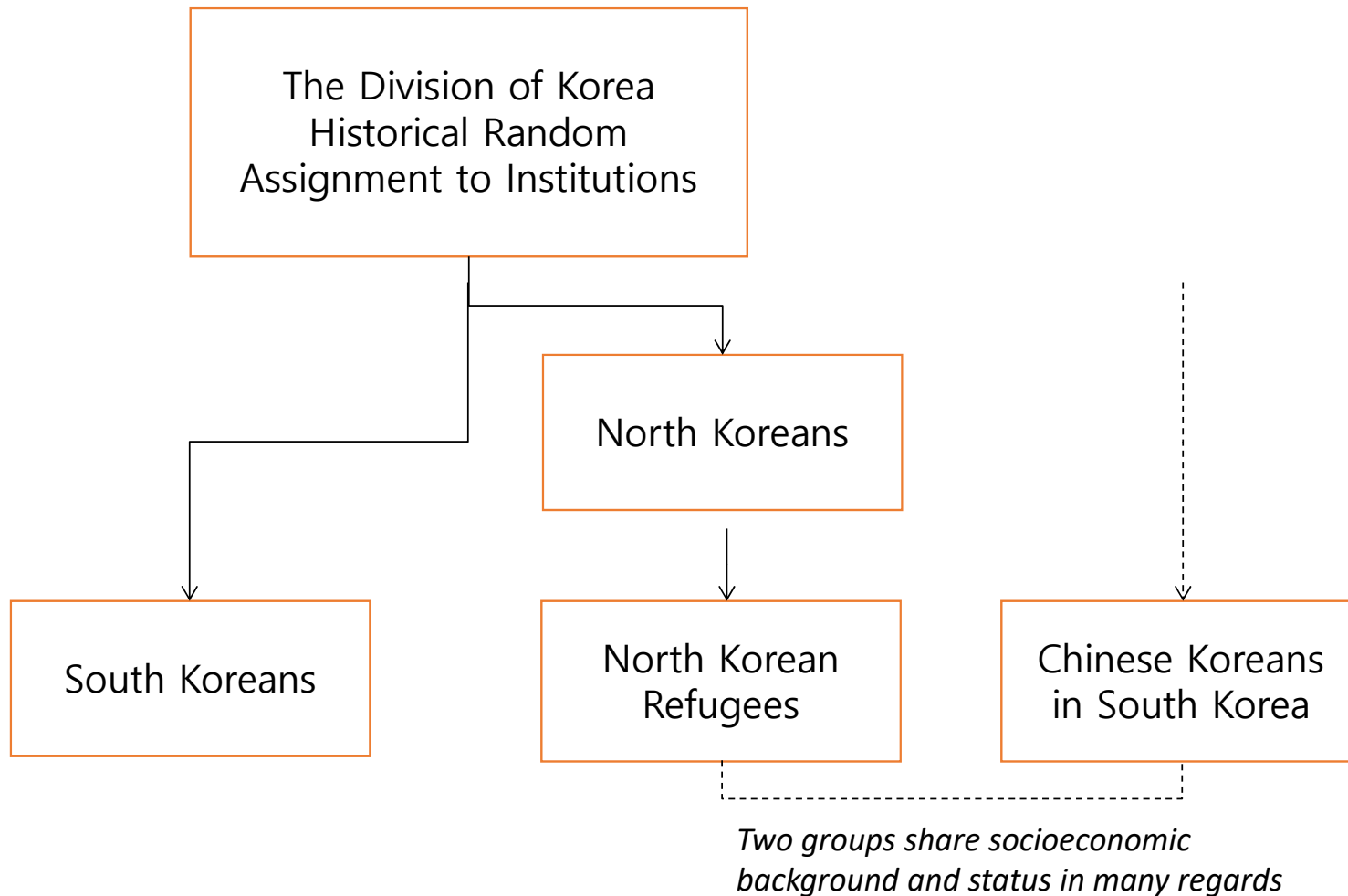
Those who aged 35 or lower



Those who aged 36 or higher



# Raven test results: 2015 sample

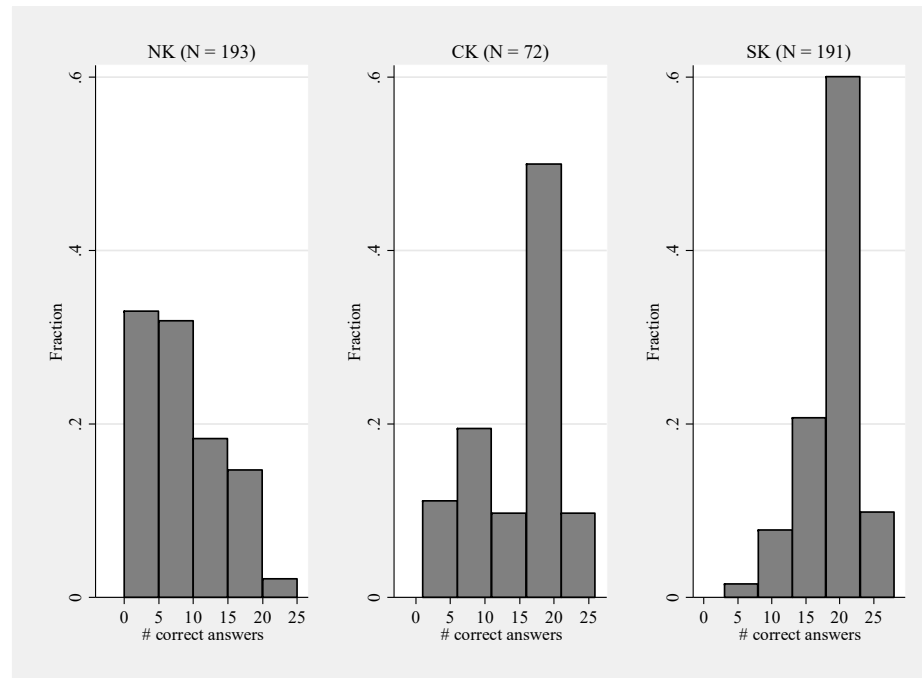


# Raven test results: 2015 sample

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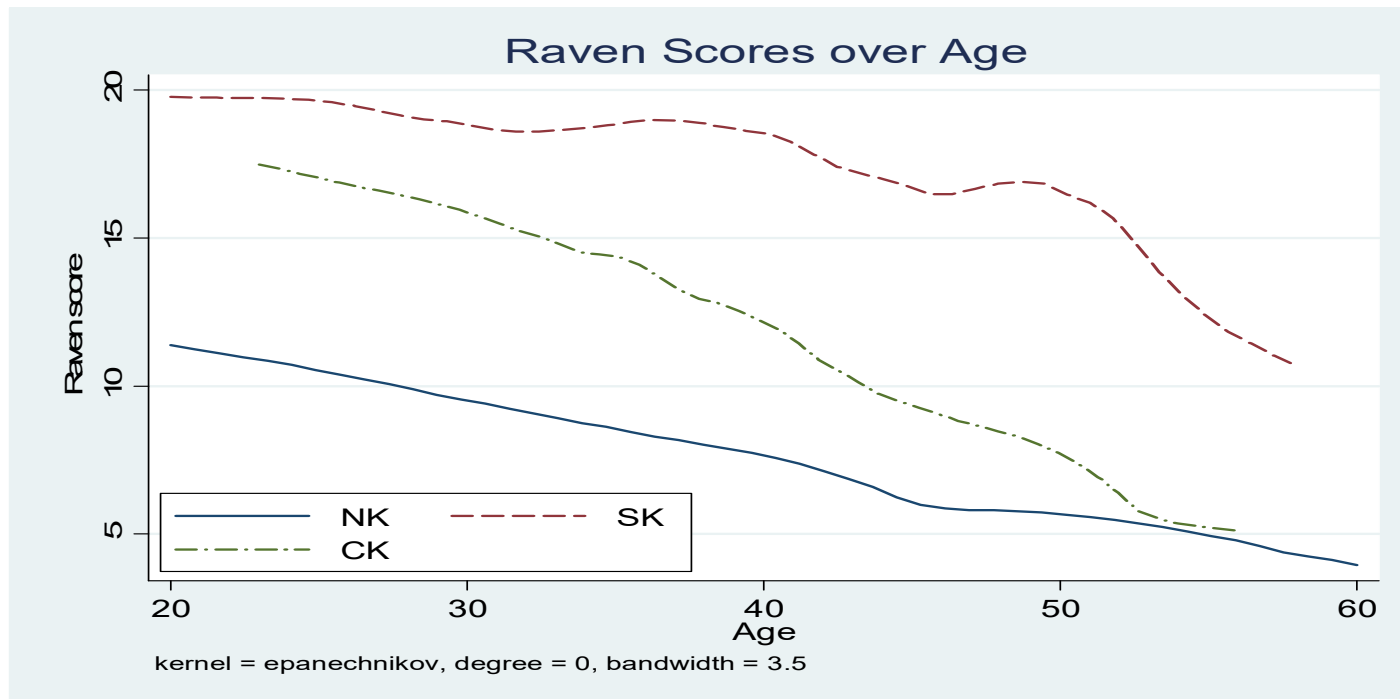
- We recruited a representative sample of North Korean refugees in South Korea (191 NK subjects).
- South Korean citizens were sampled to match with the composition of gender and age groups of North Korean refugees (193 SK subjects).
- To lessen concerns of income differences, we over-sampled low-income South Korean.
- Chinese Korean in South Korea were sampled in the same way (72 CK subjects).

# Raven test results: 2015 sample



	NK	CK	SK
Raven matrices test	8.089	14.028	18.233
	(5.357)	(6.132)	(3.881)

# Raven test results: 2015 sample

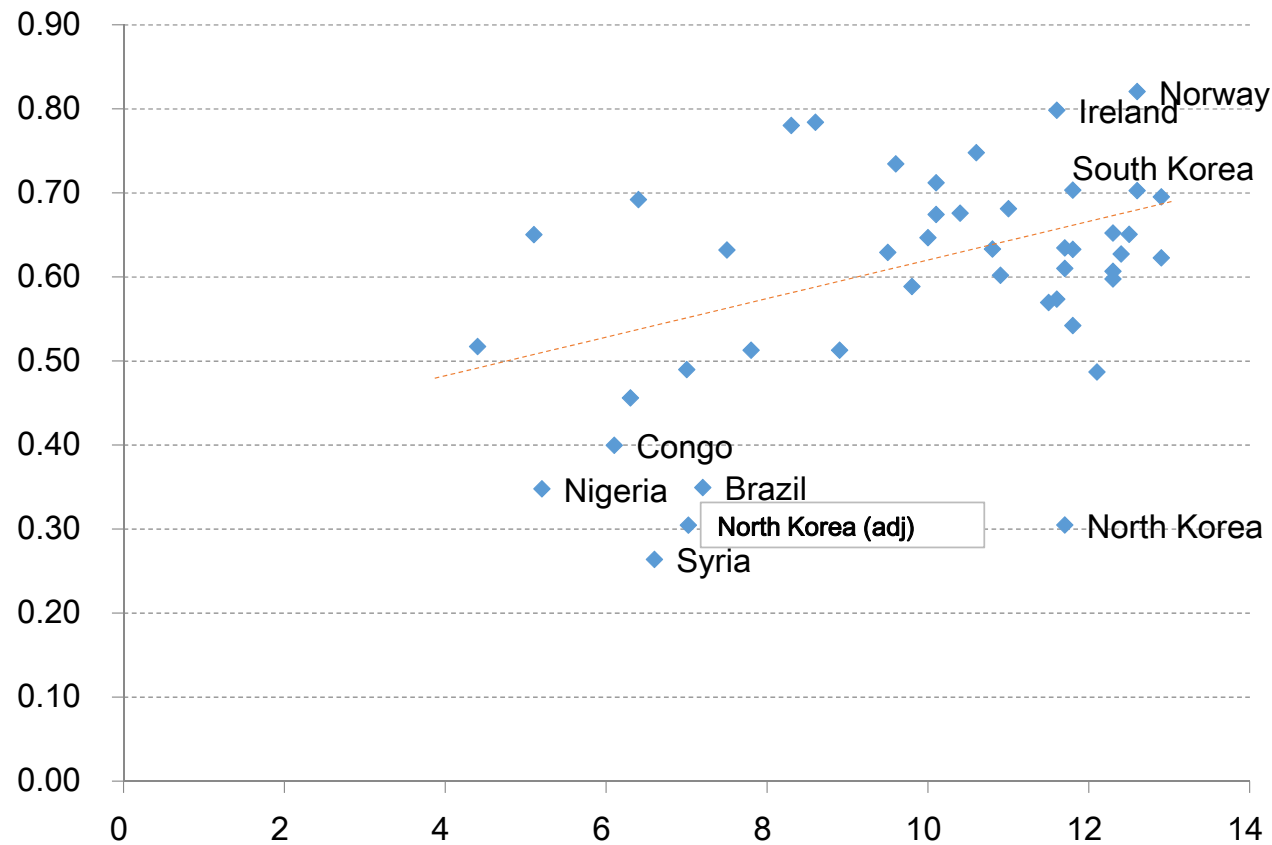


- There are substantial gaps in Raven test scores among three Koreans.
- These gaps remain significant, after controlling basic characteristics.

# Raven test results: International comparison

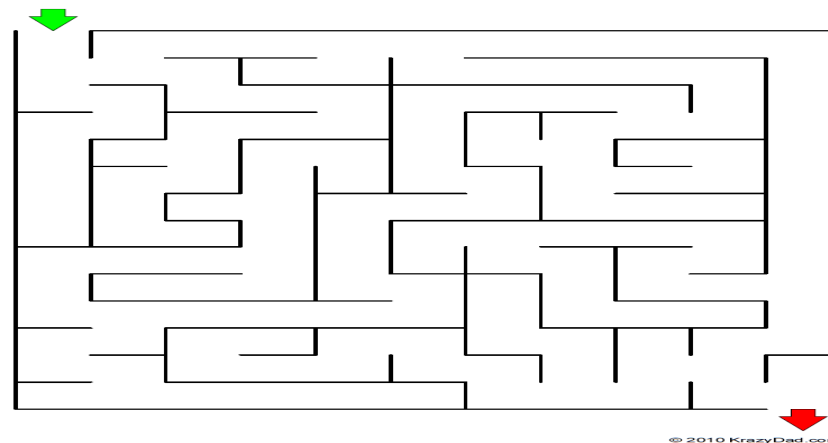
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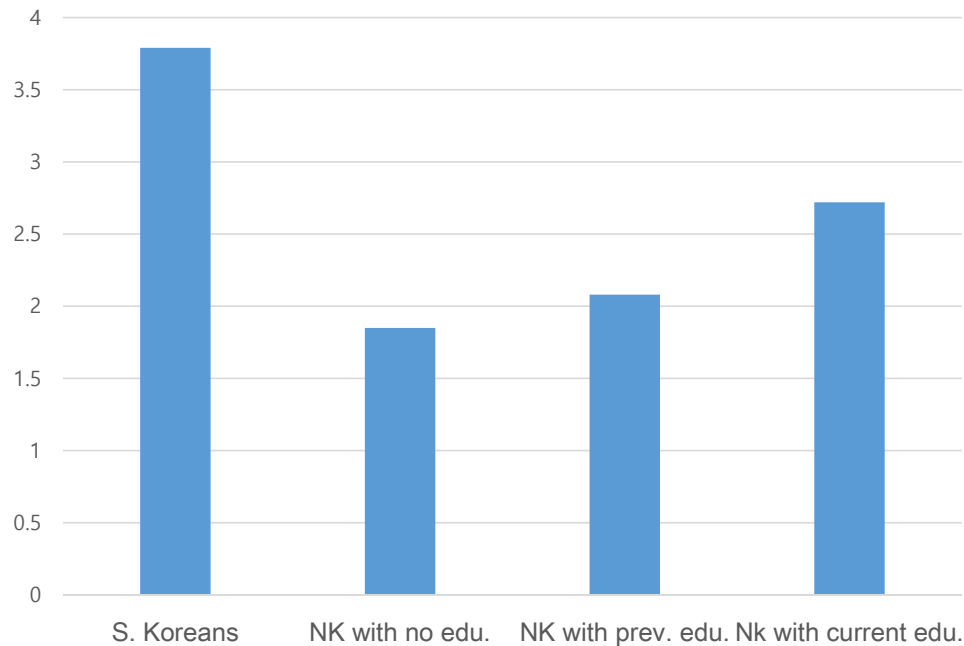
# Solving maze: Robustness check

- In 2014, solving maze was conducted as *ad hoc* experiment to understand extent of competition preference among the sample .
- Eight mazes were presented to solve in five minutes. Cash was paid in accordance with the correct number of solving mazes (app. 1\$ per one correctly solved maze)



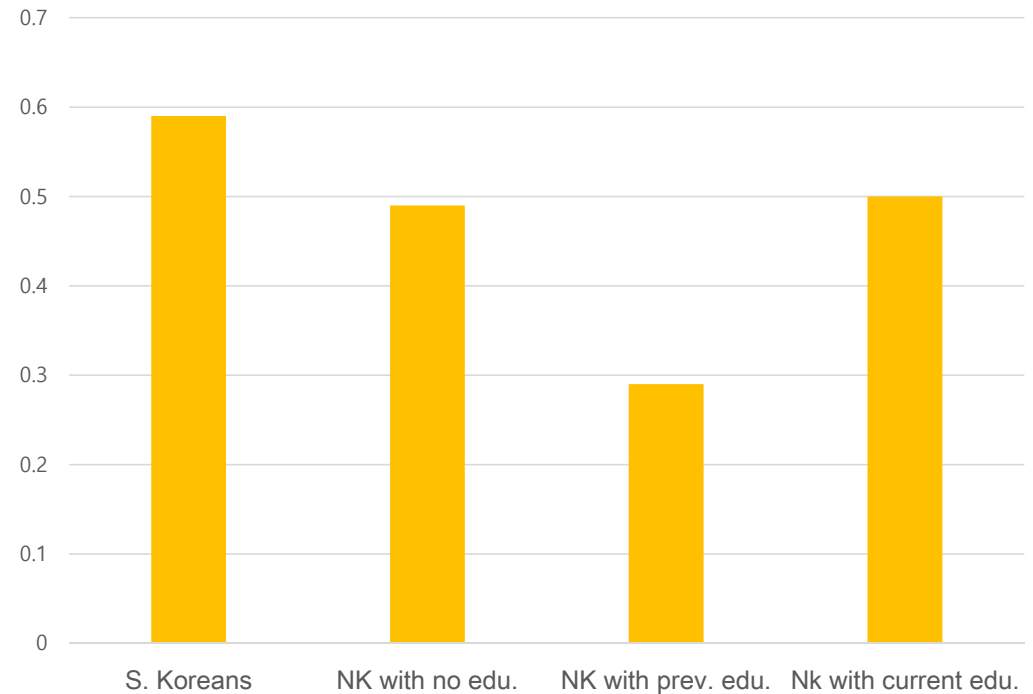
# Solving maze: education and competitiveness

The number of the correctly solved mazes



Source: W. Kim (2016)

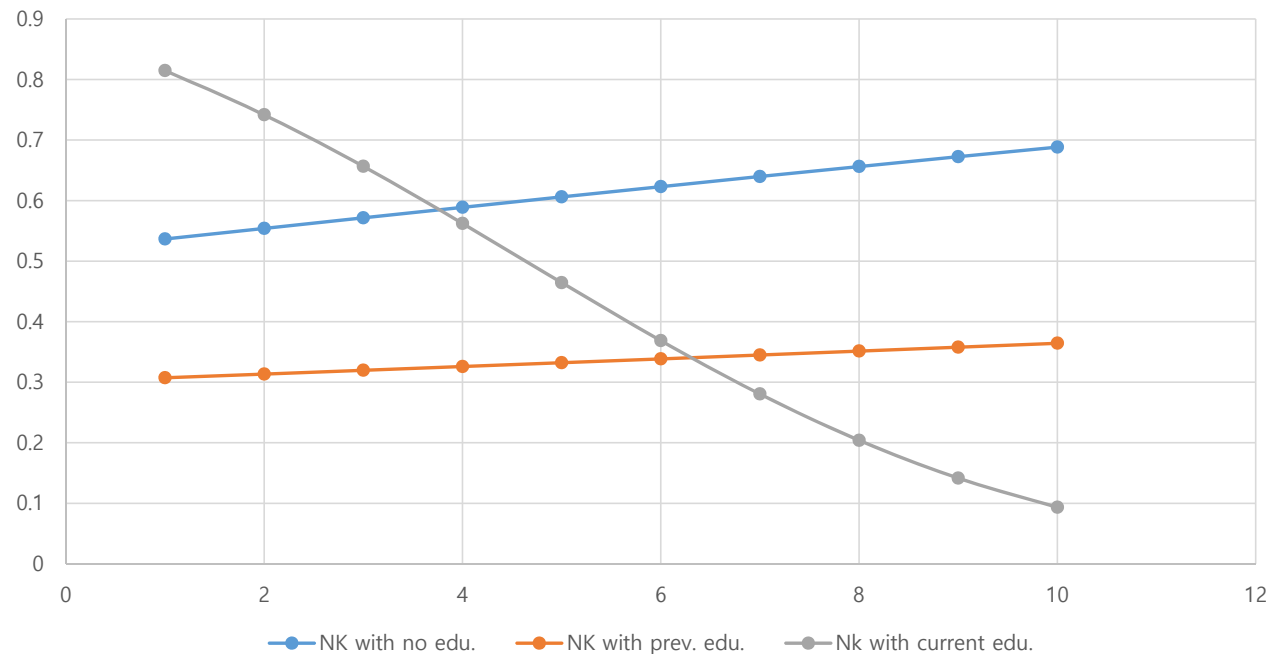
Competition orientation



Source: W. Kim (2016)

# Solving maze: education and competitiveness

Competitiveness by education and years in SK



- Education in S. Korea decreases competition orientation.
- The competitiveness of North Korean refugees currently enrolled in schools and universities declines over time.

Source: W. Kim (2016)



# Real-effort Experiments: Simple task

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- The individual real-effort task consists of 3 stages with a simple, tedious task.
  - Requiring less ability of cognition and thus (expected) little difference in performance among three groups
- In each stage, subjects count “0”s in 20 of 7×7 tables within 5 minutes:

0	1	0	1	0	0	0
1	1	1	0	0	1	0
0	1	0	1	1	0	0
1	0	1	0	1	0	1
0	0	1	1	1	0	0
0	1	0	0	0	1	0
1	1	0	1	1	0	0

# Real-effort Experiments: Simple task

Stage 1 & 2: Piece-rate scheme or tournament scheme (order is randomly allocated)

- Under piece-rate:
  - 1,000 KRW (about \$1) × (# of correct answers)
- Under tournament:
  - Matched with an anonymous participant.
  - 2,000 KRW (about \$2) × (# of correct answers) if win and 0 otherwise.

Stage 3: Choice of payment scheme

# Simple task results

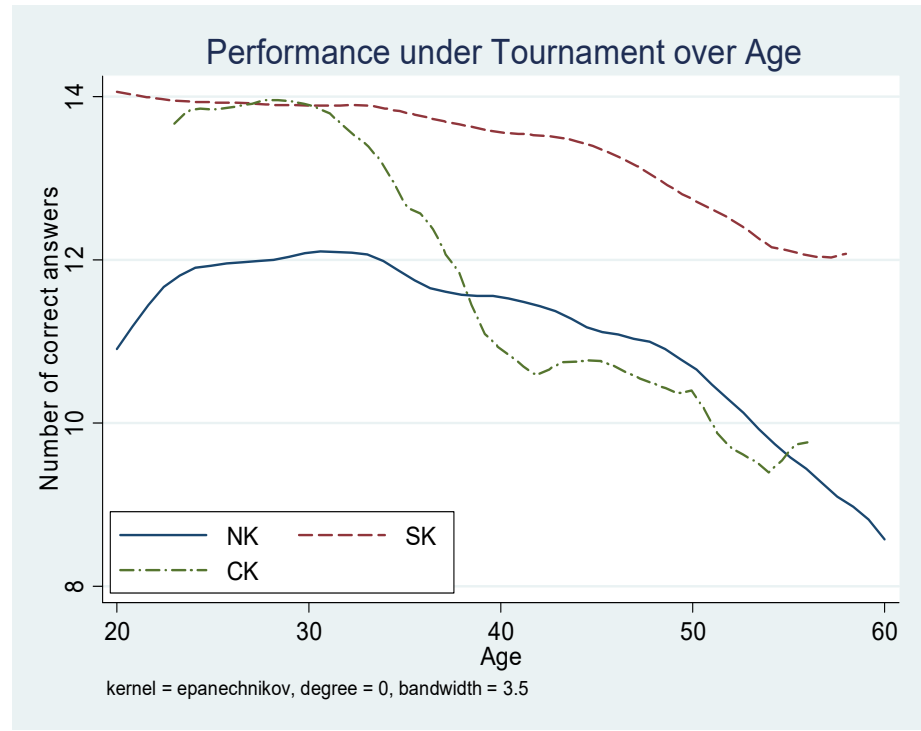
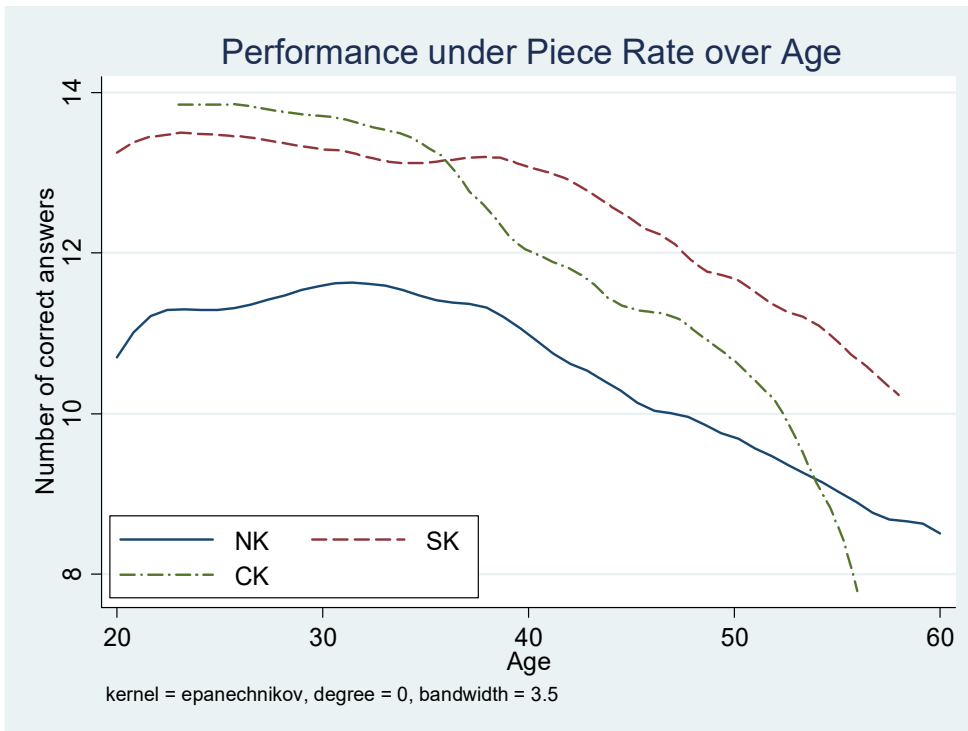
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Table. Individual Tasks

	NK	CK	SK
Task1 (under piece rate)	10.791 (3.755)	12.861 (3.762)	12.922 (3.565)
Task2 (under tournament)	11.351 (3.640)	12.667 (3.544)	13.617 (3.453)
Observations	191	72	193

# Results by Groups and Age

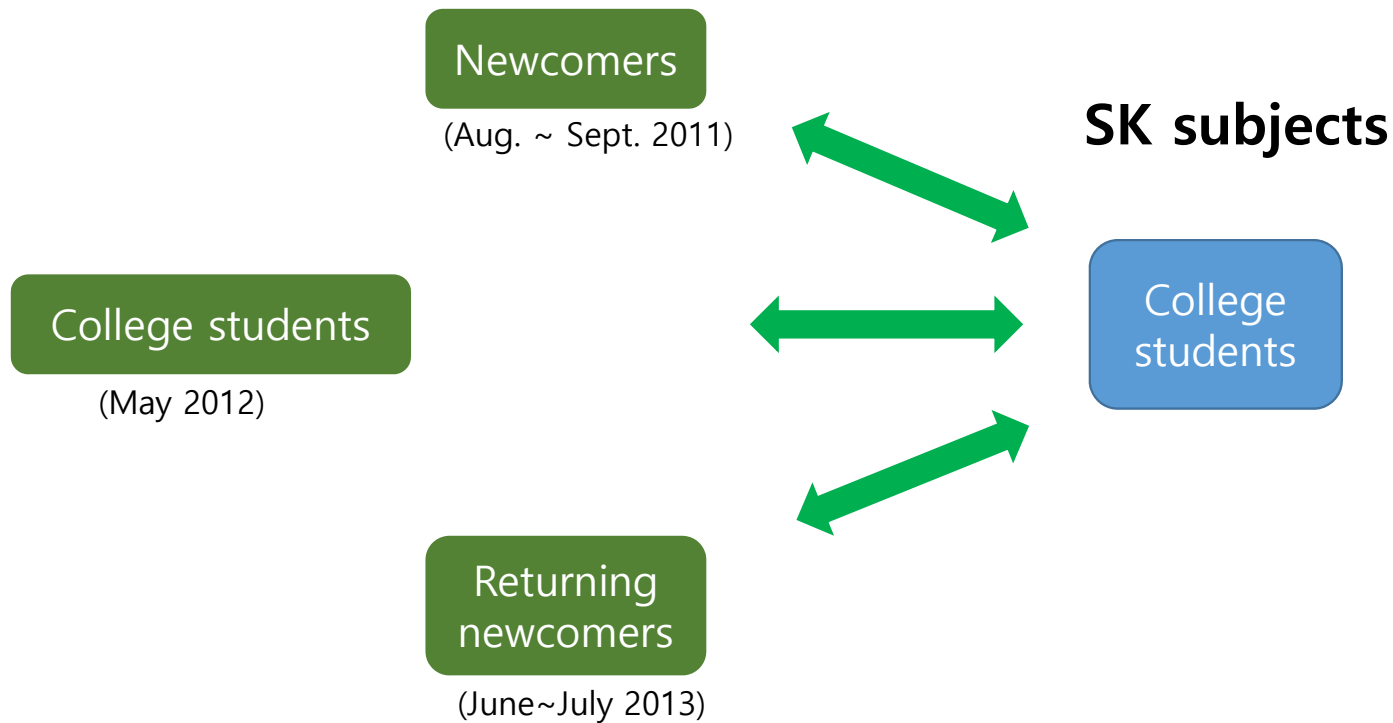


# Test of Giving behaviour: Sampling structure

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## NK subjects



# Self-Other Dictator Game: Preferences for Giving

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- In each problem, each subject was asked to allocate a given endowment (in multiples of 10%) between him-/herself (*self*) and one other anonymous participant (*other*).
  - (1) NK against NK; (2) NK against SK; (3) SK against NK; (4) SK against SK.
- 8 different allocation problems against each opponent group

$$\pi_s + p\pi_o = m$$

relative price of giving  $\swarrow$   $\nwarrow$  endowment

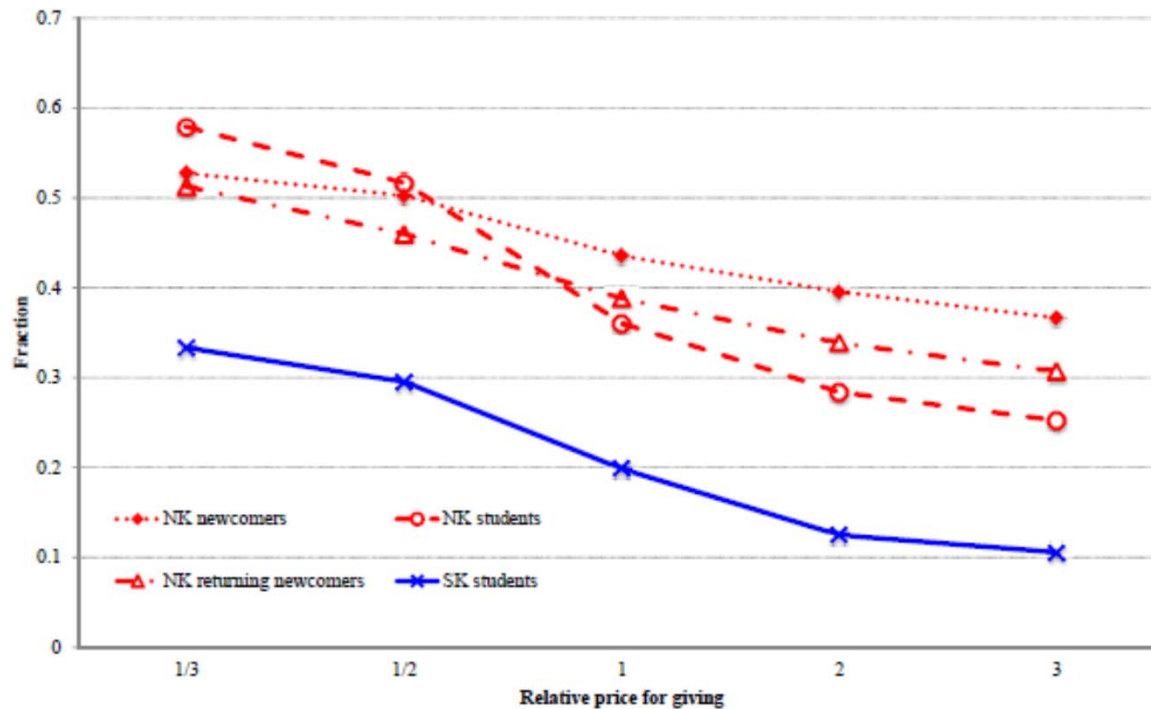
Problem	1	2	3	4	5	6	7	8
$m$ (KRW)	10,000	15,000	15,000	18,000	25,000	30,000	30,000	36,000
$p$	1/3	1	1/2	1/2	1	2	3	2

# Description of Samples

	NK subjects				SK subjects			
	Newcomers (Study 1)	Students (Study 2)	Returning newcomers (Study 3)	All	Study 1	Study 2	Study 3	All
Male	0.37	0.28	0.30	0.33	0.58	0.52	0.62	0.58
Age	36.28	25.50	41.42	34.67	21.36	22.05	22.89	22.09
Years in North Korea	35.15	16.68	38.27	31.11				
Months in South Korea	10.86	62.43	34.18	29.83				
Number of subjects	133	72	66	271	166	80	157	403

- The group of NK newcomers are older than SK subjects.
- The group of NK college students are much more similar to SK subjects: of similar age and enrolled in a university in Seoul, at the time of the studies.

# Average Behavior of Giving against an SK Opponent



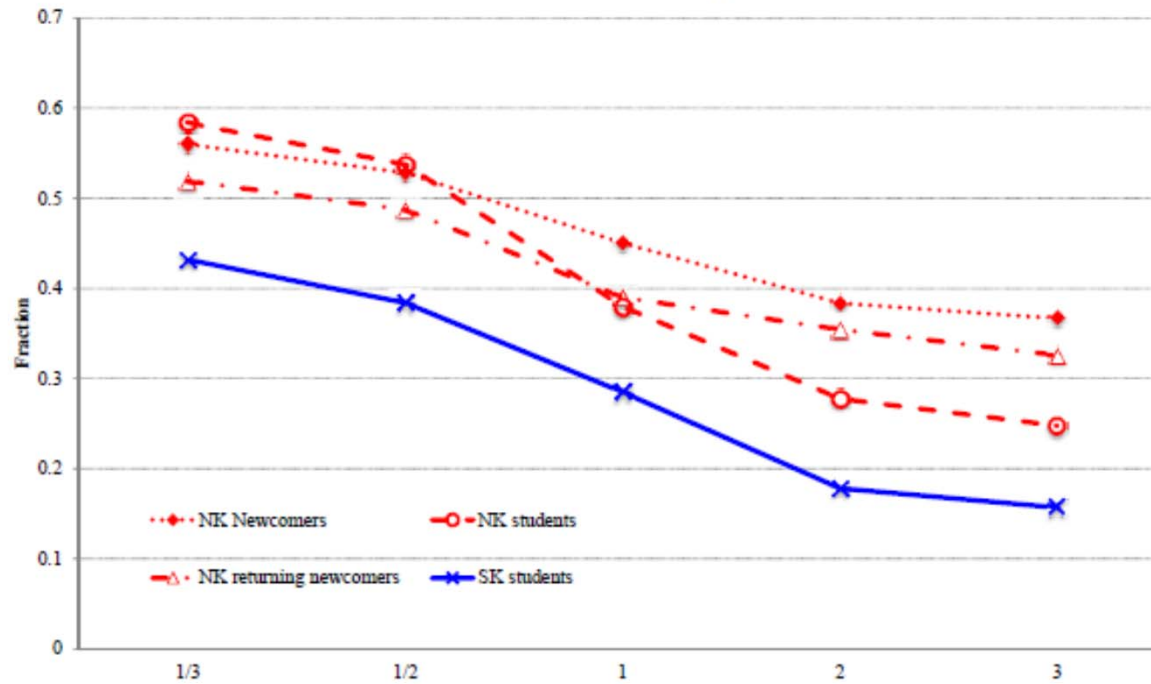
- Facing an SK opponent, NK subjects gave more about 20% more than SK subjects.
- The behavior of SK students is consistent with the findings with Western university students in the literature (e.g., Andreoni and Miller 2002; Fisman et al. 2005)



# Average Behavior of Giving against an NK Opponent

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Facing an NK opponent, NK subjects gave more about 15% more than SK subjects.

# Individual-level Analysis of Giving Behavior

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- Prototypical types of preferences for giving:

- Selfish: 
$$\frac{\pi_o}{\pi_s + \pi_o} = 0, \forall p$$

- Rawlsian: 
$$\frac{\pi_o}{\pi_s + \pi_o} = \frac{1}{2}, \forall p$$

- Utilitarian: 
$$\frac{\pi_o}{\pi_s + \pi_o} = \begin{cases} 1 & \text{if } p < 1 \\ 0 & \text{if } p > 1 \end{cases}$$

- Altruistic: 
$$\frac{\pi_o}{\pi_s + \pi_o} = 1, \forall p$$

# Classified Types of Distributional Preferences

Table 4. Individual-level classification: types of distributive preferences

A. Against an NK opponent					
Type	NK newcomers (Study 1)	NK returning newcomers (Study 1)	NK returning newcomers (Study 3)	NK students (Study 2)	SK students (all three studies)
Selfish	0.17	0.18	0.14	0.21	0.44
Altruistic	0.05	0.05	0.03	0.01	0.02
Rawlsian	0.70	0.73	0.73	0.54	0.40
Utilitarian	0.08	0.04	0.11	0.24	0.14
Number of subjects	133	66	66	72	403

B. Against an SK opponent					
Type	NK newcomers (Study 1)	NK returning newcomers (Study 1)	NK returning newcomers (Study 3)	NK students (Study 2)	SK students (all three studies)
Selfish	0.20	0.21	0.18	0.19	0.56
Altruistic	0.08	0.08	0.03	0.03	0.00
Rawlsian	0.68	0.70	0.73	0.56	0.33
Utilitarian	0.05	0.02	0.06	0.22	0.11
Number of subjects	133	66	66	72	403

- The majority preference type of NK subjects is the Rawlsian one, while the selfish type is the major type for SK subjects.
- These patterns remain largely unchanged across studies.

# Summary of findings

- There is a large difference in cognitive ability between S. Koreans and N. Korean refugees.
- Although smaller than cognitive ability, N. Korean refugees perform poorly than S. Koreans and C. Koreans in a simple task game.
- N. Korean refugees behave in accordance with egalitarian preference.

# Implications

- Unification costs are likely to be larger in Korean unification than in German unification given differences in human capital, social norms and population ratio, if unification takes place in a rapid way.
- A better way of unification is gradual one.
  - Under separate states, human capital of N. Koreans has to increase and their social norms must adapt to a market economy.
  - Economic cooperation and integration should precede to political unification.
- Marketization prevailing in current N. Korea has a potential to improve N. Koreans' human capital.