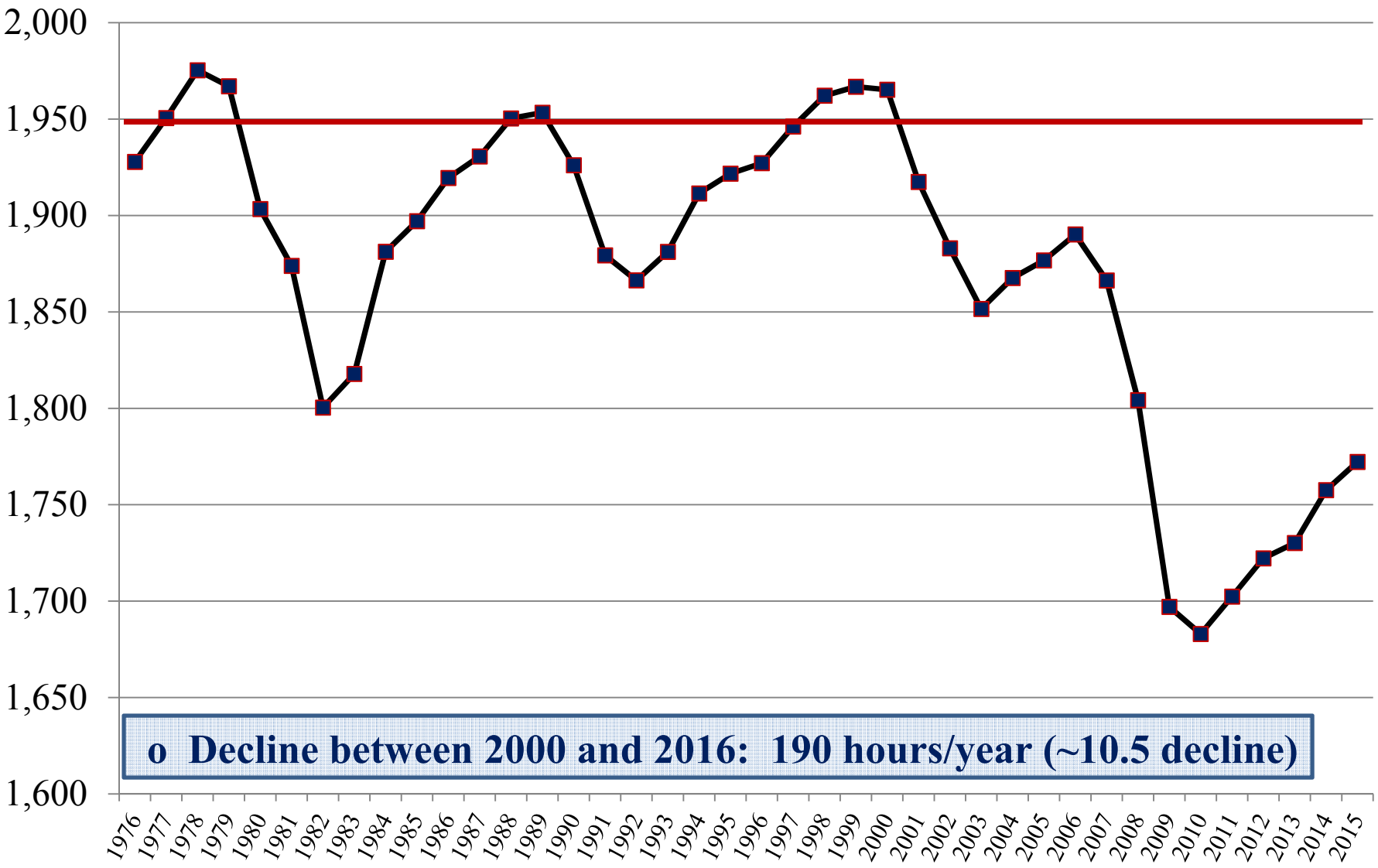
The Decline in U.S. Employment

Erik Hurst

Dale Mortensen Lecture

SED 2017

Annual Hours Worked, Male 21-55, Ed = All
March CPS 1977-2016



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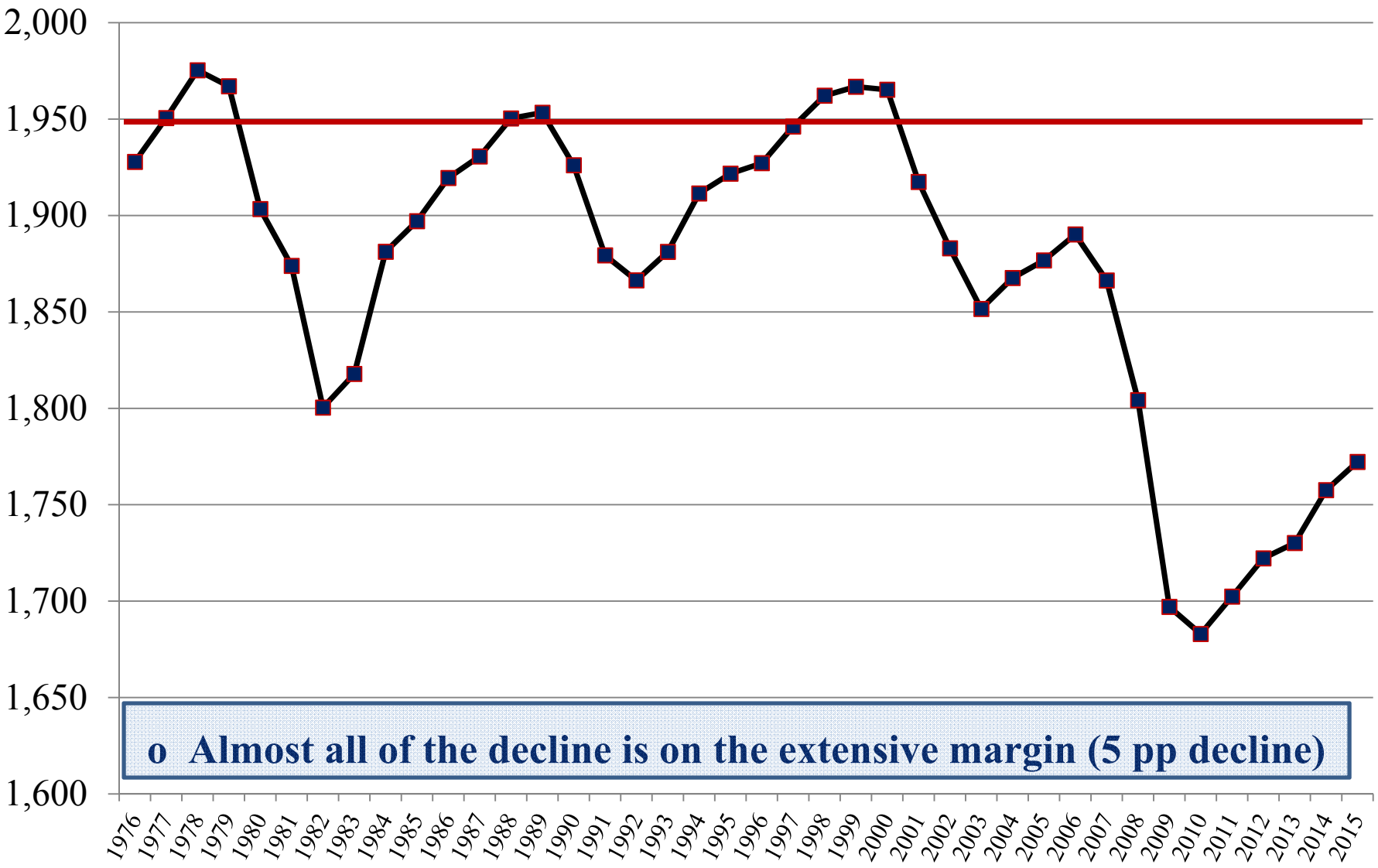
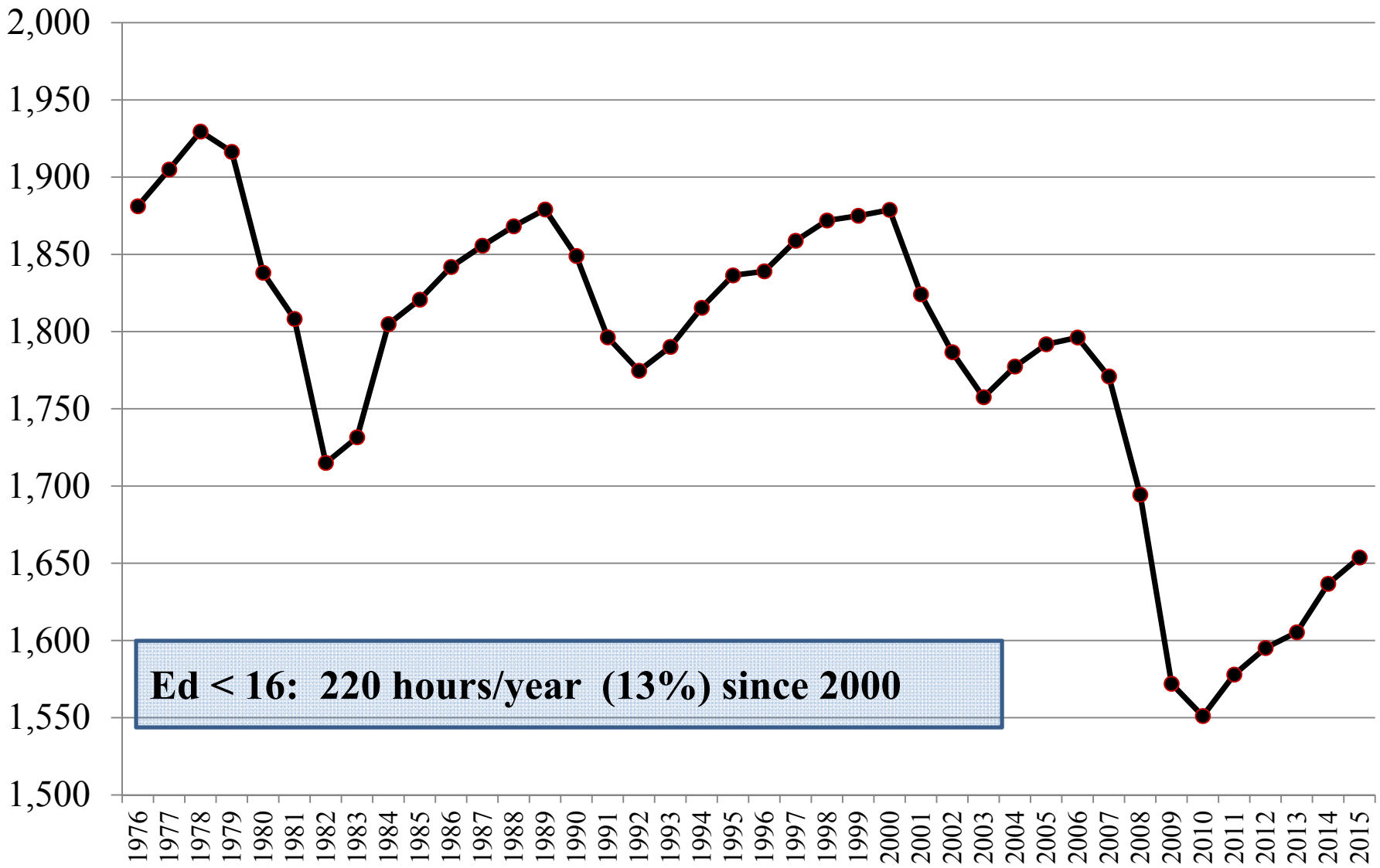
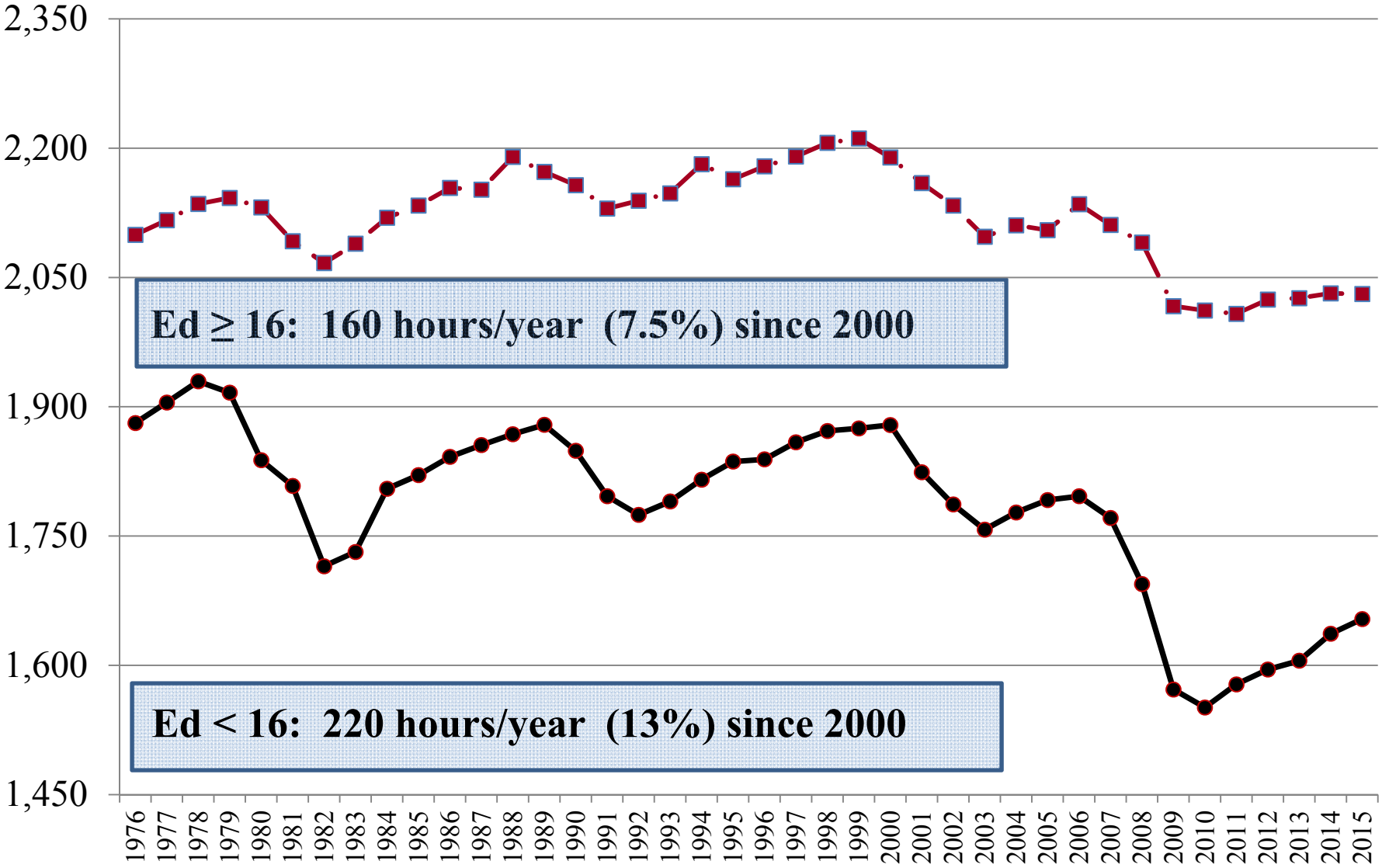


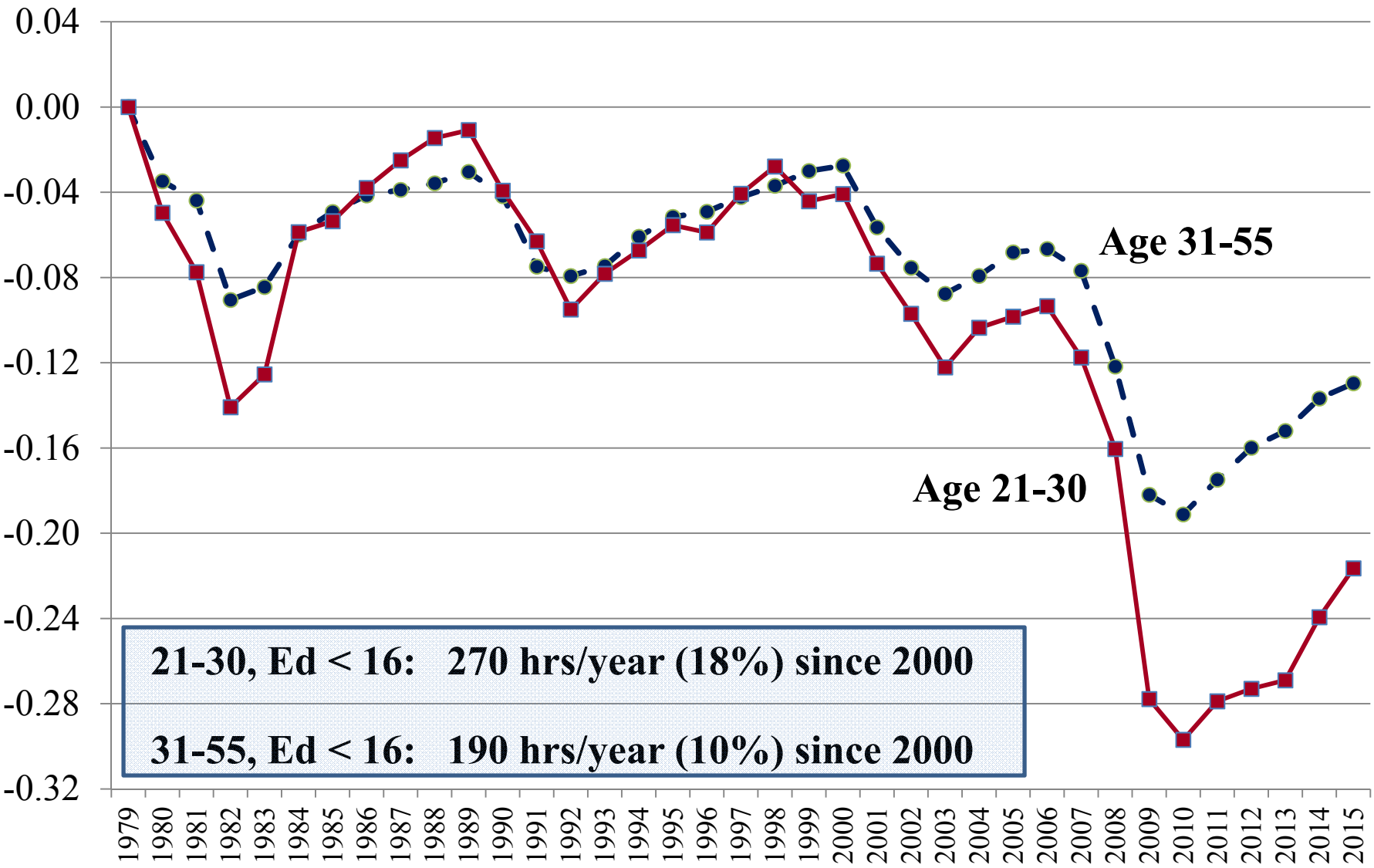
Annual Hours Worked, Male 21-55
Ed < 16, March CPS

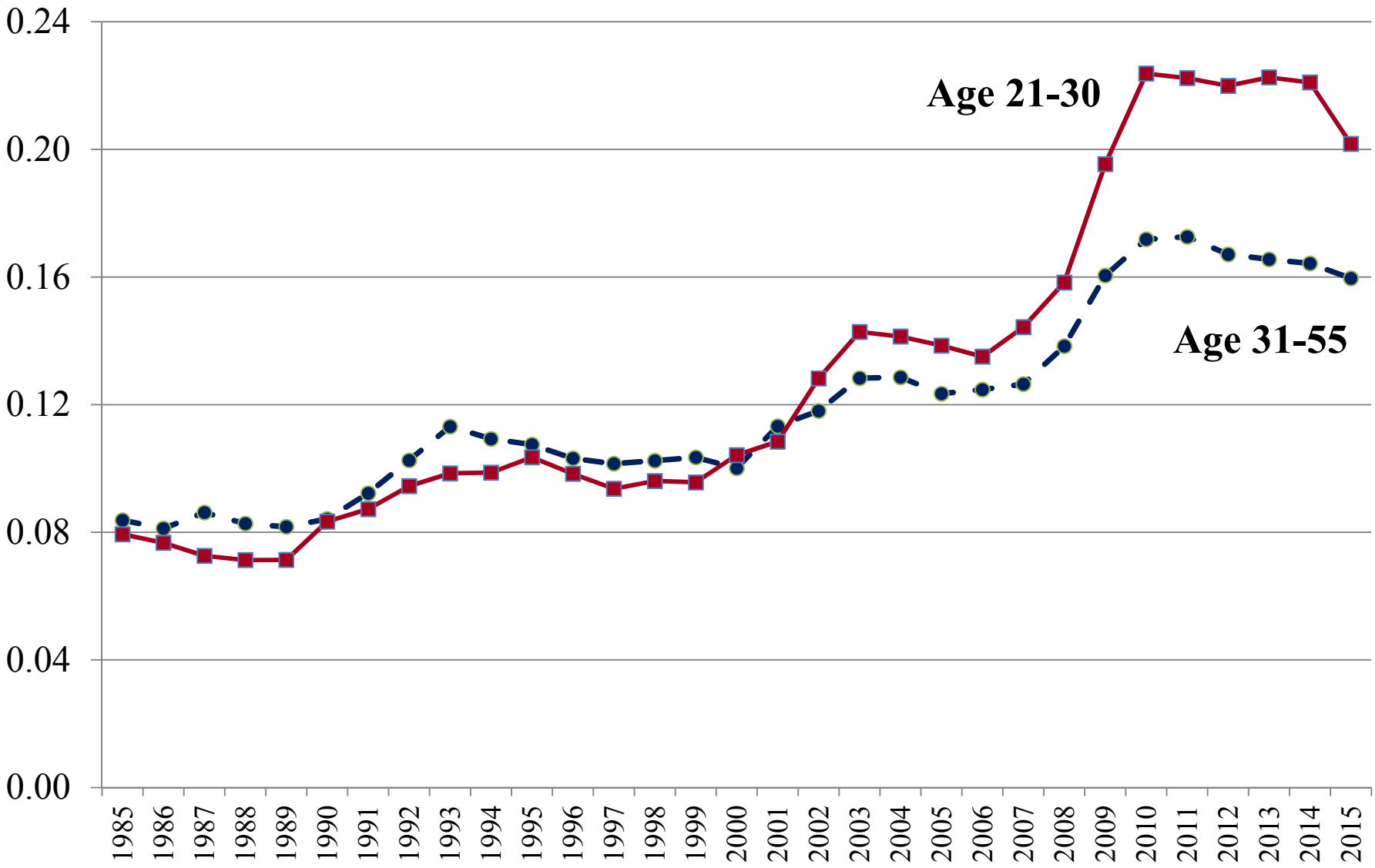


Annual Hours Worked, Male 21-55
By Education, March CPS

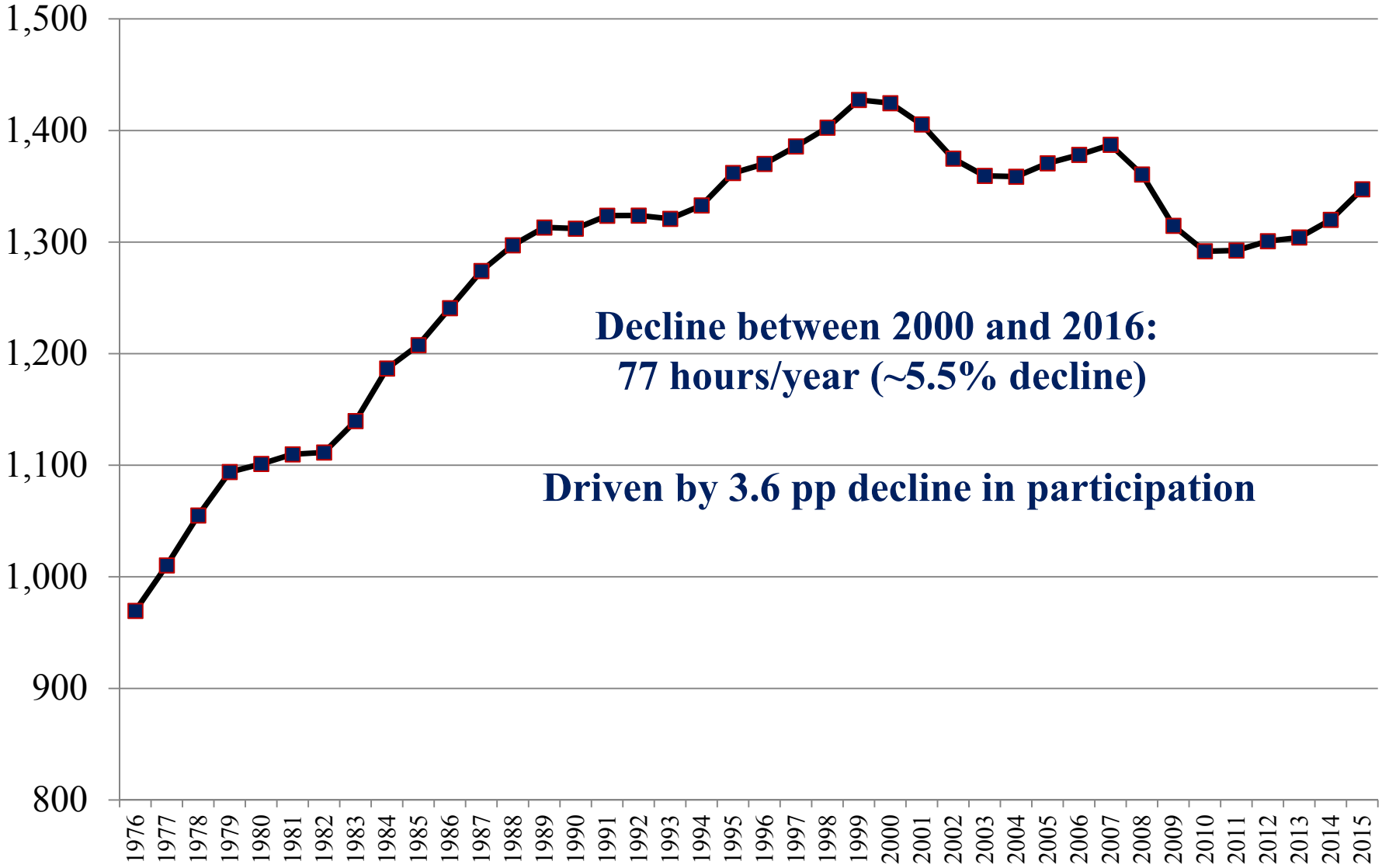


Annual Hours Worked (Log Deviation from 1979)
Men, By Age, Ed < 16, March CPS




Fraction with Zero Weeks Worked, Men
Education < 16, By Age
0.24
0.20
0.16
0.12
0.08
0.04
0.00
Age 21-30
Age 31-55
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Annual Hours Worked, Women 21-55
Ed = All, March CPS



Summary: Declining Hours During 2000s (Excluding Full Time Students)

	Men Annual Hours Decline	Women Annual Hours Decline
Ed < 16, Age 21-30	-242	-145
Ed < 16, Age 31-55	-190	-139
Ed ≥ 16, Age 21-30	-123	+68
Ed ≥ 16, Age 31-55	-145	-34

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Summary

- Very large declines in annual work hours in U.S. since 2000
- Declines are larger for men, less educated and young
- Most of the adjustment on the extensive margin

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- **Question:** Why have the hours of prime age workers fallen so sharply during the 2000s?

  What explains the heterogeneity across groups?

Plan Today

- **Highlight some of my research trying to understand the decline in hours worked during the 2000s.**

- **Part 1: Declining Labor Demand**

  - Focus on declining demand for manufacturing (or "routine" skills more broadly).

- **Part 2: Declining Labor Supply**

  - Focus on increased valuation of leisure due to advances in recreational computer technology.

- **Throughout, draw attention to potential gaps in the literature.**

Part 1:
Declining Labor Demand

Why Start With Labor Demand Stories?

- **Real wages fell throughout the 2000s (Beraja, Hurst and Ospina 2016 and Aguiar, Bils, Charles and Hurst, 2017)**
  - Fell consistently from 2000-2007, 2007-2010, and 2010-2015
  - Patterns hold controlling for changing selection of workers over time

- **Wage declines concentrated among those with lower education**

- **Persistent declines in both wages and hours consistent with declining labor demand.**

Large Literature on Secular Decline in Labor Demand During 2000s

- **Distinct from purely "Great Recession" stories**

- **Focus on declining labor demand in manufacturing or other "routine" sectors.**

  - Trade Shocks: Autor, Dorn, and Hanson, 2013
  - Automation: Pierce and Schott, 2016
  - Robots: Acemoglu and Restreppo, 2017
  - Routinization of Tasks: Autor, Levy, and Murnane , 2003
Autor and Dorn, 2013
  - Broad Manufacturing Charles, Hurst, and Notowidigido

My Contribution To This Literature

- **Three papers with Kerwin Charles and Matt Notowidigdo**
  - "The Masking of the Decline in Manufacturing Employment by the Housing Bubble"
  - "Housing Booms, Manufacturing Decline and Labor Market Outcomes"
  - "Housing Booms, Labor Market Opportunities, and College Attendance"
- **Like others in this literature:**
  - Exploit cross-region variation
  - Instrument for local labor demand changes
- **Highlight that the temporary housing boom partially "masked" the secular decline in manufacturing during 2000-2006.**
- **Conclude: The decline in manufacturing weakened labor market prior to the Great Recession.**

Attractiveness of Papers Exploiting Local Labor Demand Changes

- **Tend to be well identified**
- **Highlight particular mechanisms**
- **Document sizable correlations between negative local sectoral shock and both local employment and wage declines**
- **Cross region patterns consistent with many of the aggregate time series patterns**
  - Effects occur for both men and women (although slightly larger for men)
  - Effects are concentrated among those with less education
  - Smaller effects still found for higher educated men and women.

A Caveat on this Recent Labor Demand Literature

- Papers are not without limits.

- Highlight two issues with this literature that reduces their usefulness for explaining aggregate employment trends.

Issue 1: Extrapolation

Can regional/sectoral estimates be extrapolated to perform aggregate counterfactuals?

How much of aggregate employment declines can be attributed to sectoral labor demand declines?

Issue 1: Extrapolation

- **Most of the sectoral decline literature exploiting cross region variation run regressions that are similar to the following (myself included).**

- **Researchers estimate:**

$$\Delta EmpRate_{igkt} = \alpha_t^n + \beta_g^n Shock_{gkt} + X_{igkt} + \varepsilon_{igkt}^n$$

- **i = individual, g = group, k = location, t = time**

- **What can be learned from β^n's and β^w's?**

Issue 1: Extrapolation

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- **Usual mapping between regional estimates and aggregates:**

  - **Take estimated β and multiply by some aggregate "shock" to get effect of shock on aggregate employment**

Potential Problems with Extrapolation

- **Are cross-region elasticities (β's) to a given shock the same as the aggregate elasticity to the same shock?**

- **Not likely**:

  - Factor mobility across regions (e.g., migration)
  - Goods mobility across regions (e.g., trade)
  - Local vs. aggregate policy response (e.g., fiscal and monetary policy)
  - Other G.E. effects
    - Trade shock hurts exporters and helps importers
    - Robot shock hurts workers who are substitutes with robots but helps robot producers.

- **By definition, aggregate effects are differenced out of cross-region regressions.**

Gap in the Literature

- **Very little work mapping local elasticities to aggregate elasticities**

- **Would be useful if literature developed more ways to map cross-region elasticities to aggregate elasticities.**
  - Help to quantify how important these sectoral shocks (identified off of cross-region variation) are for aggregate employment dynamics.

- **One step in that direction:**
  - "Aggregate Implications of Regional Business Cycles" (Beraja, Hurst and Ospina, 2016)
  - Our paper focuses more on business cycle variation than sectoral declines.
  - Suggests that local elasticities and aggregate elasticities to a variety of different shocks can be substantively different from each other.

Issue 2: Why Now?

The U.S. has had sectoral labor demand declines before (e.g., agriculture) without such large declines in aggregate hours worked.

Why are we experiencing persistent declines in aggregate hours during the 2000s?

Issue 2: Why Now? Potential Explanation 1

- **Required skills needed in declining sectors and growing sectors are different.**
  - Agriculture and manufacturing have a more similar skill set than manufacturing and cognitive services.
  - Focus of Charles, Hurst and Notowidigido (coming soon)
  - Estimate elasticities of substitution across occupations to sectoral shocks for different groups.
  - Goal is to help provide parameters for "skill mismatch" literature.

Issue 2: Why Now? Potential Explanation 2

- **It is more difficult for the marginal person to acquire skills desired by the current labor market.**
  - More of the US population is becoming skilled.
  - Is it possible that those who remain less skilled have a higher cost of skill acquisition?
  - Some data suggestive of this hypothesis.

Results from Hurst, Schwartz and Rubinstein (2017)

Fraction of Cohort Employed or Enrolled in School
Men, Age 26-30, NLSY Data

AFQT Quartile	Employed or Enrolled 1979 Cohort	Employed or Enrolled 1997 Cohort	Delta
1	**78.8**	**74.3**	**-4.6**
2	86.2	86.2	-0.1
3	89.7	89.5	-0.2
4	93.0	94.0	1.0

- **All the decline is concentrated among low AFQT individuals**
- AFQT has predictive power above and beyond education.

Part 2:
Declining Labor Supply

A Puzzle

- **Why are young men (age 21-30) in U.S. working so little?**

- **Patterns are persistent: Within the U.S., the most recent cohorts are still working less than pre-recession cohorts**

  - Holds excluding students

- **No differential wage patterns in U.S. between the young and old despite large differences in hours declines.**

- **Structural labor demand stories not shown to affect young more.**

- **Patterns are broad based across many OEC countries (UK, Australia, Korea, Canada, etc.)**

Why are the Young Working Less?

1. **Can declining labor supply be part of the story?**

2. **Do not directly receive government transfers (at least for U.S.)**

   - Transfers are not empirically important for younger men

3. **What type of other stories can explain declining labor supply of young men?**

   - Transfers from parents (Kaplan 2012)

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   - Increased valuation of leisure

Draw on my recent work "Leisure Luxuries and Labor Supply of Young Men" (with Mark Aguiar, Mark Bils and Kerwin Charles)

Question

- **Did increased technology in recreational computer activities increase the marginal value of leisure (reservation wage) of young men?**

- **If so, is that quantitatively important in explaining declining hours worked of young men (relative to older men).**

- **Need structure to isolate this story.**

  - Develop a methodology to isolate innovations in leisure technology.

  - Leisure demand system

  - Use model structure to relate to changes in labor supply

- **Has parallels to work on innovations in home production technology on the labor supply of women.**

Major Innovations in Computer Leisure Technology Starting in Mid-2000s

- Able to engage in leisure activities easily with others at different locations.
- **Social media** – Facebook started in 2004; grew from 12 million to 360 million users between 2006 and 2009.
- **Video games** – Sony, Microsoft and Nintendo all released consoles in 2005/2006 that allowed online capabilities. Video game revenues increased by 50 percent 2006-2009 (were flat between 2000 and 2006).
- **Large multiplayer online video games** developed over same time period. World of Warcraft started around 2005 and had 10 million monthly users by 2009.
- **iPhone** released in 2007. Smart phones take off.

- **Time series trends in leisure technologies occurred around same time as Great Recession.**

Changing Time Allocation of Men (Hours Per Week): Changes Between 2004-2007 and 2012-2015

	Men 21-30 Ed = All	Men 31-55 Ed = All
Market Work	**-2.7**	**-1.1**
Job Search	0.4	0.1
Home Production	-0.6	-0.9
Child Care	-0.4	0.4
Education	0.7	0.0
Leisure	**2.5**	**1.2**

- **Data from the American Time Use Survey**
- **24 hour time diary (one day per person)**

Leisure Categories

1. **Adjusted Sleep, Eating and Personal Care**
   - Subtract off 49 hrs./week for biological needs
   - 5^{th} percentile of the distribution
   - Assume remaining is leisure (sleeping in, long meals, etc.).

2. **Computer Usage**
   - Includes video/computer games, email, time surfing the web, time surfing on smart phones, Facebook, etc.

3. **TV/Movies/Netflix**
   - Includes time watching YouTube, streaming services, etc.

4. **Socializing**

5. **Other Leisure**

Hours per Week of Leisure Time, Young Men (Age 21-30)

	Young Men (n = ~2,200/sample)		
	Pooled 2004-2007 ATUS		Pooled 2012-2015 ATUS
Total Leisure	**61.1**	**+2.5**	**63.6**
Adj. Eating/Sleeping/P. Care	24.3		24.9
Total Computer Time	**3.3**	**+1.9**	**5.2**
(Video Game Sub Component)	**(2.0)**	**(+1.4)**	**(3.4)**
TV	17.3		17.2
Socializing	7.8		8.0
Other Leisure	8.3		8.2

Take Away: Computer time went up by 100 hours per year from 2004-2015

Hours per Week of Leisure Time, By Employment Status

	Hours Per Week		
	04-07	12-15	Change
Employed Young Men			
Total Computer Time	3.0	**4.3**	1.3
(Video Game Portion)	(1.9)	**(2.9)**	(1.0)
Non-Employed Young Men			
Total Computer Time	5.5	**9.7**	4.2
(Video Game Portion)	(3.5)	**(5.9)**	(2.4)

Time Use (Hours Per Week) from ATUS, By Sex-Age-Skill Group

	(1) Pooled 2004-2007	(2) Pooled 2012-2015	(3) Diff (2)-(1)
Men, 31-55, Ed = All			
Total Leisure	57.0	58.1	1.1
Total Computer	2.1	2.2	0.1
Video Games Sub Component	(0.9)	(0.8)	(-0.1)
Women, 21-30, Ed = All			
Total Leisure	58.4	60.0	1.6
Total Computer	1.5	2.2	0.7
Video Games Sub Component	(0.8)	(0.8)	(0.0)
Women, 31-55, Ed = All			
Total Leisure	56.1	58.0	1.9
Total Computer	1.6	2.1	0.5
Video Games Sub Component	(0.6)	(0.7)	(0.1)

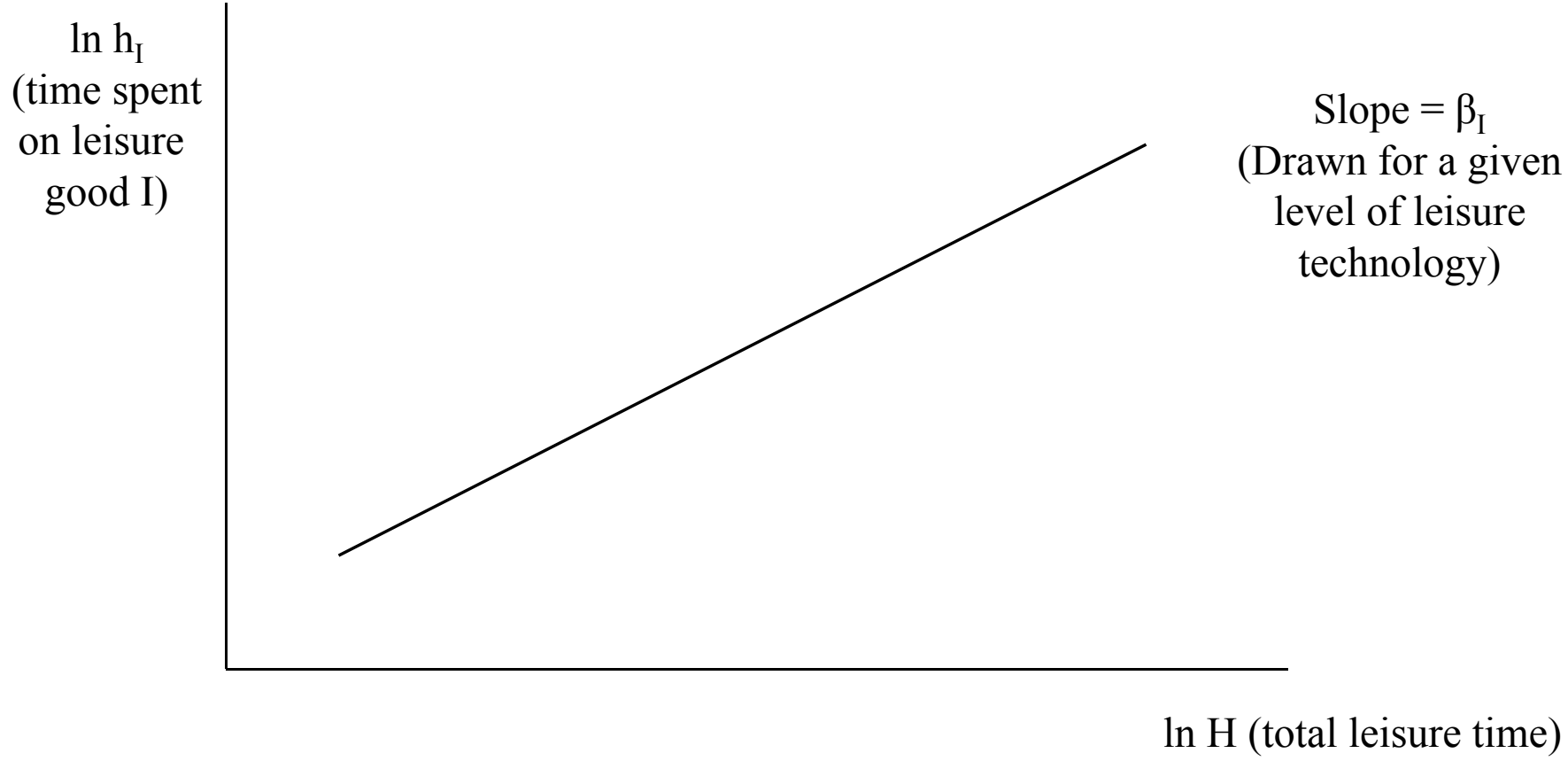
Brief (Static) Model Overview

$$U(c, \tilde{v}(h_i, ..., h_I; \boldsymbol{\theta}))$$

$$\tilde{v}(h_i, ..., h_I; \boldsymbol{\theta}) = \sum_{i=1}^{I} \frac{\left(\theta_i h_i\right)^{1-\frac{1}{\eta_i}}}{1 - 1/\eta_i}$$

- $\boldsymbol{h_i}$ = time spent on activity *i*
- $\boldsymbol{\theta} = \{\theta_i, ...\theta_I\}$ = vector of leisure technology shifters
- $\boldsymbol{\eta_i}$ = governs diminishing returns to spending time in activity i.
- Assume weak separability between consumption (*c*) and leisure vector (allows two stage budgeting)
- Second stage, choose h_i's conditional on total leisure time (*H*).
- First stage, choose *c*, *H*, and $\boldsymbol{\theta}$

Overview Using Leisure Demand System to Uncover Change in Leisure Technology



- **Estimate β's from cross region variation during the 2000s.**
- **$\beta_{computer}$ = 2.1 for young men.**

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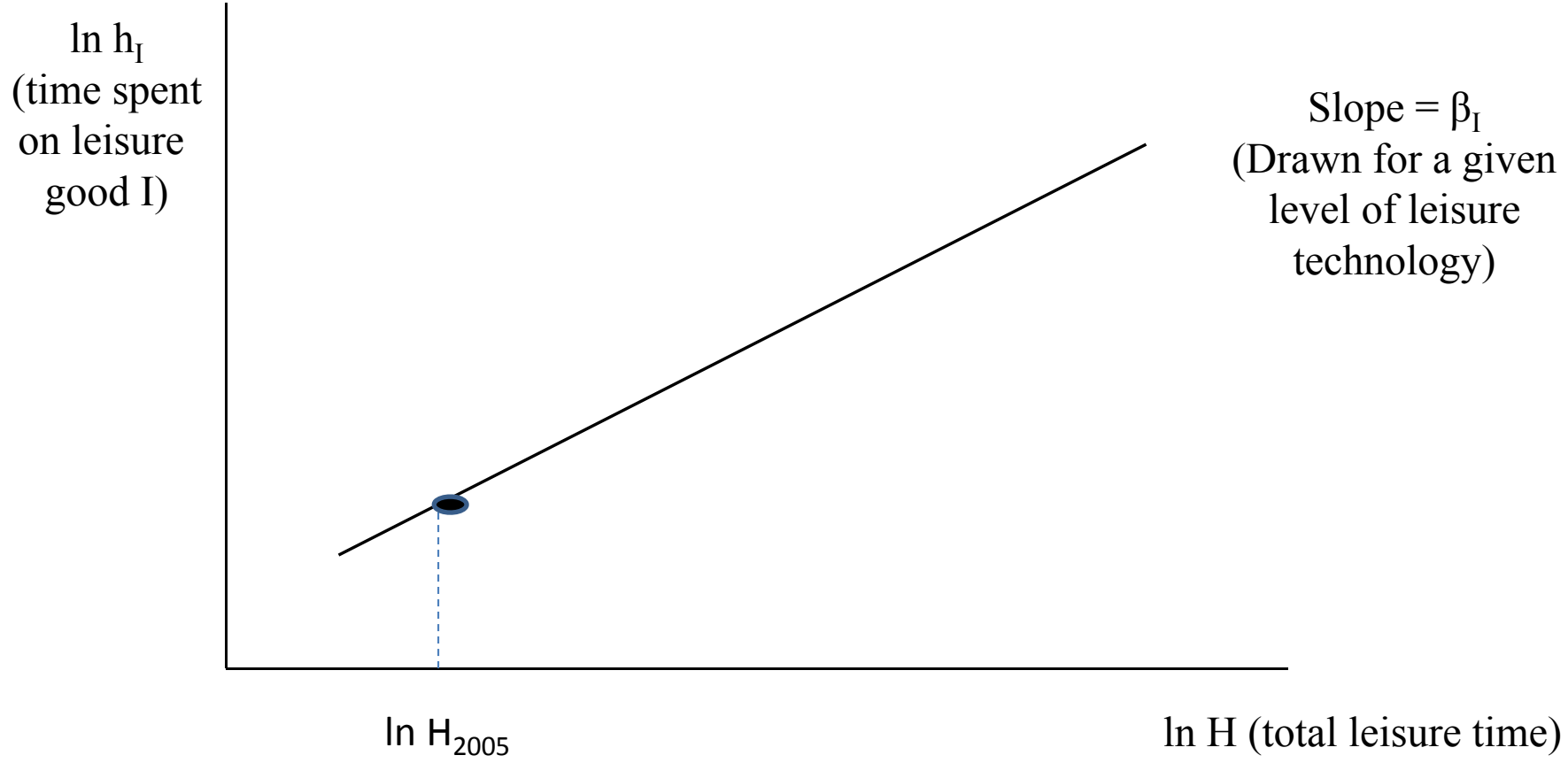

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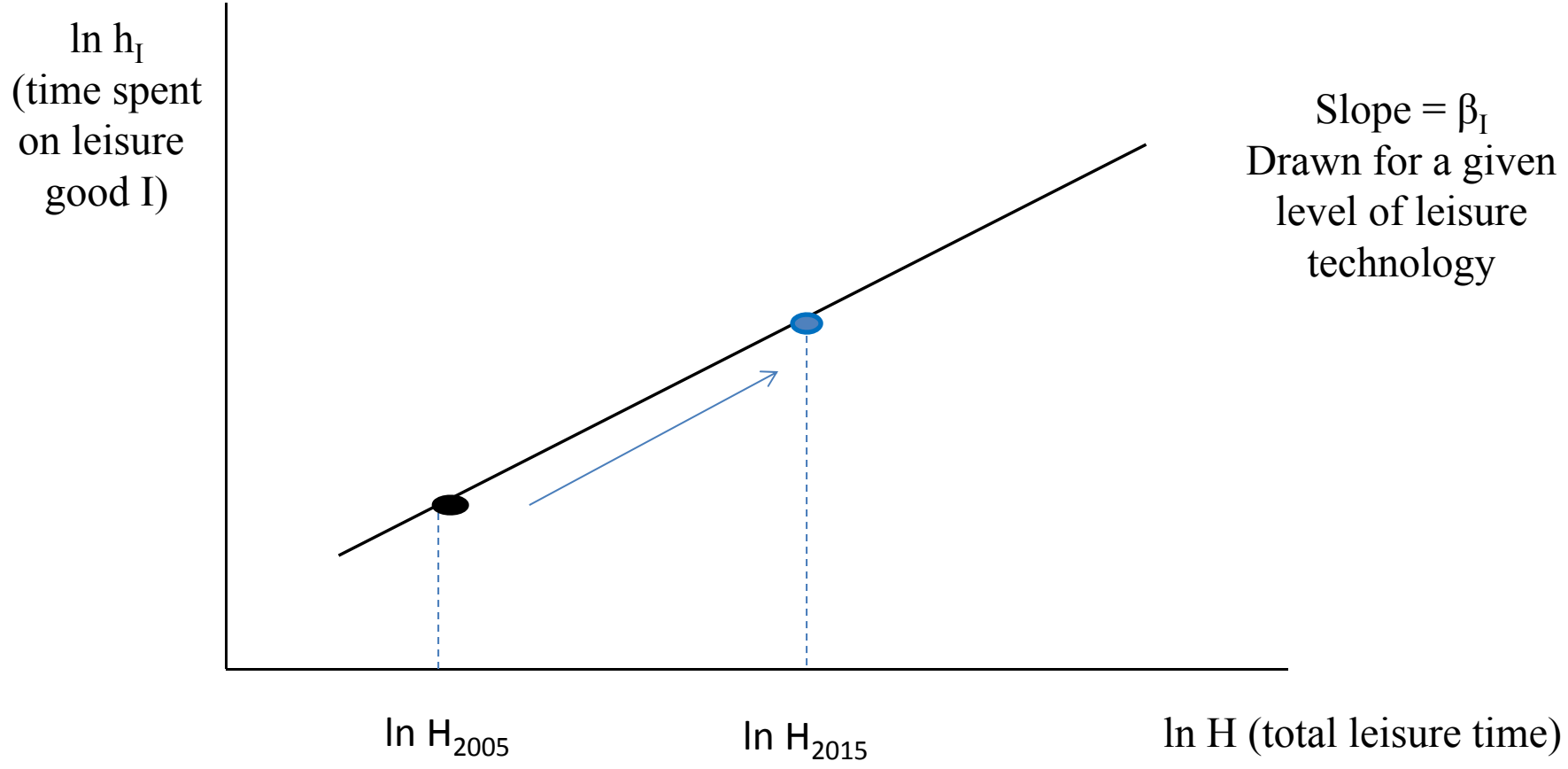
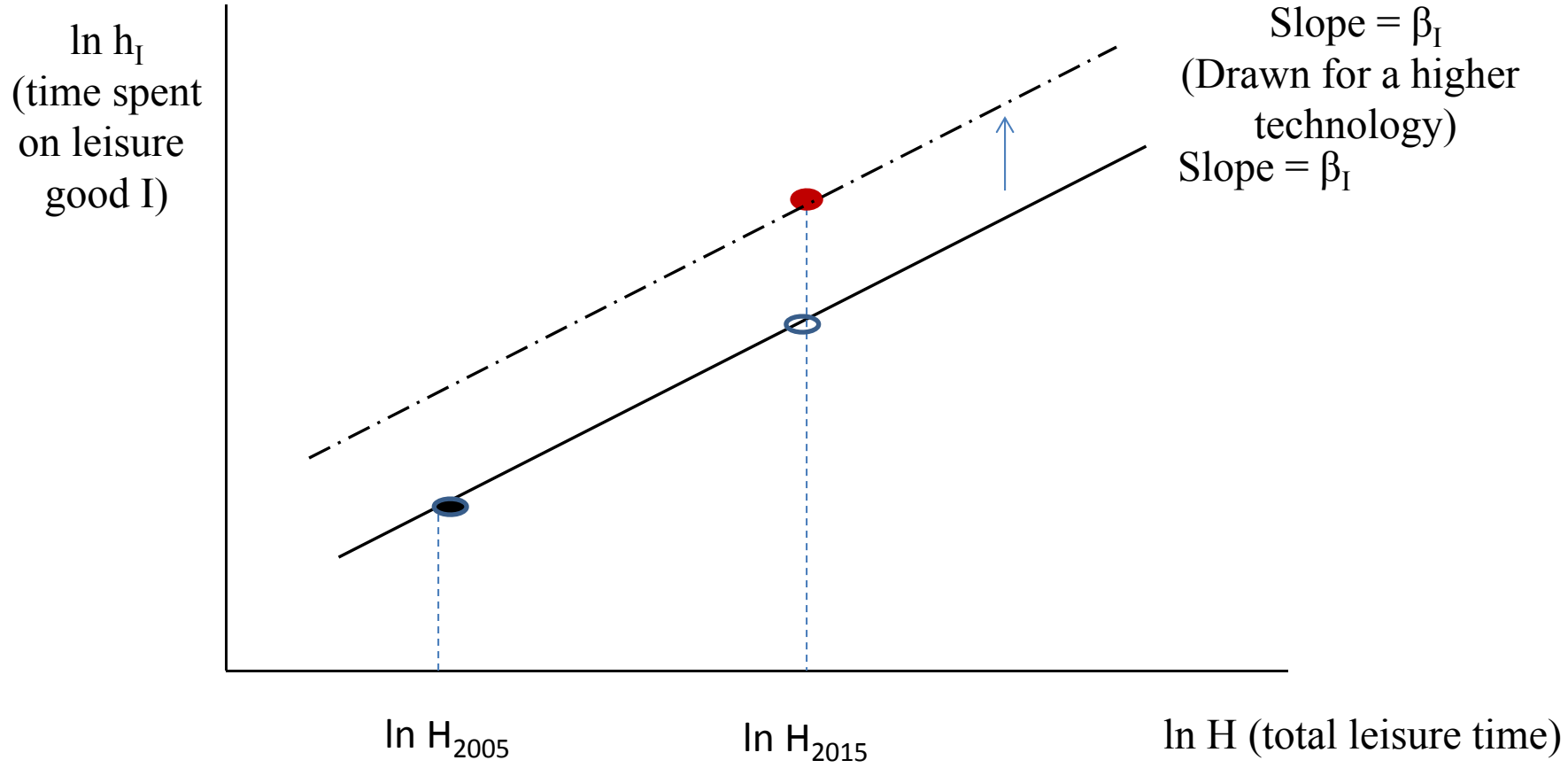
Overview Using Leisure Engel Curve to Uncover Change in Leisure Technology



- **Do individuals slide along a given "Leisure Engel Curve"?**

Overview Using Leisure Demand System to Uncover Change in Leisure Technology



- **Is there a shift up in the Leisure Engel Curve?**
- **Implies a relative increase in leisure technology for good *I*.**

Estimate of Leisure Computer Technological Change

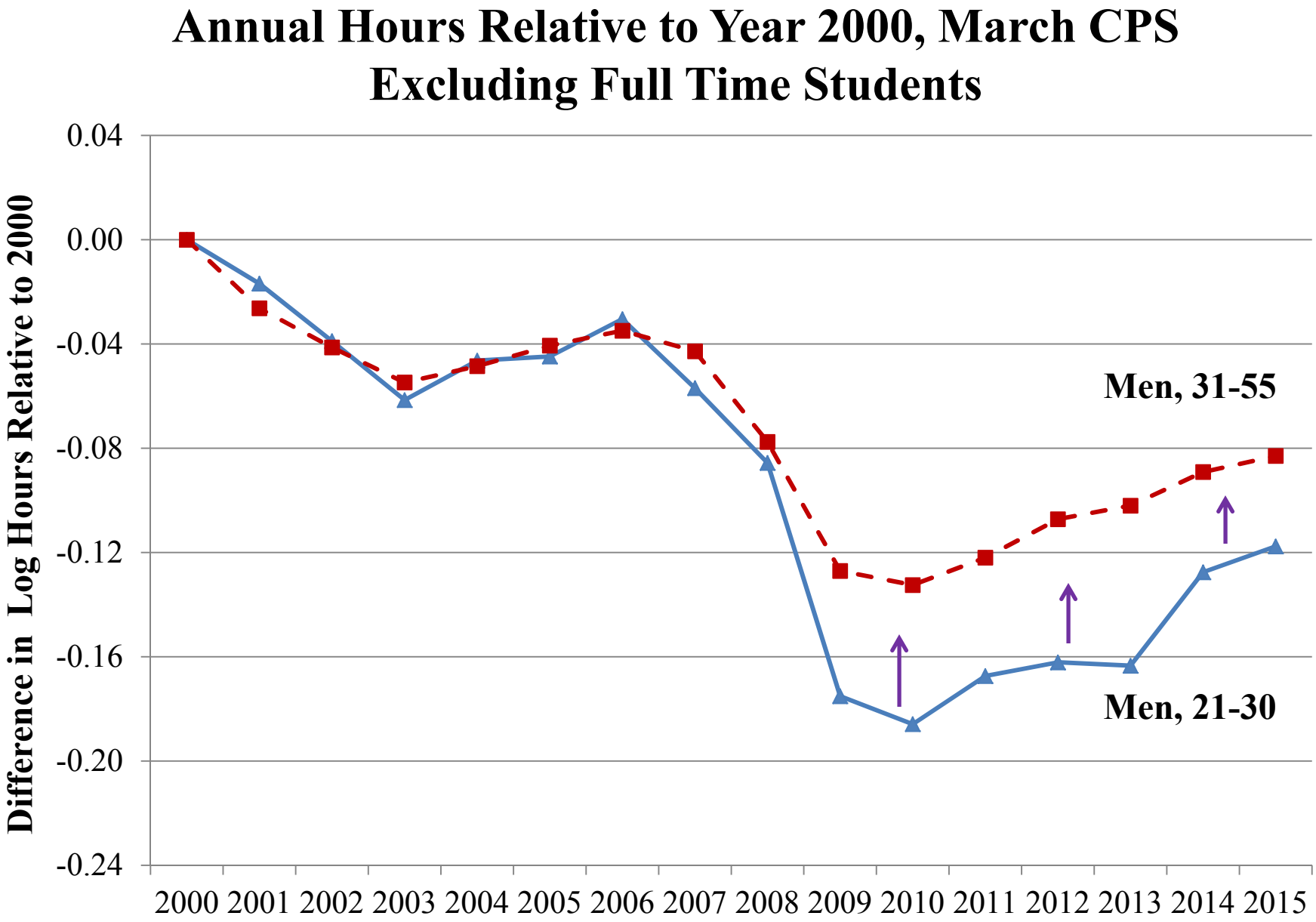
$$\Delta \ln \tilde{\theta}_{comp} = \Delta \ln h_{comp} - \left(\frac{\beta_{comp}}{\beta_{sleep}} \right) \Delta \ln h_{sleep} + \Delta \ln \tilde{\theta}_{sleep}$$

- $\Delta \ln \tilde{\theta}_j = (\eta_j - 1) \Delta \ln \theta_j$
- Reference activity: Sleep, Assume $\Delta \ln \theta_{sleep} = 0$
- $\Delta \ln h_{comp} = 46.4\%$ (Data from the ATUS)
- $\Delta \ln h_{sleep} = 2.3\%$ (Data from the ATUS)
- $\beta_{comp}/\beta_{sleep} = 2.11/0.58 = 3.64$ (Estimated from cross-region variation)

Implied $\Delta \ln \tilde{\theta}_{comp} = 38.1\%$; (~4.8% per annum)

Results: Shift in Labor Supply

- **Estimate shifts in labor supply for different demographic groups using our model.**
  - Depends on a few other parameters including the Frisch elasticity of labor supply.
  - Need to take a stance on change to the marginal utility of consumption
- **Our base estimation:**
  - Explain about $1/5^{th}$ - $2/5^{th}$ of the decline in hours of younger men in US between 2004 and 2015.
  - Explain none of the decline for older men
  - Explain small amounts of the decline for women
- **This closes some of the gap between young men and older men.**
  - Explains between 38% and 78% of differential hours decline between younger men and older men during 2000s.


Annual Hours Relative to Year 2000, March CPS
Excluding Full Time Students
Difference in Log Hours Relative to 2000
0.04
0.00
-0.04
-0.08
-0.12
-0.16
-0.20
-0.24
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Men, 31-55
Men, 21-30

Trends in Self Reported Happiness

- **Data from General Social Survey (GSS)**
- **Look at fraction self-reporting "pretty happy" or "very happy"**
- **Change between 2001/05 and 2011/15**

Younger Men (21-30)	
Ed = All	+5.3 p.p
Ed < 16	+6.8 p.p.
Older Men (31-55)	
Ed = All	-3.9 p.p.
Ed < 16	-6.9 p.p.

Technology's Impact on Labor Market

- **Technology and trade likely have had an effect on labor demand.**
  - Sectoral decline in manufacturing and routine occupations
  - Effects concentrated on those lower levels of education
- **Technology may have also had an effect on labor supply**
  - Makes leisure more attractive
  - Raises the reservation wage
  - Effects concentrated on young men
- **How do these factors interact with human capital (skill acquisition) decisions?**

Final Thoughts:
Going Forward

Why Does it Matter?

- **We observe large declines in employment within the U.S. during the 2000s**

- **Are the declines due to:**

  - Constraints? Preferences? Technology?
  - Matters for welfare

- **Policy makers are considering policies to promote work**

  - Trade policy
  - Immigration
  - Human capital policies (subsidize training)
  - Apprenticeships
  - Industrial policy (e.g., energy, coal, etc.)

- **Employment response depends on (1) what caused decline and (2) elasticity to policy**

Future Research Projects

- **Much work to be done understanding the decline in employment**
- **People in this room are well suited to make such progress**
  - Understand data
  - Understand models
- **Progress is going to come from more structure**
  - Merge the responses we get from well identified micro studies with models to get a sense of how important these factors are for aggregate trends
  - Models can be used to understand various policy proposals
  - Models should incorporate endogenous skill acquisition

I’m Done…..
Thank You!