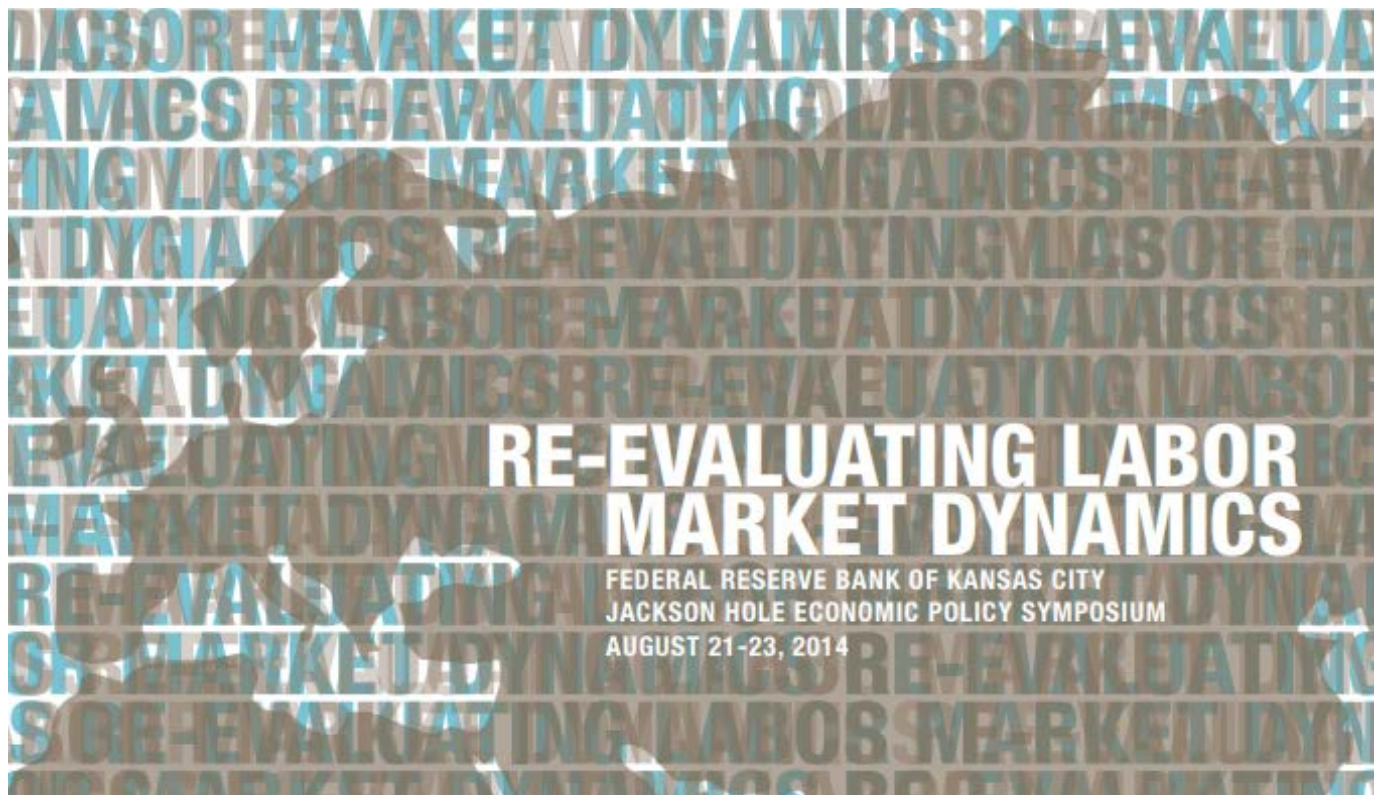


# Polanyi's Paradox and the Shape of Employment Growth

by

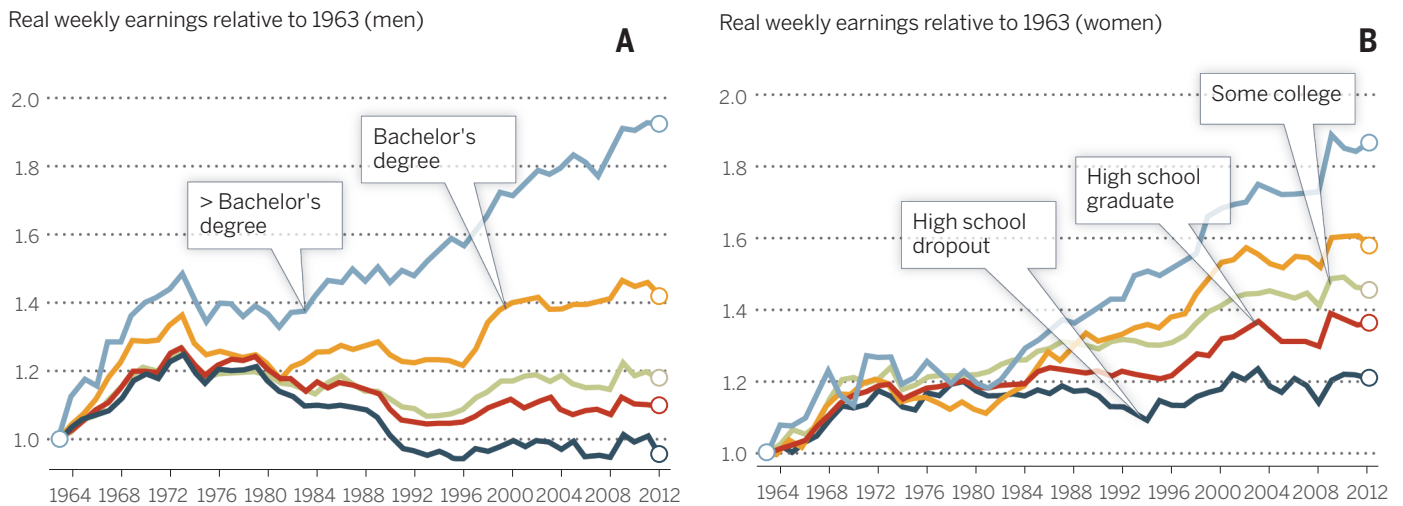
David H. Autor  
MIT, NBER and JPAL

## **PRESENTATION**



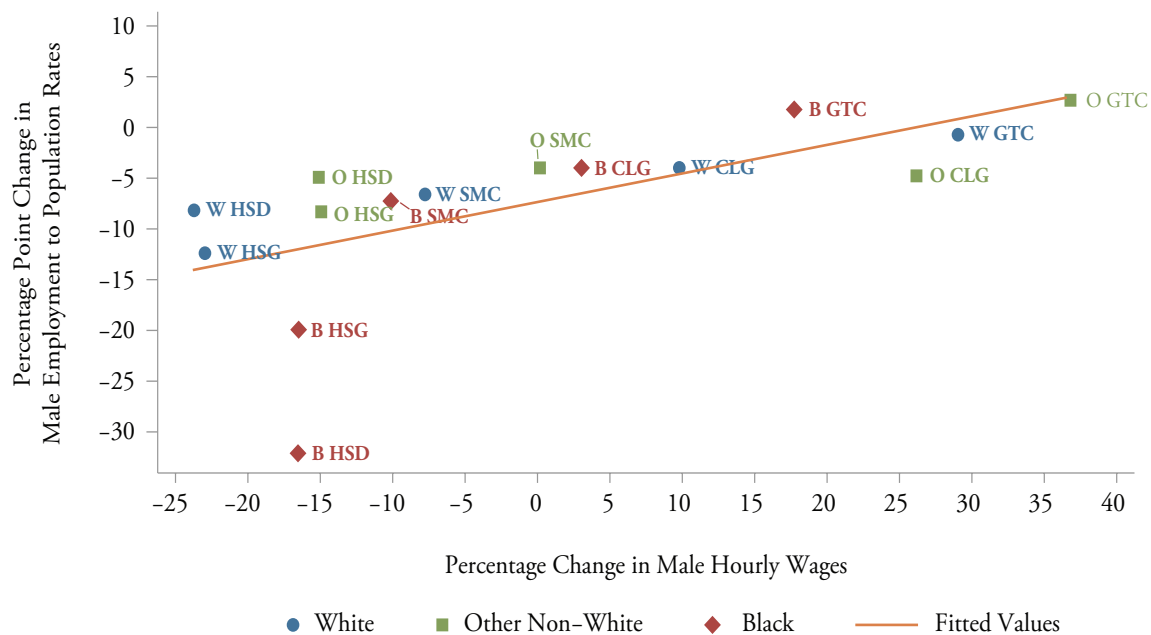
Federal Reserve Bank of Kansas City  
Jackson Hole Economic Policy Symposium  
August 22, 2014

**Figure 1a. Changes in Real Wage Levels of Full-Time U.S. Workers by Sex and Education, 1963–2012**



Source: Autor (2014b, Figure S6) based upon March Current Population Survey data for earnings years 1963 – 2012.

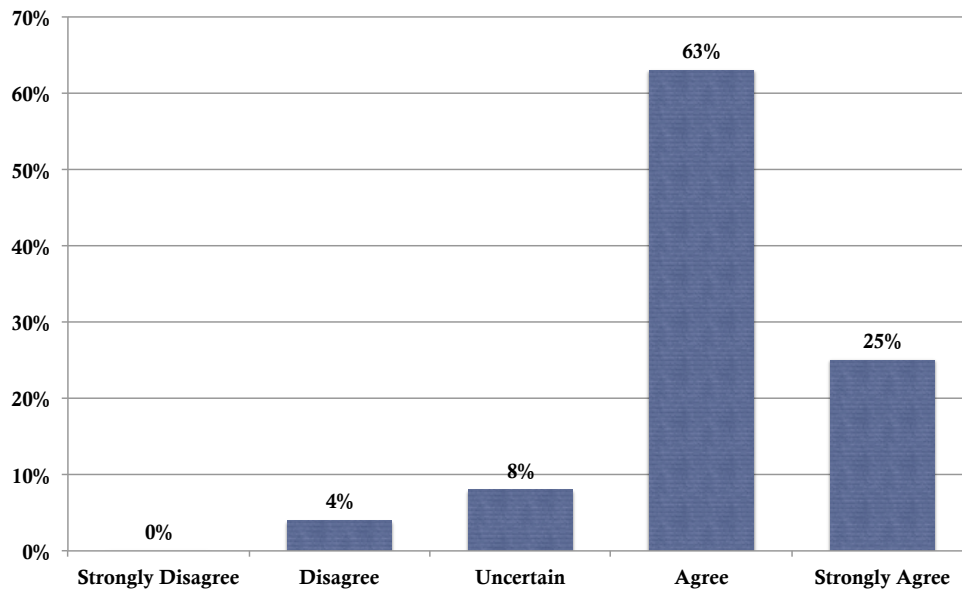
**Figure 1b. Changes in Real Hourly Earnings and Changes in Employment to Population Rates by Race and Education between 1979 and 2009: U.S. Males Ages 25 – 39**



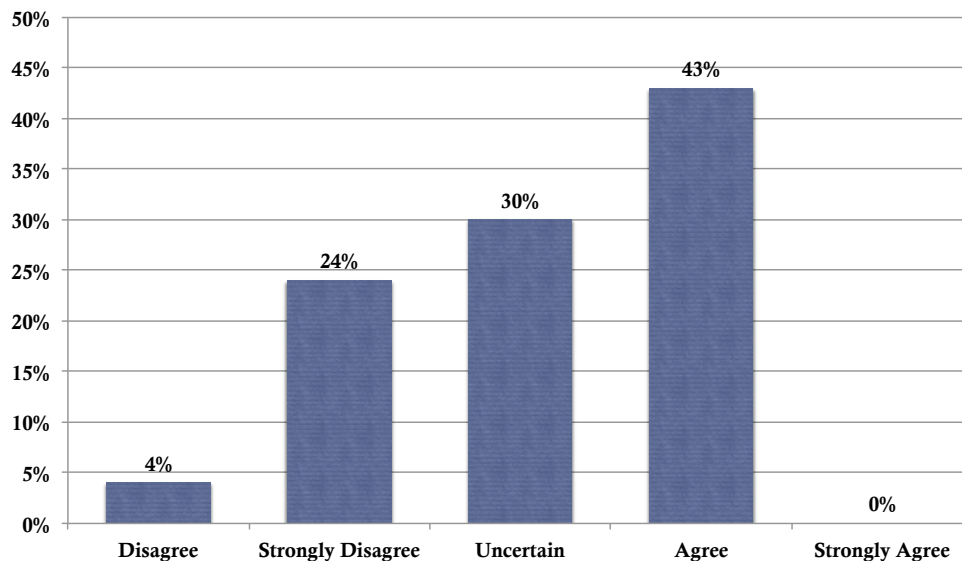
Source: Autor and Wasserman (2013). Figure is constructed using Census IPUMS 5 percent sample for 1980 and American Community Survey Sample for 2009.

**Figure 2.**  
**Chicago Booth IGM Expert Poll: Impact of Automation on Employment and Wages**  
**(February 25, 2014)**

**A. Advancing Automation has Not Historically Reduced Employment in the United States...**

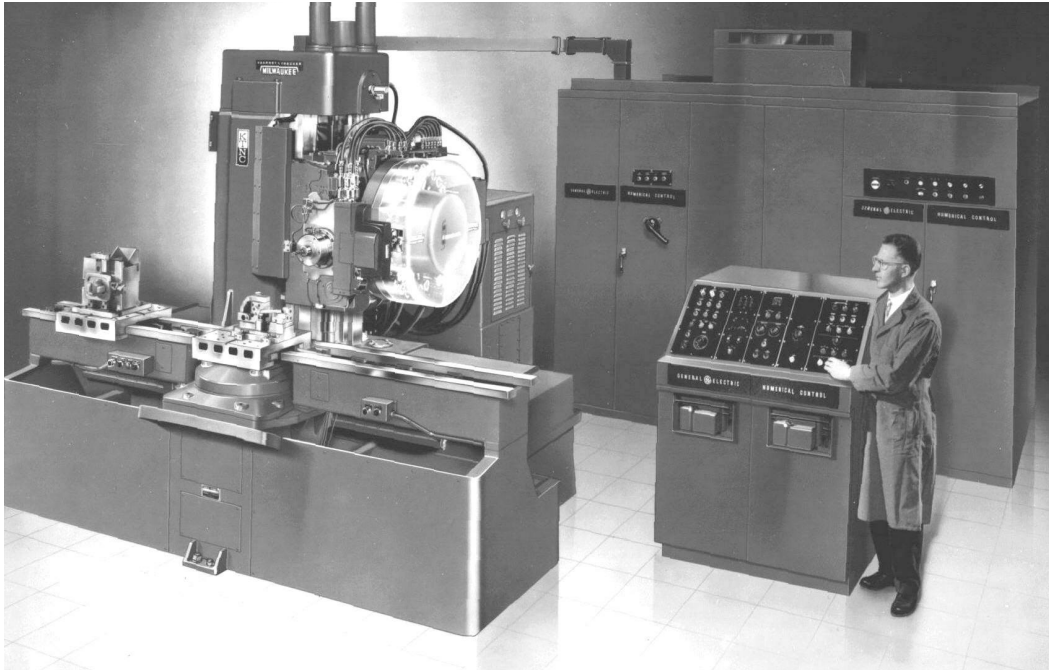


**B. Information Technology and Automation Are a Central Reason Why Median Wages Have Been Stagnant in the US Over the Past Decade, Despite Rising Productivity.**



Notes. Survey date February 25, 2014. Details available at [http://www.igmchicago.org/igm-economic-experts-panel/poll-results?SurveyID=SV\\_eKbRnXZWx3jSRBb](http://www.igmchicago.org/igm-economic-experts-panel/poll-results?SurveyID=SV_eKbRnXZWx3jSRBb)

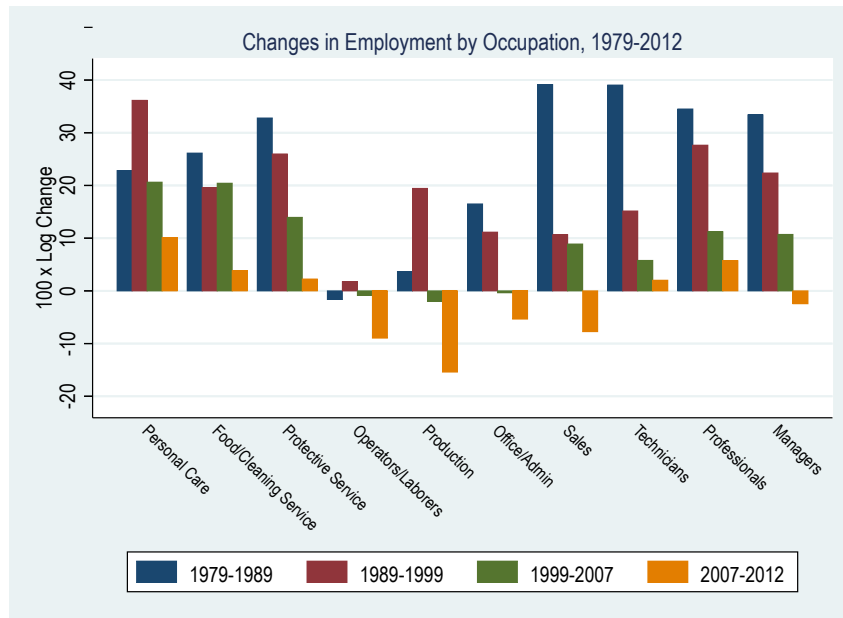
**Figure 3. The Milwaukee-Matic Industrial Machining Tool, 1963**



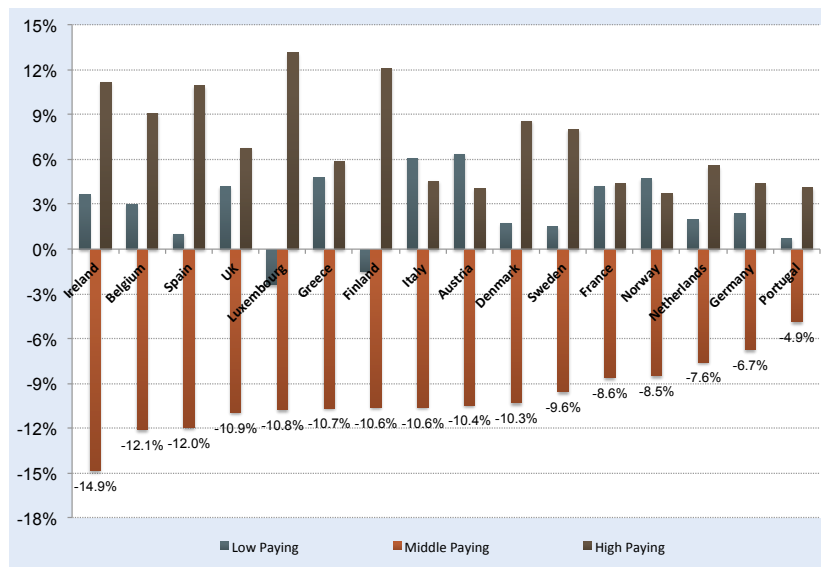
- 1964: President Johnson establishes “Blue-Ribbon National Commission on Technology, Automation, and Economic Progress”
- 1966: ‘Ad-Hoc Committee on the Triple Revolution’ (key members: Jacob Heilbroner, Linus Pauling, Gunnar Myrdal). An open letter to President Johnson:

“The traditional link between jobs and incomes is being broken... The economy of abundance can sustain all citizens in comfort and economic security whether or not they engage in what is commonly reckoned as work.”
- U.S. Dept. of the Interior, 1974: “Leisure, thought by many to be the epitome of paradise, may well become the most perplexing problem of the future.”
- Michael Polanyi, *The Tacit Dimension*, 1966: “We can know more than we can tell... The skill of a driver cannot be replaced by a thorough schooling in the theory of the motorcar; the knowledge I have of my own body differs altogether from the knowledge of its physiology.”

**Figure 4a. Percentage Changes in Employment by Major Occupation, 1979 – 2012**



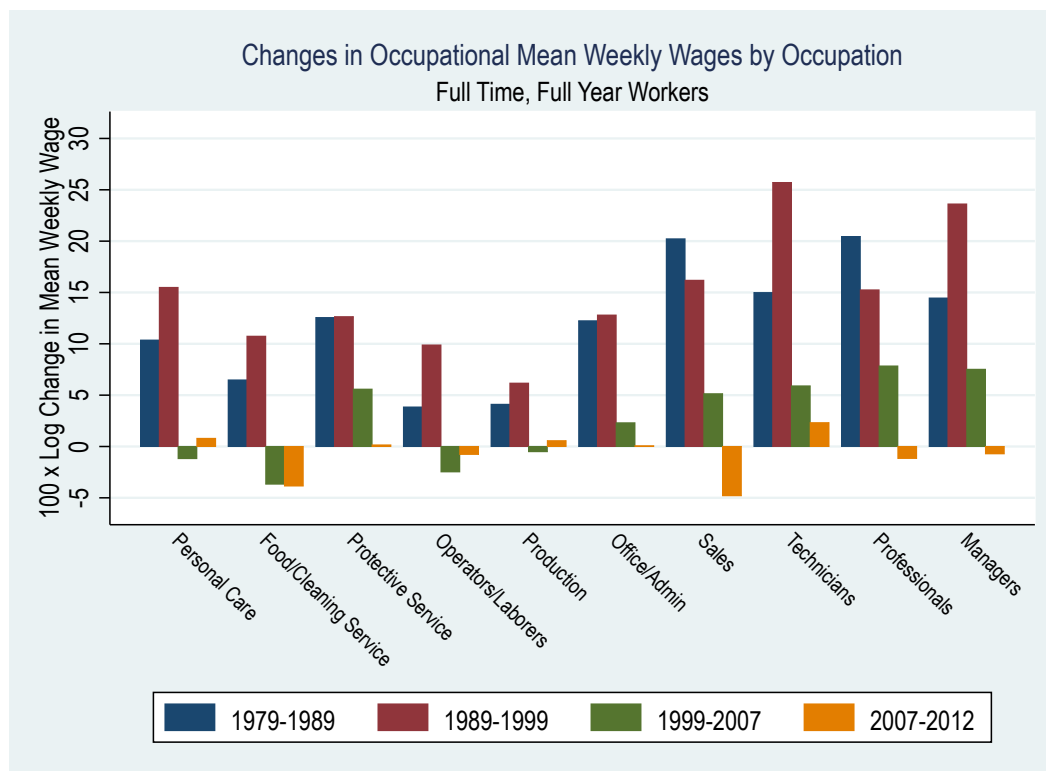
**Figure 4b. Change in Occupational Employment Shares in Low, Middle and High Wage Occupations in 16 EU Countries, 1993 - 2010**



Panel A: Source 1980, 1990 and 2000 Census IPUMS files, American Community Survey combined file 2006 – 2008, and American Community Survey 2012. Sample includes the working-age (16-64) civilian non-institutionalized population. Employment is measured as full-time equivalent workers.

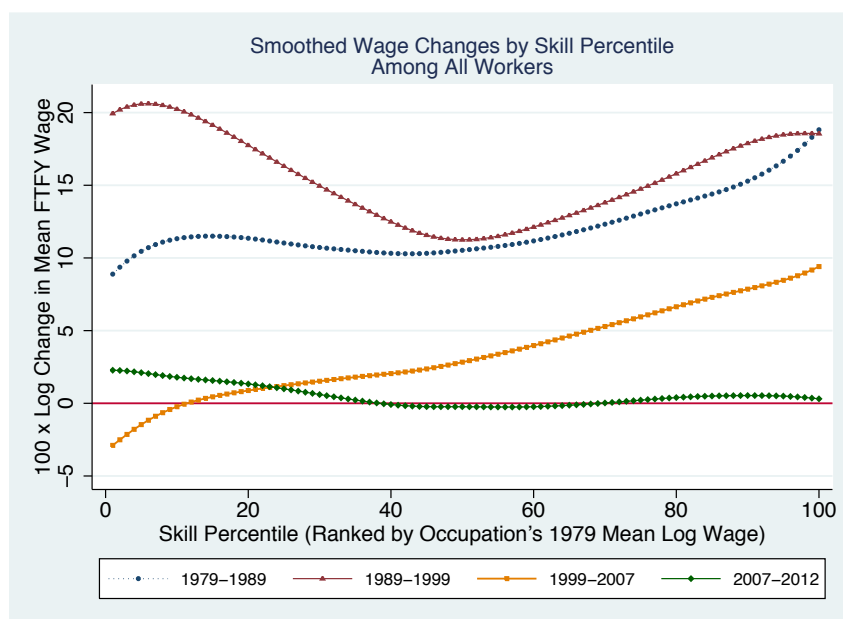
Panel B: Source Goos, Manning and Salomons (2014, Table 1). High-paying occupations are corporate managers; physical, mathematical and engineering professionals; life science and health professionals; other professionals; managers of small enterprises; physical, mathematical and engineering associate professionals; other associate professionals; life science and health associate professionals. Middle-paying occupations are stationary plant and related operators; metal, machinery and related trade work; drivers and mobile plant operators; office clerks; precision, handcraft, craft printing and related trade workers; extraction and building trades workers; customer service clerks; machine operators and assemblers; and other craft and related trade workers. Low paying occupations are laborers in mining, construction, manufacturing and transport; personal and protective service workers; models, salespersons and demonstrators; and sales and service elementary occupations.

**Figure 5. Percentage Changes in Mean Weekly Earnings by Major Occupation, 1979 – 2012**

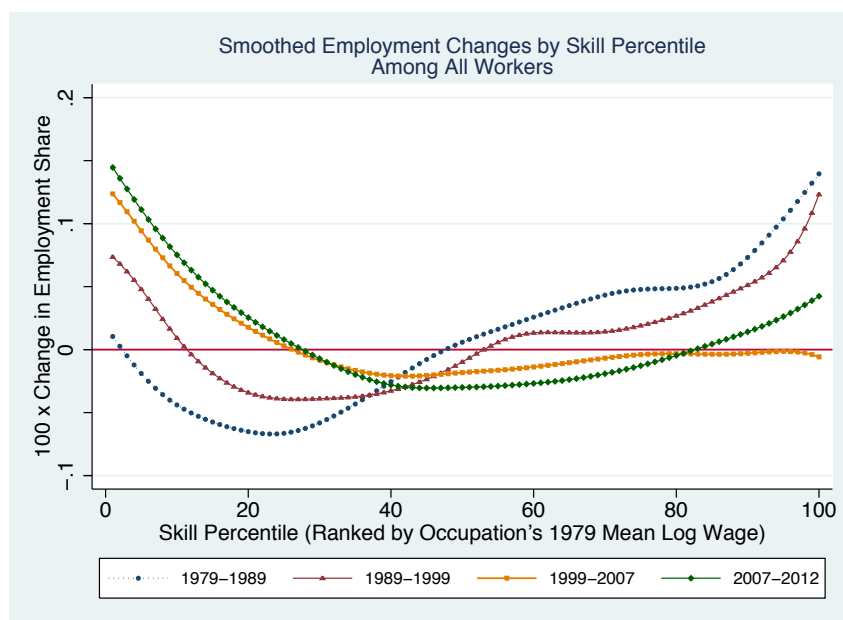


Source: 1980, 1990 and 2000 Census IPUMS files; American Community Survey combined file 2006 – 2008, American Community Survey 2012. Sample includes the working-age (16-64) civilian non-institutionalized population with 48+ annual weeks worked and 35+ usual weekly hours. Weekly wages are calculated as annual earnings divided by weeks worked.

**Figure 6a. Smoothed Changes in Mean Wages by Occupational Skill Percentile among Full-Time, Full-Year Workers, 1979 – 2012**

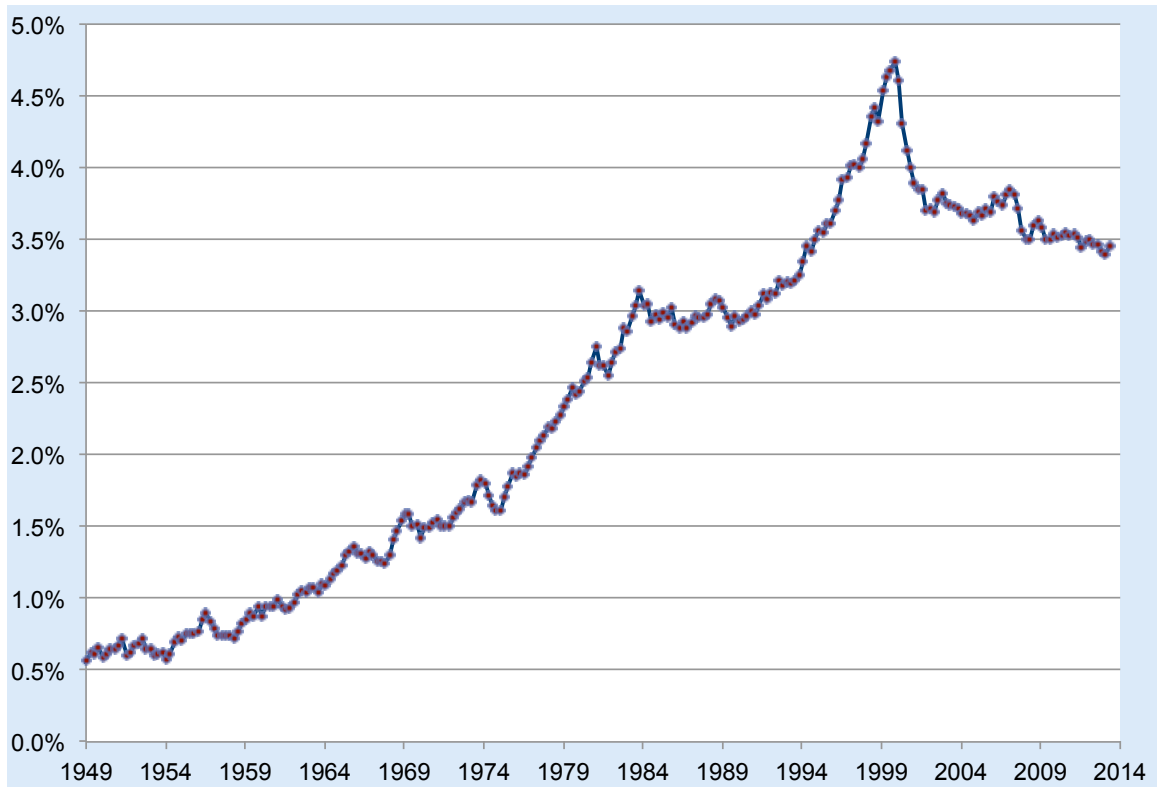


**Figure 6B. Smoothed Changes in Employment Shares by Occupational Skill Percentile among Full-Time, Full-Year Workers, 1979 – 2012**



Source: 1980, 1990 and 2000 Census IPUMS files; American Community Survey combined file 2006 – 2008, American Community Survey 2012. Panel A plots changes in mean log wages by 1980 occupational skill percentile rank using a locally weighted smoothing regression (bandwidth 0.8 with 100 observations), where skill percentiles are measured as the employment-weighted percentile rank of an occupation's mean log wage in the Census IPUMS 1980 5 percent extract. Panel B plots changes in employment shares by 1980 occupational skill percentile. Weekly wages are calculated as annual earnings divided by weeks worked. Employment in each occupation is calculated using workers' hours of annual labor supply times the Census sampling weights. Consistent occupation codes for Census years 1980, 1990, and 2000, and 2008 are from Autor and Dorn (2013).

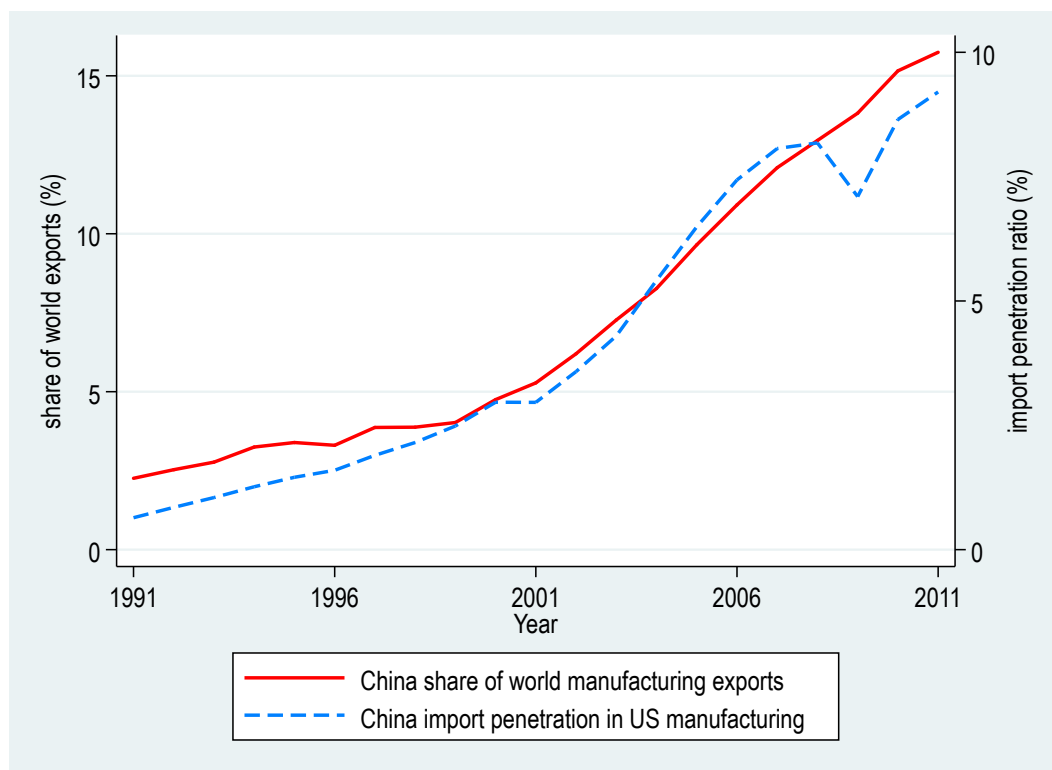
**Figure 7.**  
**Private Fixed Investment in Information Processing Equipment and Software as a  
Percentage of Gross Domestic Product, 1949-2014**



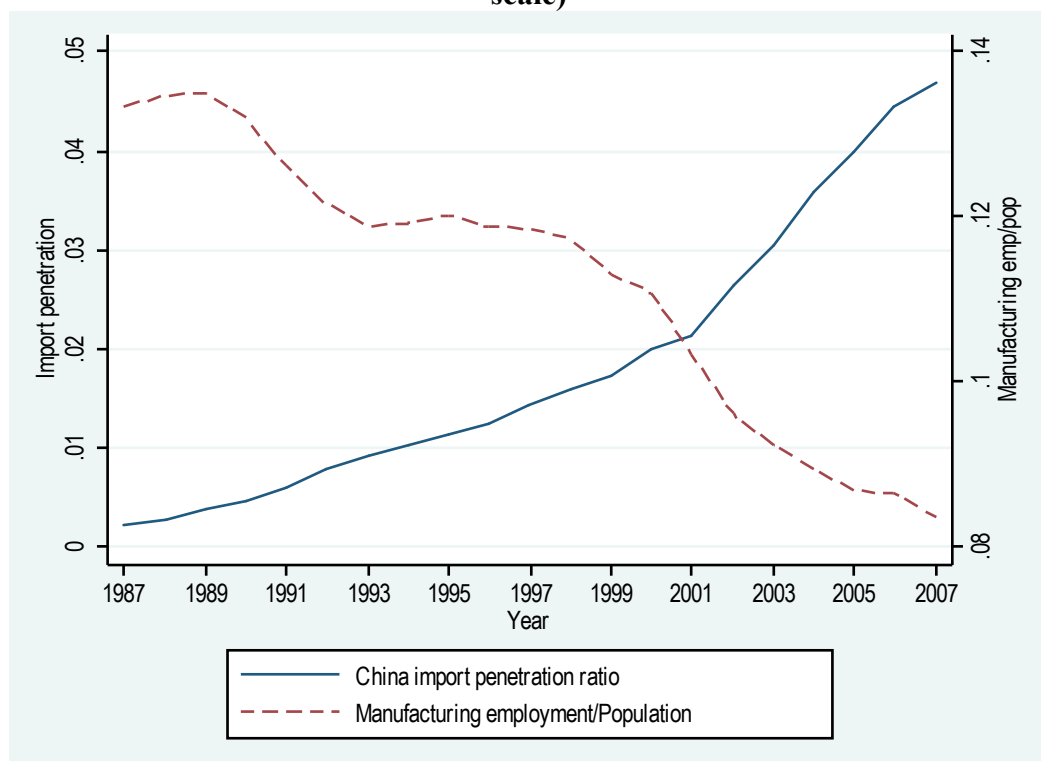
Source: FRED, Federal Bank of St. Louis. <http://research.stlouisfed.org/fred2/graph/?g=GXc> (accessed 8/3/2014)



**Figure 8A. China Share of World Manufacturing Exports and China Import Penetration in U.S. Manufacturing, 1991-2011**



**Figure 8B. Import Penetration Ratio for US Imports from China (left scale), and Share of US Working-Age Population Employed in Manufacturing (right scale)**



Panel A: Autor, Dorn, Hanson and Song, 2014. Panel B. Autor, Dorn and Hanson 2013.

**Figure 9. Kiva Systems Robotic Order Fulfillment:  
Panel A. Robotic Drive Units Move Shelves to Workers for Picking**



**Panel B. Guided by Laser Pointer, Worker Picks Items from Shelves for Shipping**

