

Analysis of the Structural Change in Household Debt Distribution by Age of Householder in Korea and the US

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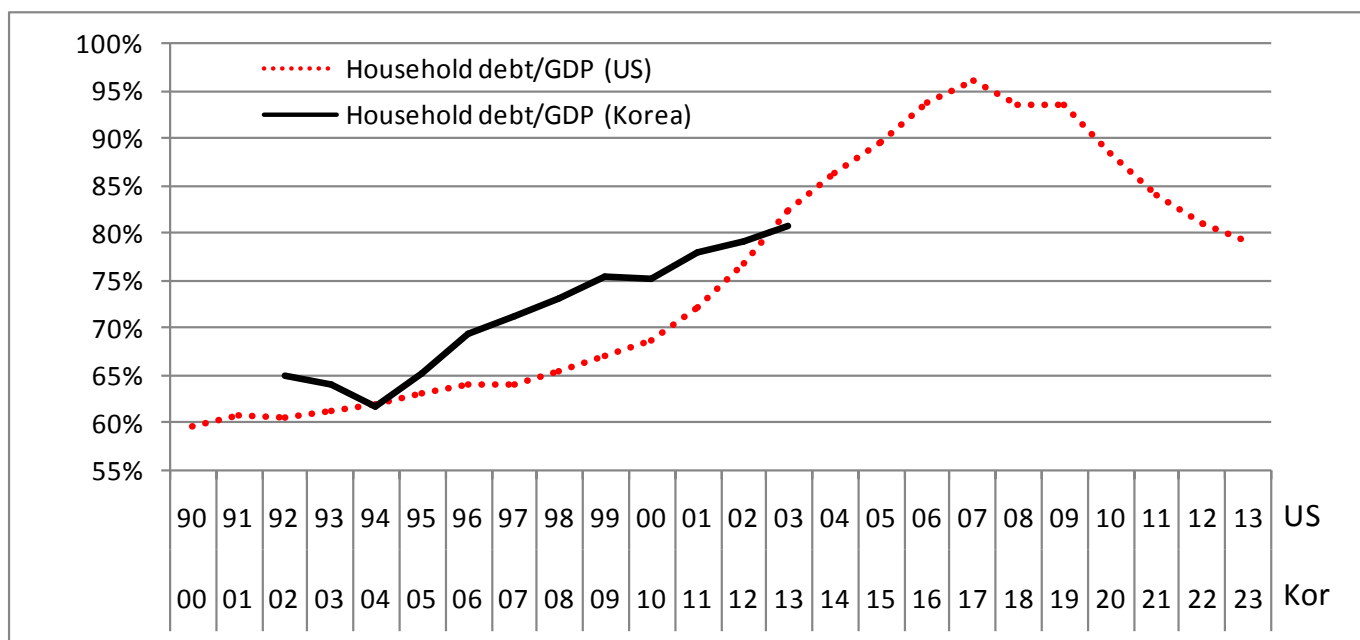
Korea Development Institute

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Household Debt to GDP Ratio

- Compare Korea's household debt distribution by householder's age to that of the US within and across time.
 - ✓ Korea's recent household debt to GDP ratio is almost the same as that of the US in 2003 and 2013.
 - ✓ The US ratio went up to almost 95% and then deleveraged after the global financial crisis.

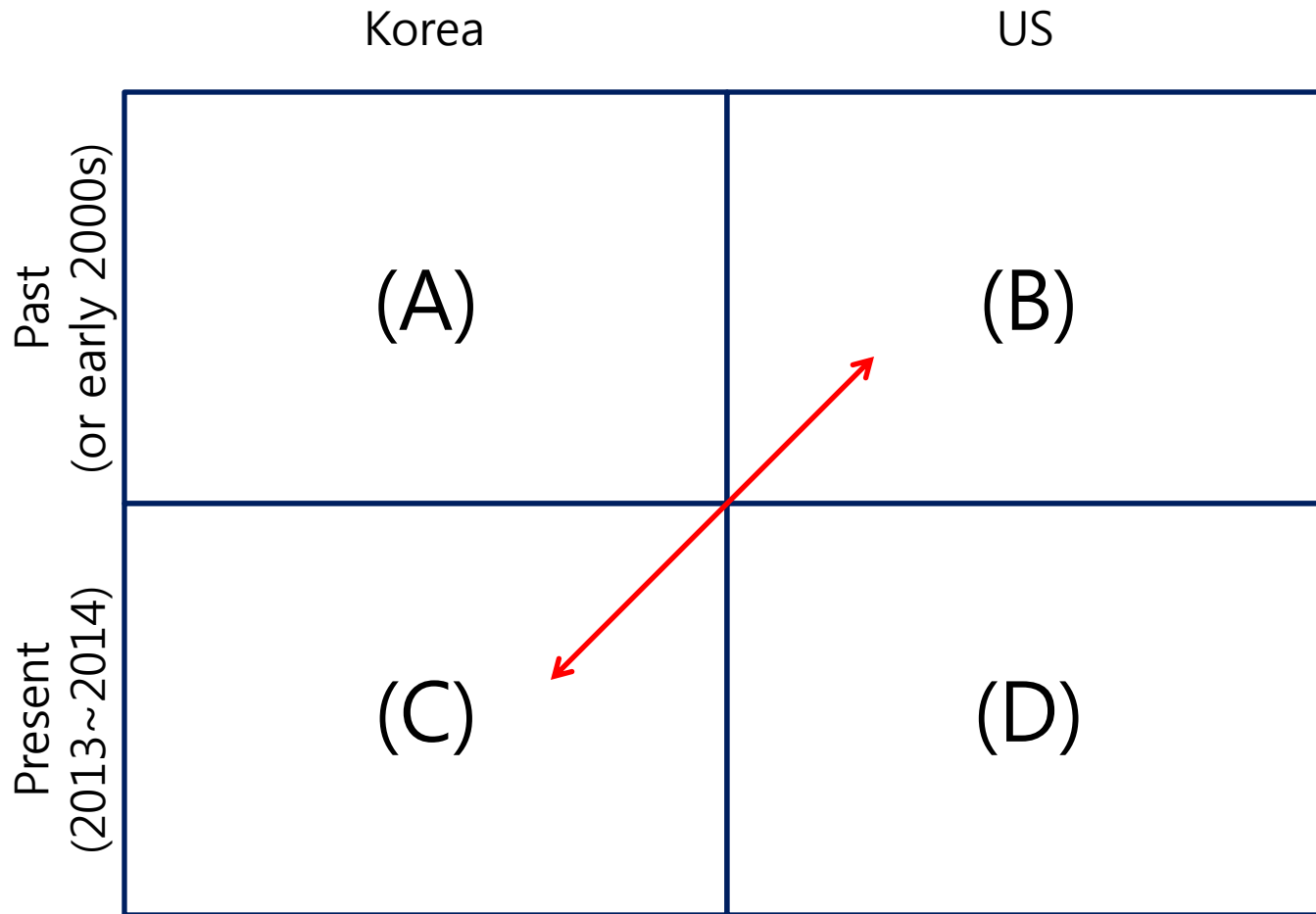
<Household debt to GDP ratio>



Source: OECD, Bank of Korea

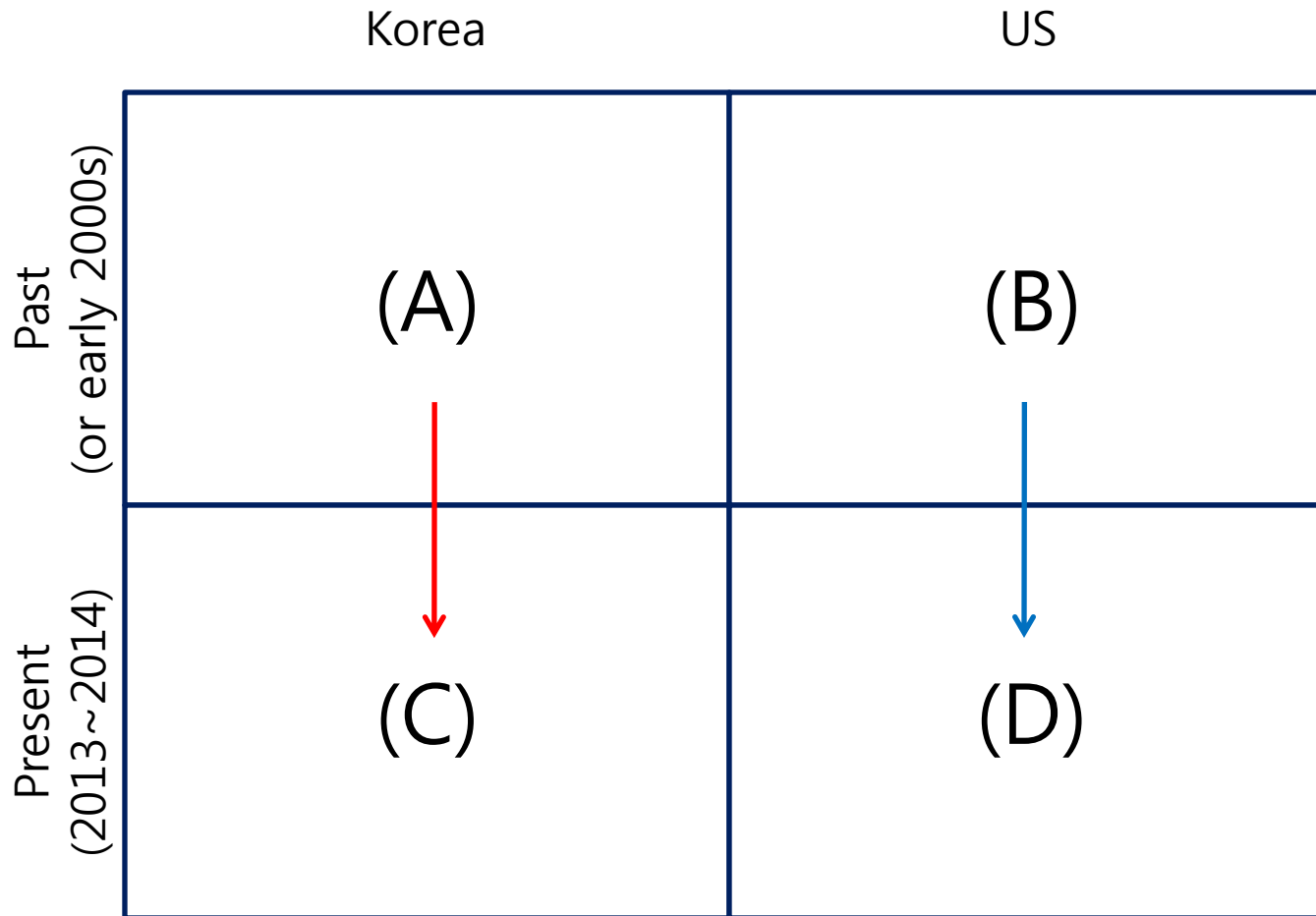
Overview for Today

Compare household debt distribution – static level



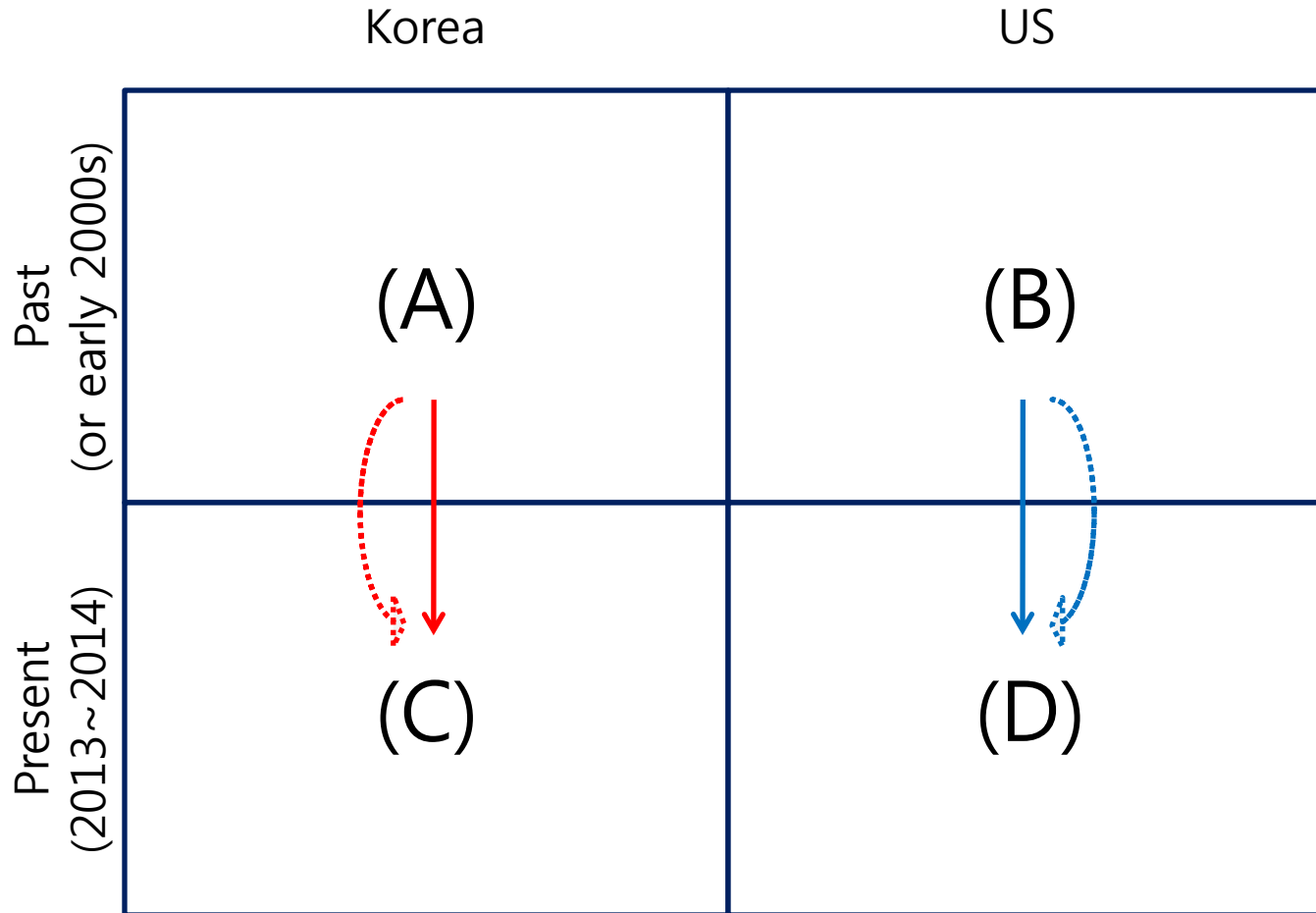
Overview for Today

Compare household debt distribution – dynamic level



Overview for Today

Which factors drive the change in household debt distribution?
Age? Income? Asset?



Data Description

- Korean data: Korean Labor and Income Panel Study (KLIPS) & Survey of Household Finances and Living Conditions (SHFLC)
- US data: Survey of Consumer Finances (SCF)

	Korea		US
	KLIPS	SHFLC	SCF
Number of samples	4,300~6,700	18,000	3,000~6,000
Survey year	1999-2012	2010-2014	Every 3 year since 1983
Panel structure?	Yes	2010-11, 2012-14	Generally, no (1983-89, 2007-09 panel)
Unit of analysis	Household and individual level	Household level	Primary economic unit (PEU)
Major features	Broad categories of questionnaires (similar to PSID)	Household finance related questionnaires (similar to SCF)	Very fine categories of questionnaires about household finance issues

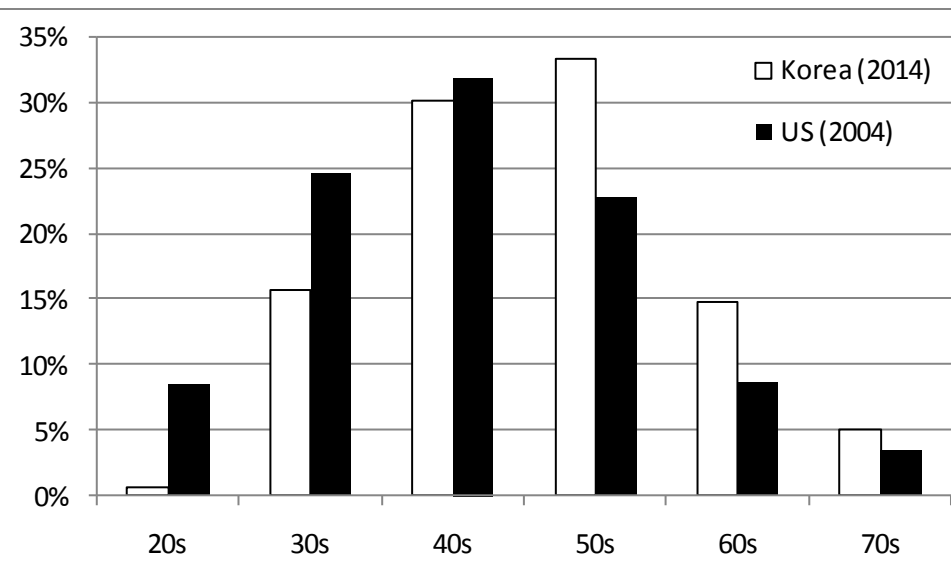
Household Debt Distribution

- The proportion of household debt held by Korean households in their 50s is much higher than those held by the US households.
 - ✓ When I control the demographic difference between Korea and the US, Korean household debt is more concentrated in older-aged groups.

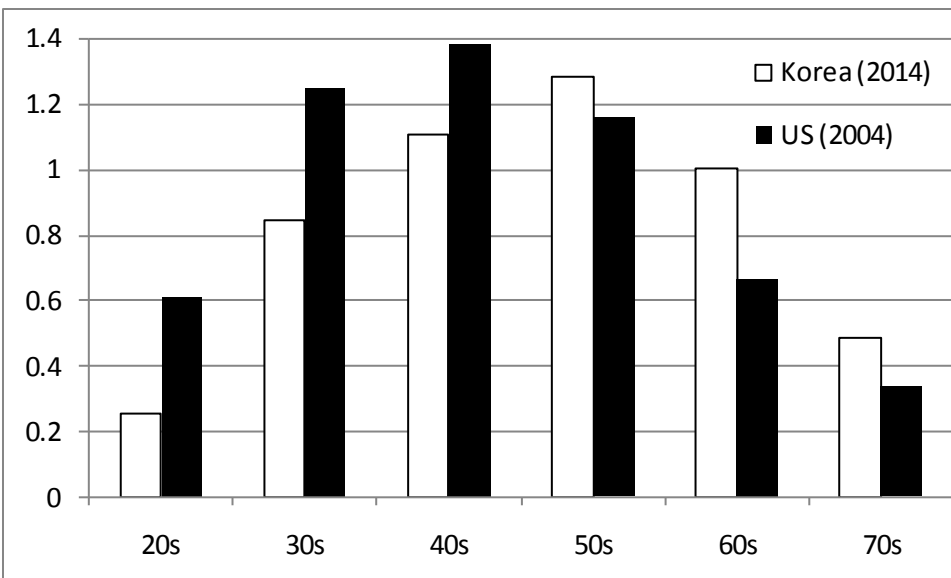
$$\text{Household debt ratio} = \frac{\sum_{i \in \text{Age}} w_i m_i}{\sum_{i \in \text{Pop}} w_i m_i}$$

$$\text{Per-household debt to average of all households} = \frac{\sum_{i \in \text{Age}} w_i m_i / \sum_{i \in \text{Age}} w_i}{\sum_{i \in \text{Pop}} w_i m_i / \sum_{i \in \text{Pop}} w_i}$$

<Household debt ratio by householder's age>



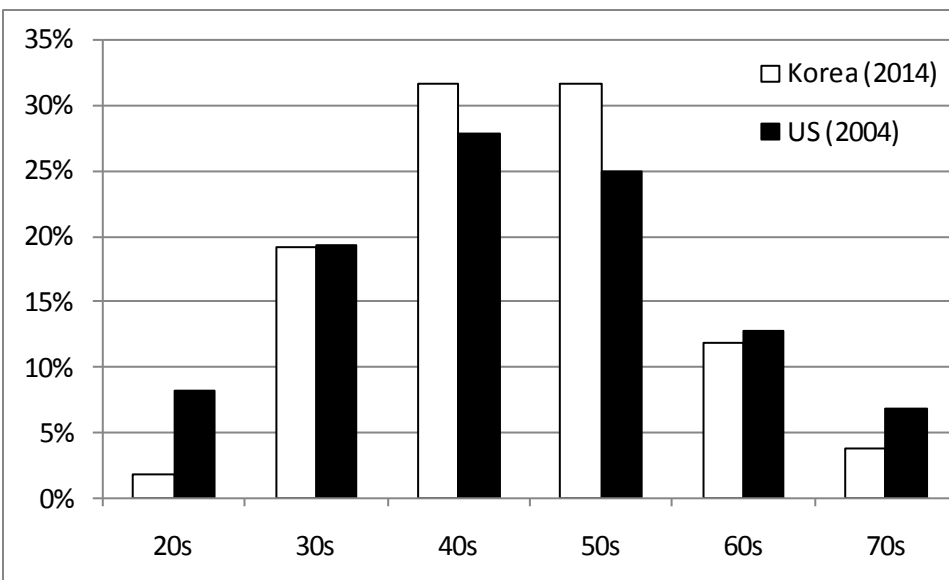
<Ratio of per-household debt to average of all households>



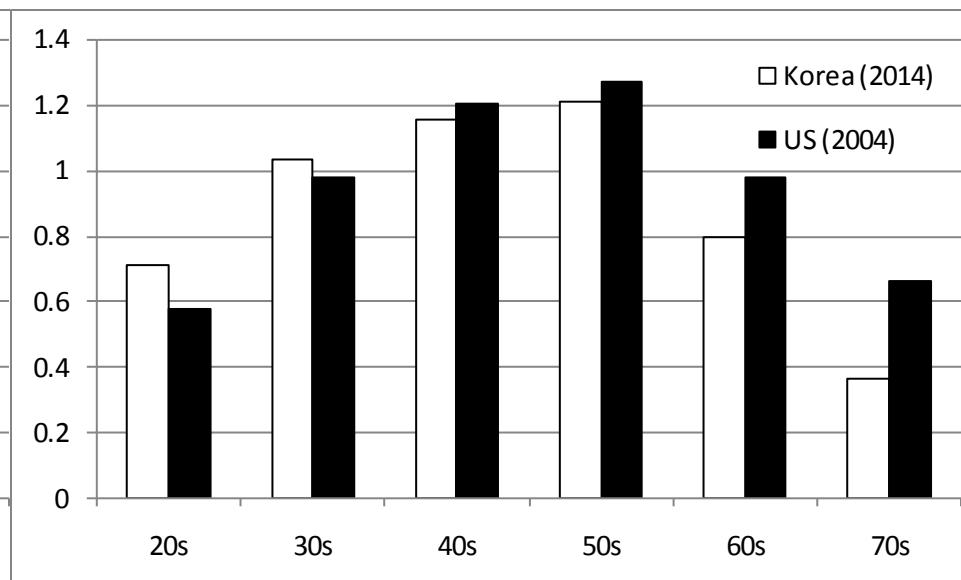
Household Income Distribution

- Korean households experience a sharp decline in their income after their retirement age
 - ✓ The proportion of income held by Korean households in their 50s is higher than that held by US households.
 - ✓ This is attributed by the number of population in 50s.
 - ✓ Korean households in their 60-70s have lower income than those in the US.

<Household income ratio by householder's age>



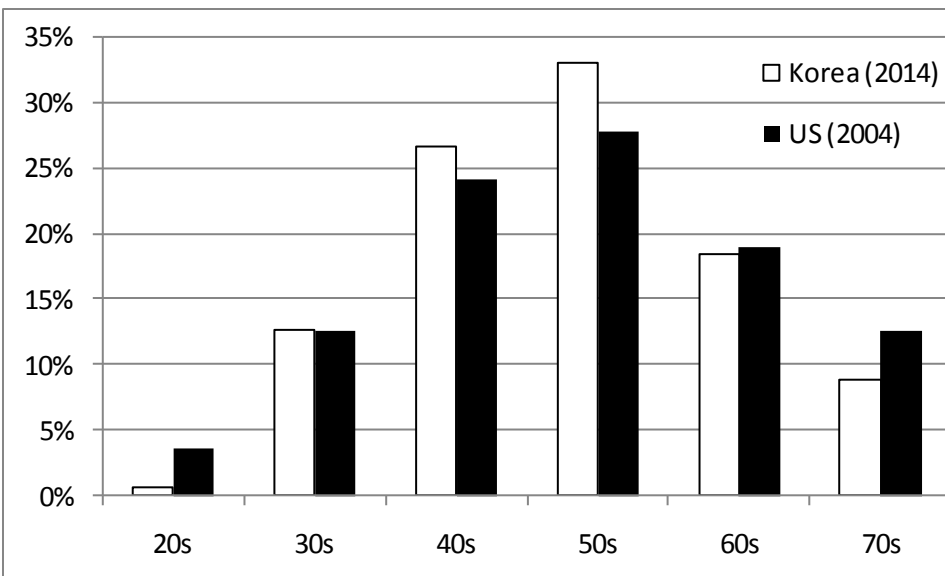
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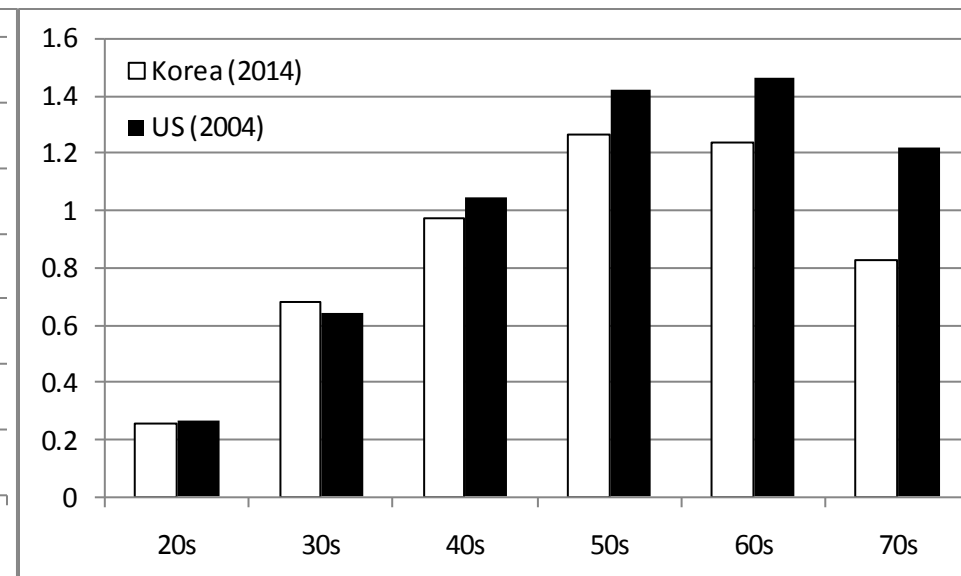
Household Asset Distribution

- Seniors in Korea own lesser proportion of assets than those in the US.
 - ✓ Average amounts of assets held by the senior group is higher than that held by younger people both in Korea and the US.

<Household asset ratio by householder's age>



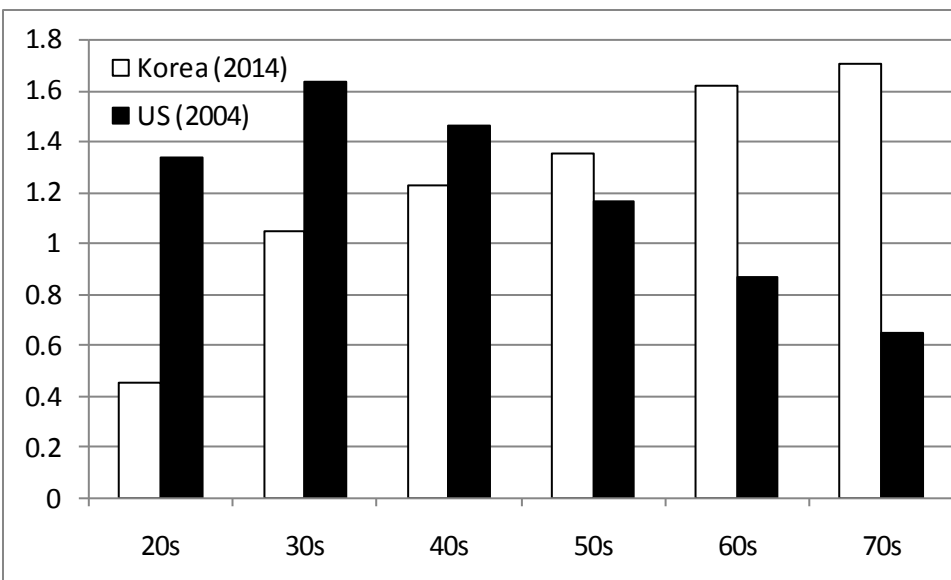
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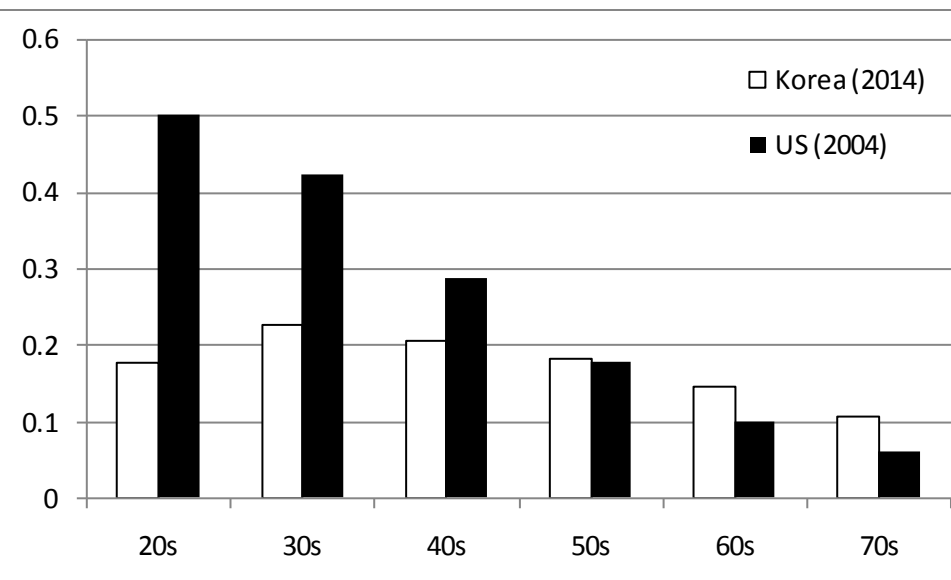
Debt-to-Income & Debt-to-Asset Ratio

- Korea's debt-to-income ratio increases as householders become older; debt-to-asset ratio does not decrease as fast as that of the US.
 - ✓ Household income and assets held by Korean seniors are lower than those held by US households.
 - ✓ Debt contract structure in Korea matters – bullet-type loans.
 - Roll-over debt repeatedly.

<Household debt to income ratio>



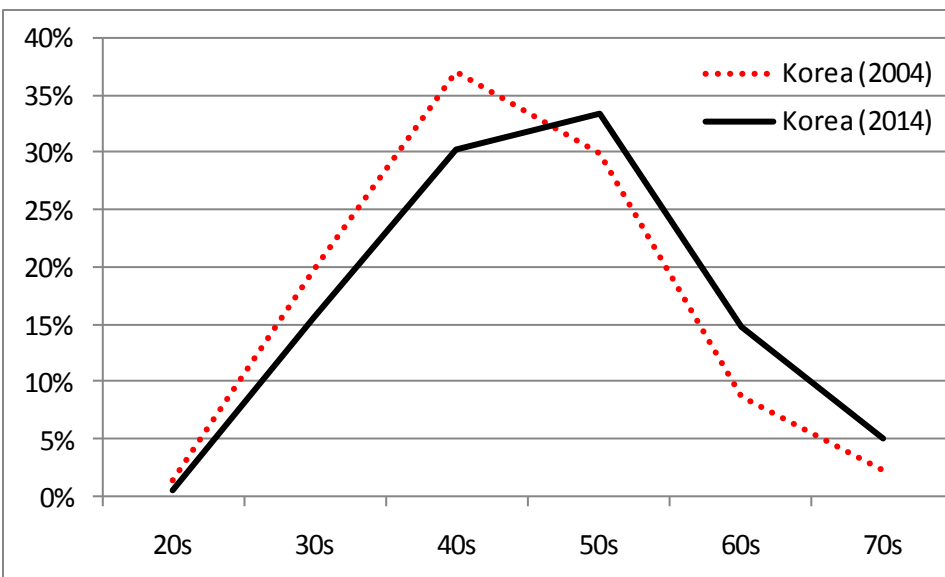
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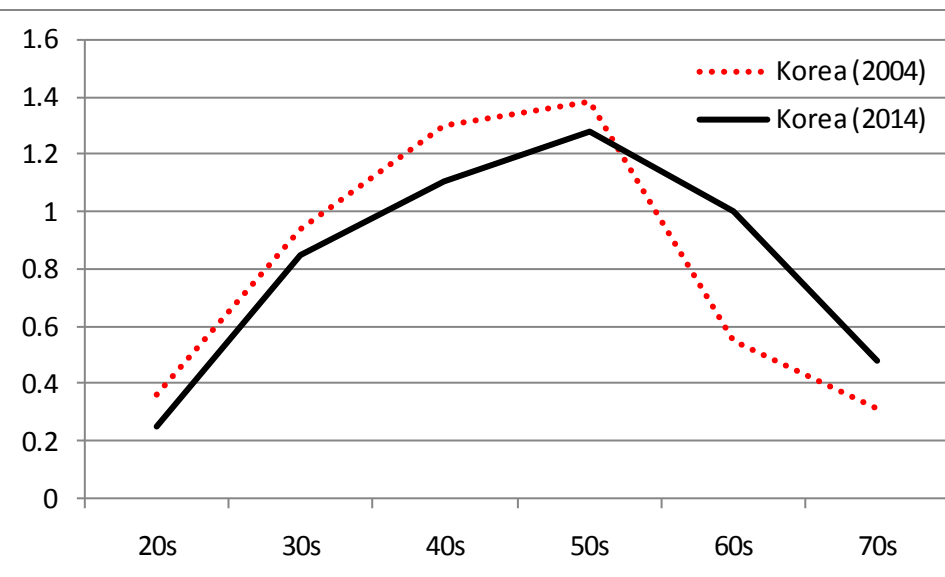
Changes in Household Debt Distribution (Korea)

- The proportion of household debt held by old-aged households has increased over the last decade, while debt held by households whose age is less than 40s has decreased.
 - ✓ Average debt held by in their 60-70s has increased.
 - ✓ Note: 2004 KLIPS and 2014 SHFLC are used.

<Household debt ratio by age >



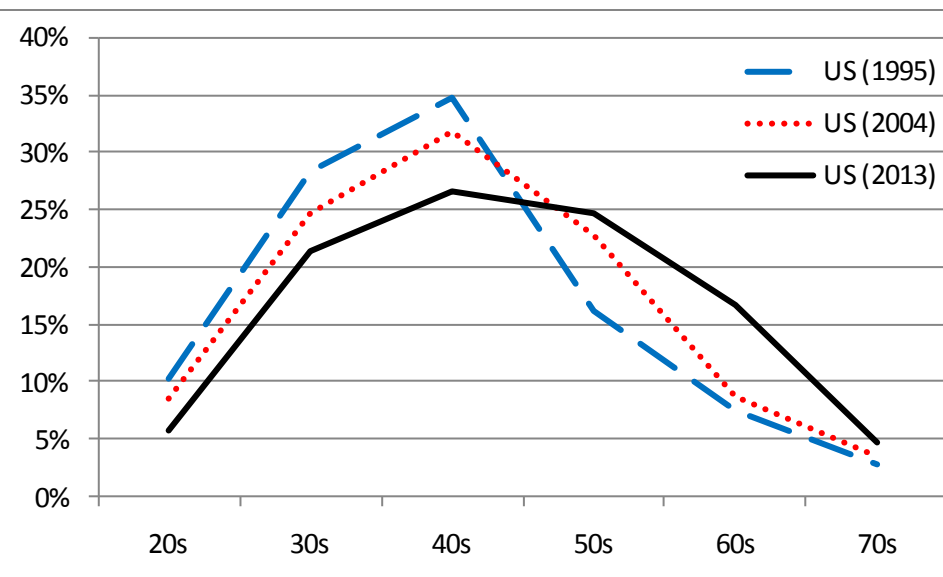
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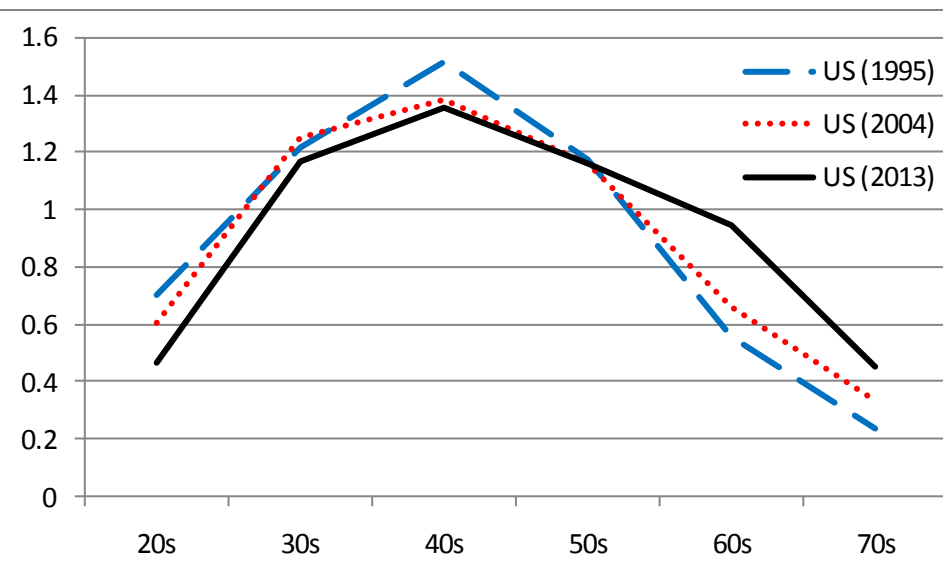
Changes in Household Debt Distribution (US)

- Similar patterns can be observed in the US over the last 20 years.
 - ✓ Household debt distribution has shifted to the right direction.
 - ✓ Average amount of debt held by in their 60-70s has increased.

<Household debt ratio by age >



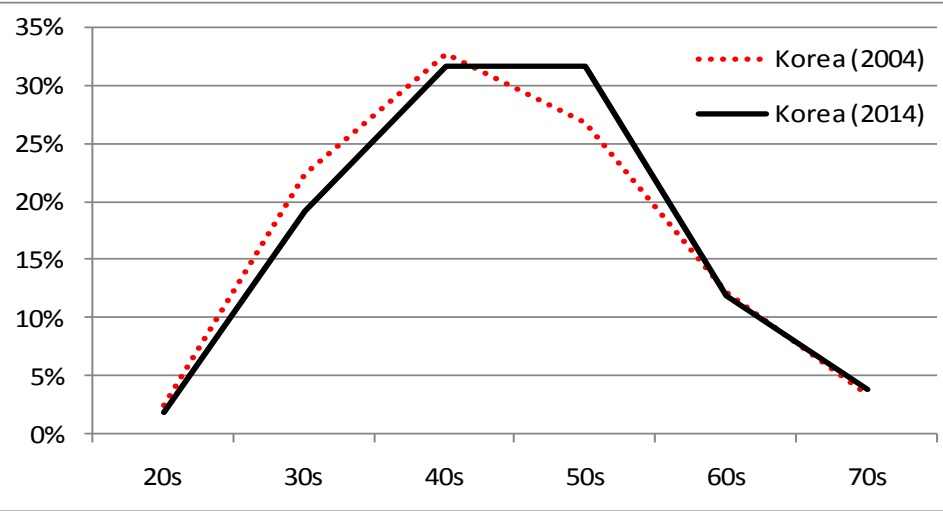
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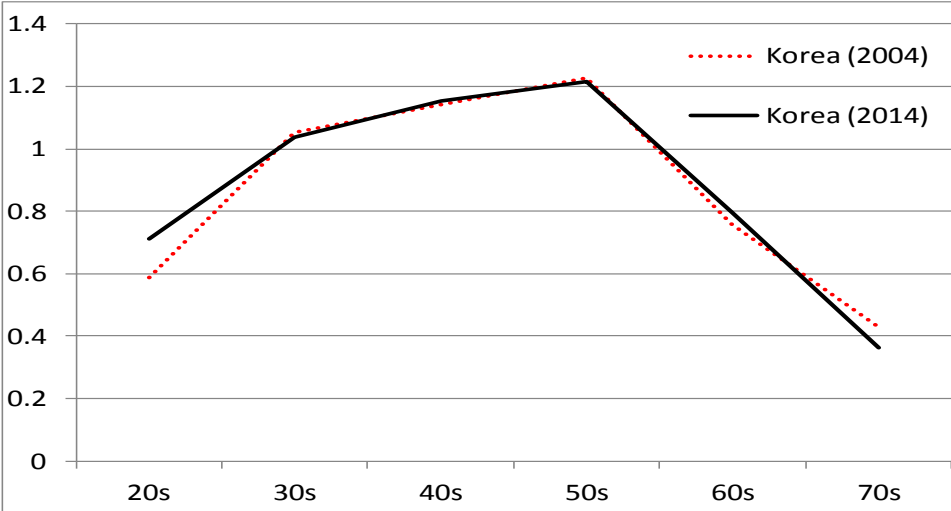
Changes in Household Income & Asset Distribution (Korea)

- Household income and asset holding rates by age also has (slightly) shifted to the right direction over the last decade.

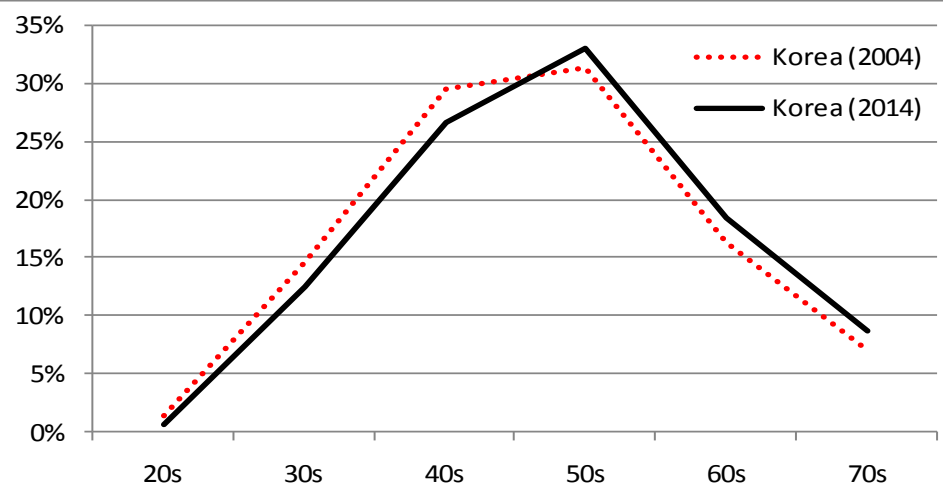
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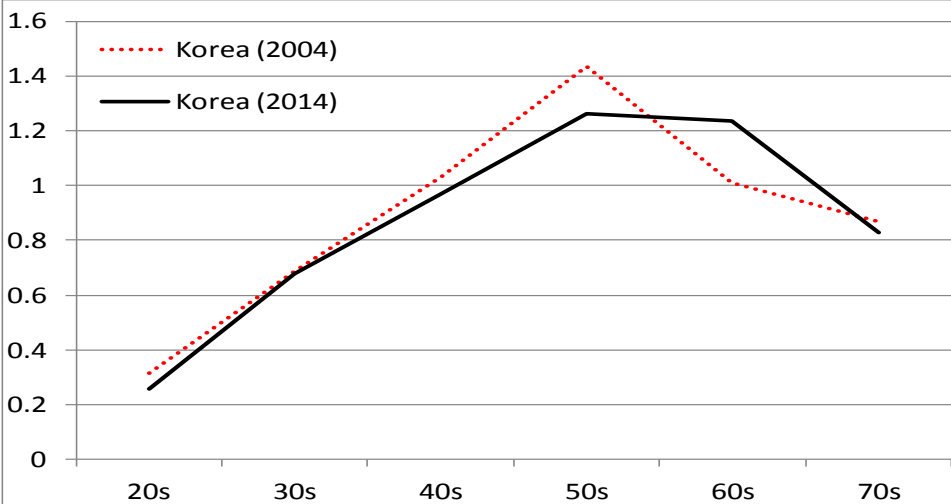
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<Household asset distribution by age >



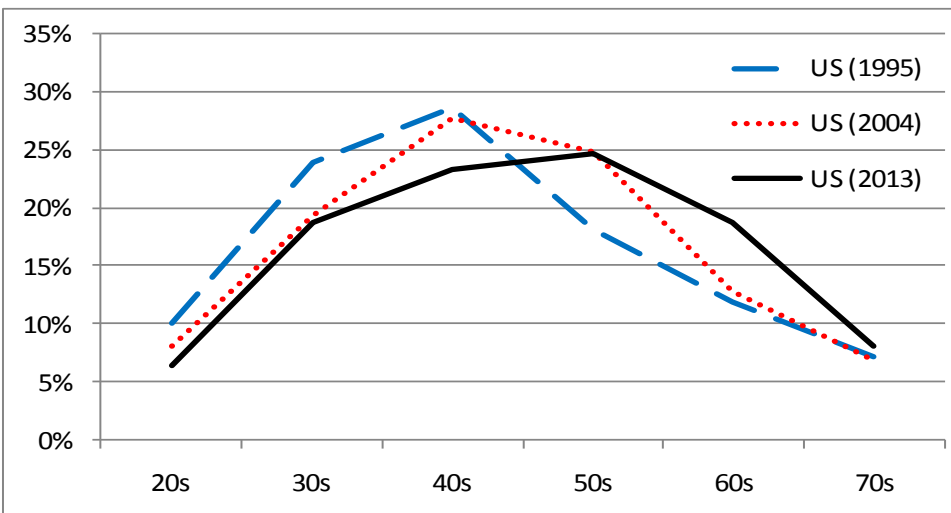
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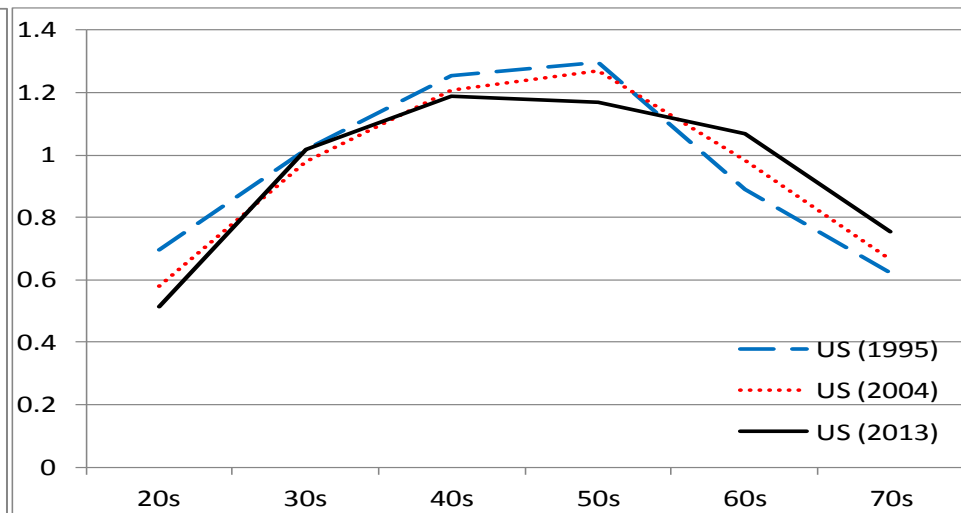
Changes in Household Income & Asset Distribution (US)

- Similar patterns can be observed in the US.

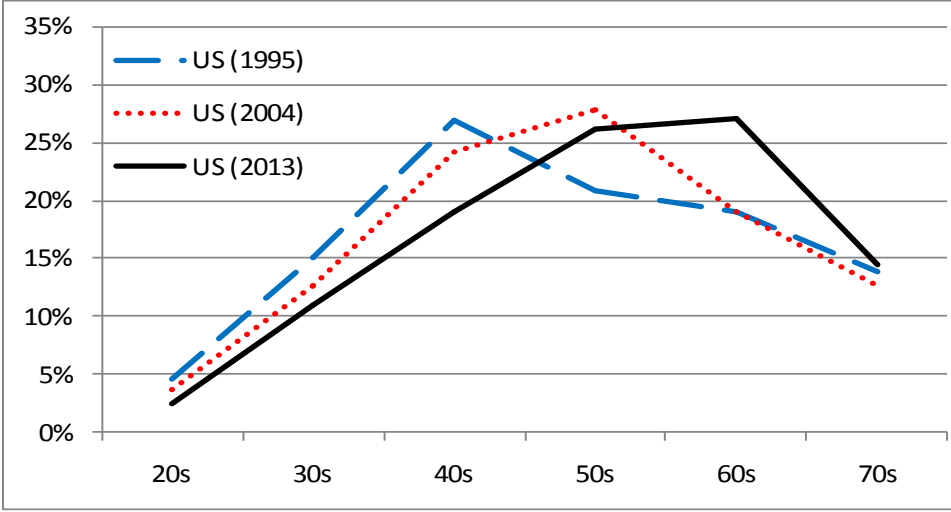
<Household income distribution by age >



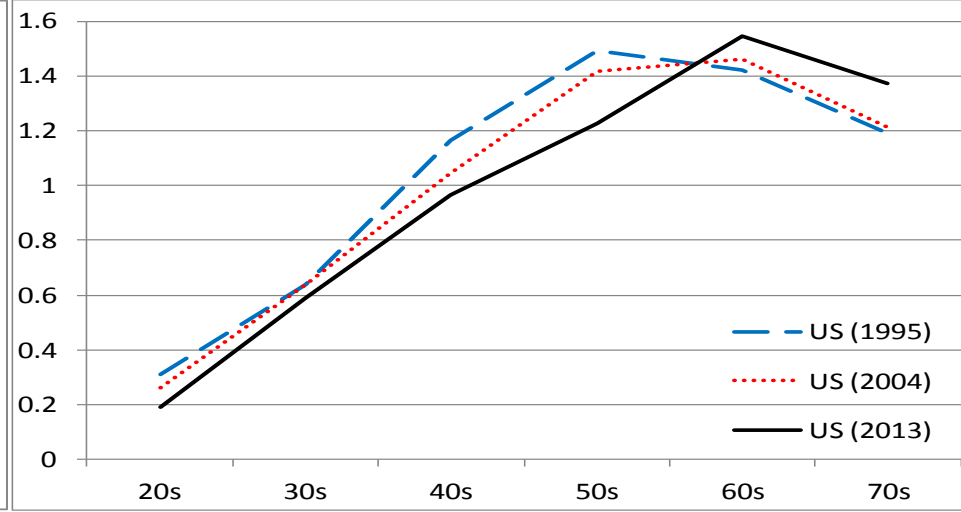
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<Household asset distribution by age >



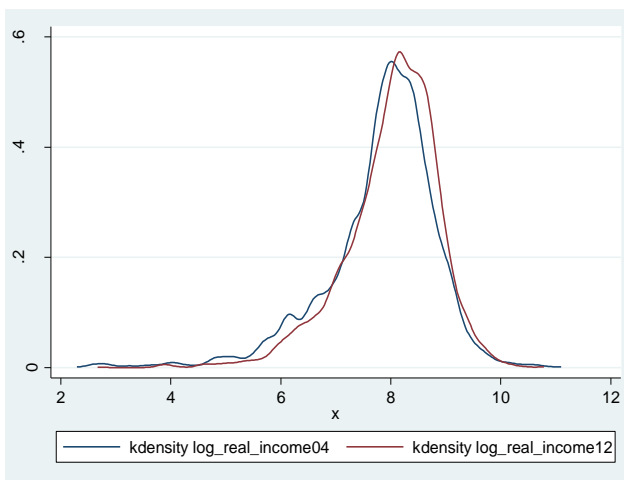
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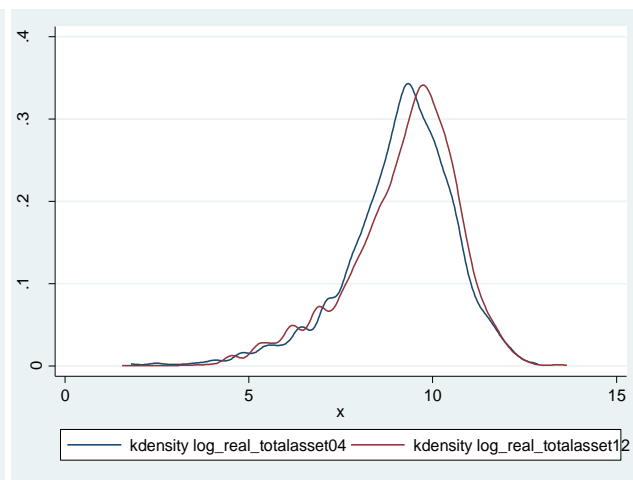
Why Debt Distribution Changes?

- Analyze the main driving force that has shifted the household debt distribution.
 - ✓ Changes in demographic (or age) distribution? Changes in income or asset distribution?
- How much each component has contributed to the shift in household debt distribution?

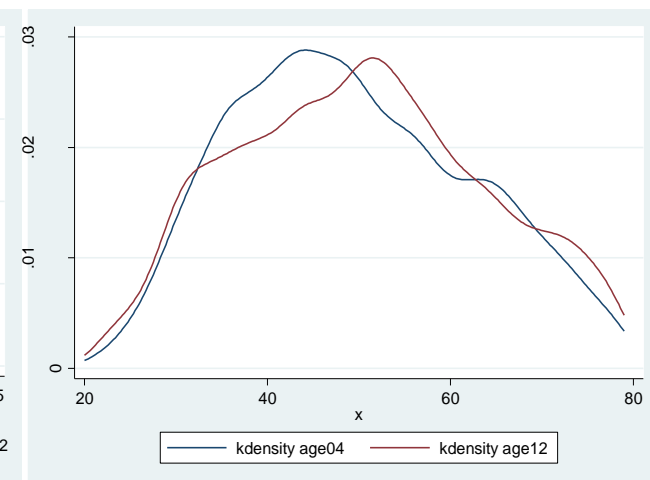
<Log real income distribution>



<Log real asset distribution>



<Demographic distribution>

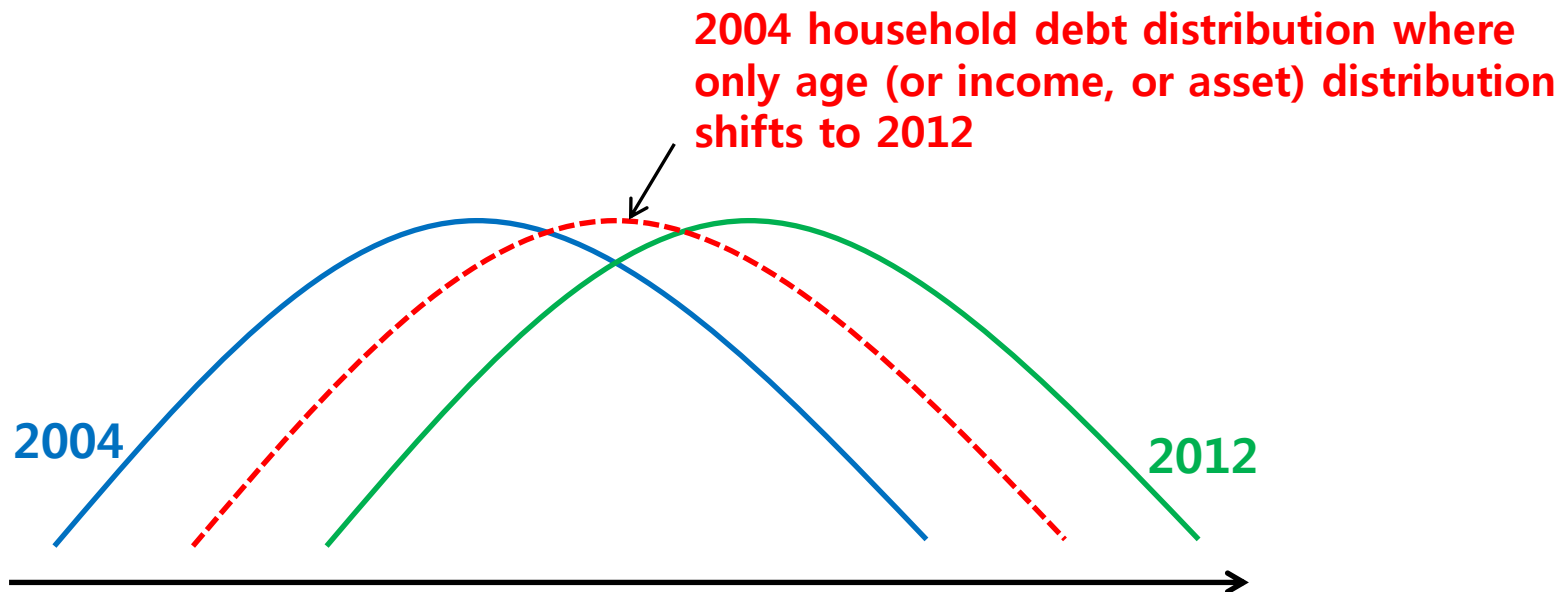


— 2004 KLIPS

— 2012 KLIPS

Analysis Idea

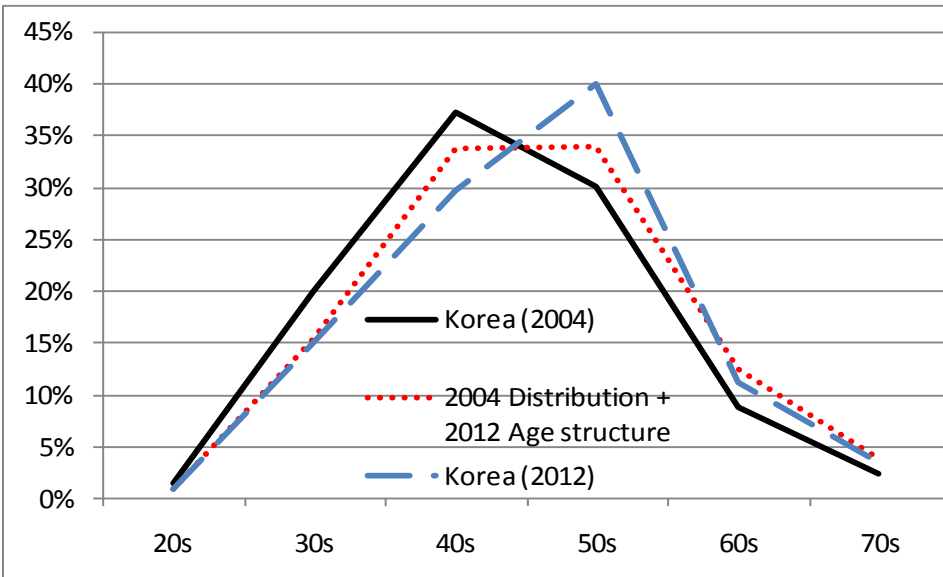
- Application and extension of *DiNardo, Fortin, and Lemieux (1996, Econometrica)*
- Example: Consider a counter-factual 2004 household debt distribution where only household demographic distribution changes to that of 2012, and other household characteristics remain at 2004.



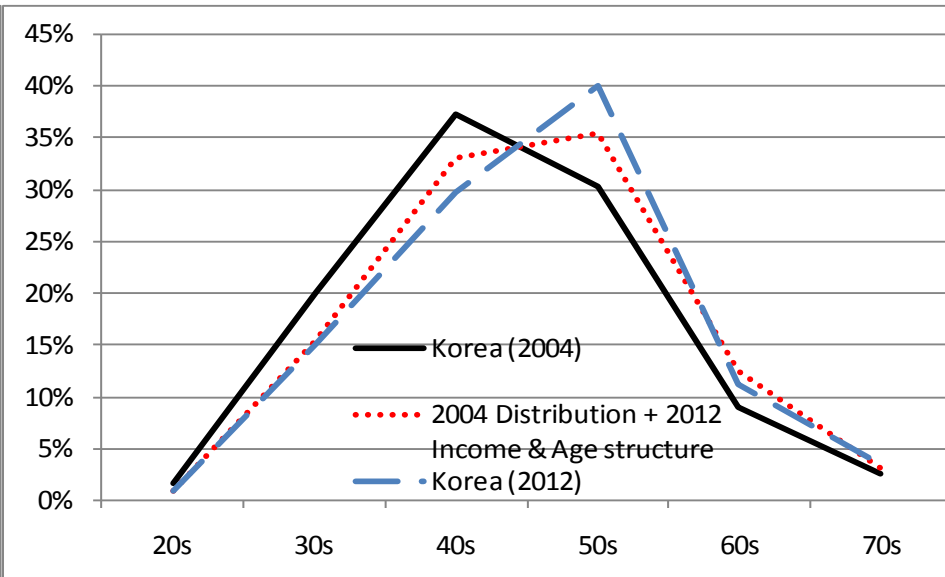
Analysis Results - Korea

- Changes in demographic distribution from 2004 to 2012 can explain the change in household debt distribution almost by half.
 - ✓ Changes in income distribution slightly affect the change in household debt distribution.
 - ✓ Changes in asset distribution have no effects in changes in household debt distribution.
 - Note: Used 2004 & 2012 KLIPS; Similar results when using 2014 SHFLC instead of using 2012 KLIPS.

<Analysis of age distribution changes>



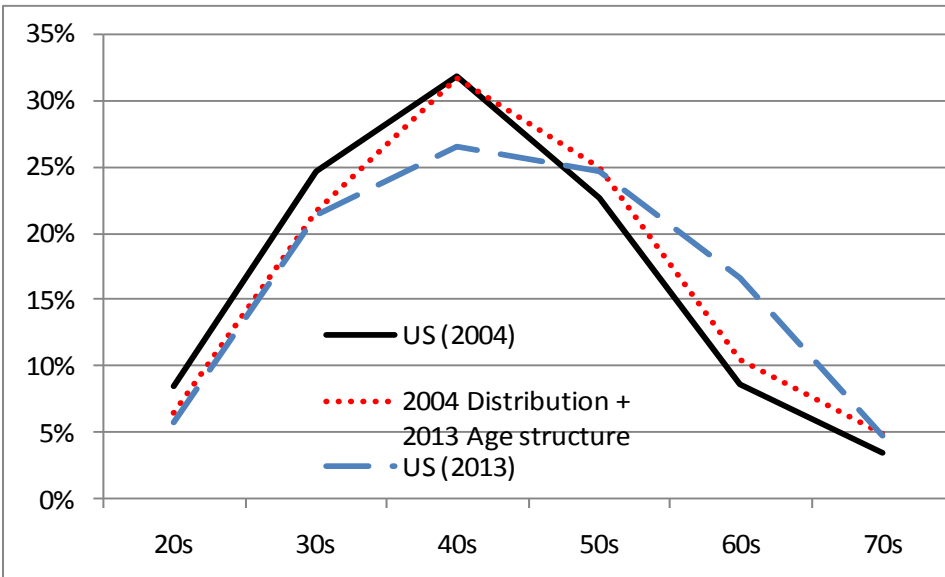
<Analysis of age and income distribution changes>



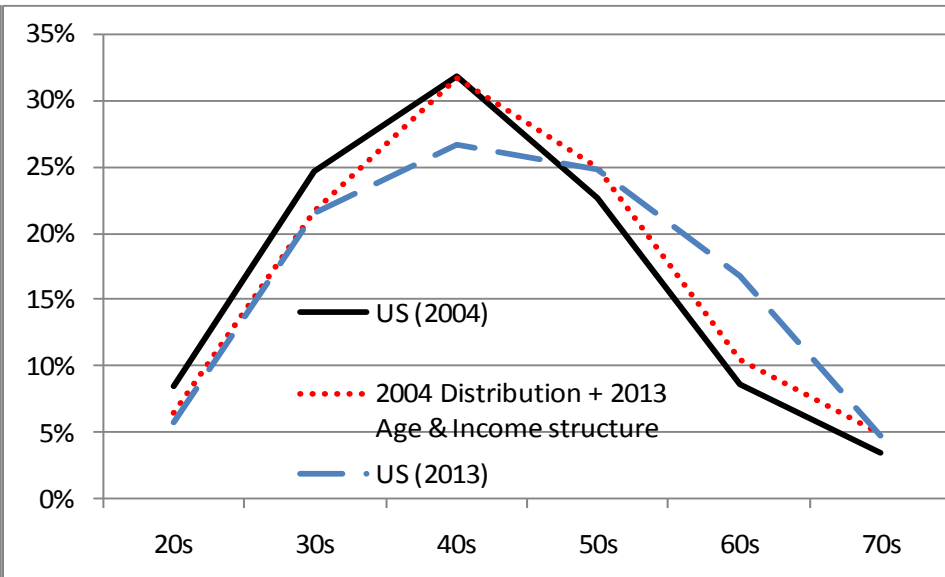
Analysis Results - US

- The change in demographic distribution partly affects the change in household debt distribution in the US, though not strong.
 - ✓ The US economy has experienced unprecedented boom and bust over the last decade, which might make it difficult to explain the shift in household debt distribution merely by household characteristics variables.

<Analysis of age distribution changes>



<Analysis of age and income distribution changes>



Concluding Remarks

- The shift in household debt distribution is mainly driven by a change in householder's demographic distribution, not by income or asset distribution, especially in Korea.
- The proportion of household debt held by senior households is expected to increase as demographic structure changes.
 - ✓ However, household income held by senior groups is still low.
- Policy implications
 - ✓ Consider diverse policy measures to improve old-aged income. (ex: wage peak system)
 - ✓ Prevent asset price deflation. (ex: adopt reverse mortgage)
 - ✓ Change the debt contract structure: bullet-type → long-term amortized loans
 - ✓ Strengthen macro-prudential policies (ex: DTI regulation)

Appendix

Analysis Sketch

- Notation: (m, z, t) = (household debt, household-specific characteristics, survey year)
- Unconditional household debt density:

$$f_{t=2004}(m) = \int f(m | z, t_m = 2004) dF(z | t_z = 2004)$$

- Suppose household characteristics z is composed of (z_1, z_2) . Then, re-write the density function as follows:

$$\begin{aligned} & f(m; t_m = 2004, t_{z_1|z_2} = 2004, t_{z_2} = 2004) \\ &= \int f(m | z, t_m = 2004) dF(z_1 | z_2, t_{z_1|z_2} = 2004) dF(z_2 | t_{z_2} = 2004) \end{aligned}$$

- Consider a counter-factual density function where only the distribution of z_1 is switched to 2012.

$$\begin{aligned} & f(m; t_m = 2004, t_{z_1|z_2} = 2012, t_{z_2} = 2004) \\ &= \int f(m | z, t_m = 2004) dF(z_1 | z_2, t_{z_1|z_2} = 2012) dF(z_2 | t_{z_2} = 2004) \\ &= \int f(m | z, t_m = 2004) \Psi(z) dF(z_1 | z_2, t_{z_1|z_2} = 2004) dF(z_2 | t_{z_2} = 2004) \end{aligned}$$

Analysis Sketch

- Given the household debt density function, calculate household debt distribution by householder's age:

$$\frac{\int_{Age} mf(m; t_m = t, t_{z1|z2} = 2004, t_{z2} = 2004) dm}{\int_{Pop} mf(m; t_m = t, t_{z1|z2} = 2004, t_{z2} = 2004) dm} \approx \frac{\sum_{i \in Age} w_i m_i}{\sum_{i \in Pop} w_i m_i}$$

- Calculate the counter-factual household debt distribution by householder's age:

$$\frac{\int_{Age} mf(m; t_m = t, t_{z1|z2} = 2012, t_{z2} = 2004) dm}{\int_{Pop} mf(m; t_m = t, t_{z1|z2} = 2012, t_{z2} = 2004) dm} \approx \frac{\sum_{i \in Age} w_i \Psi(z_i) m_i}{\sum_{i \in Pop} w_i \Psi(z_i) m_i}$$