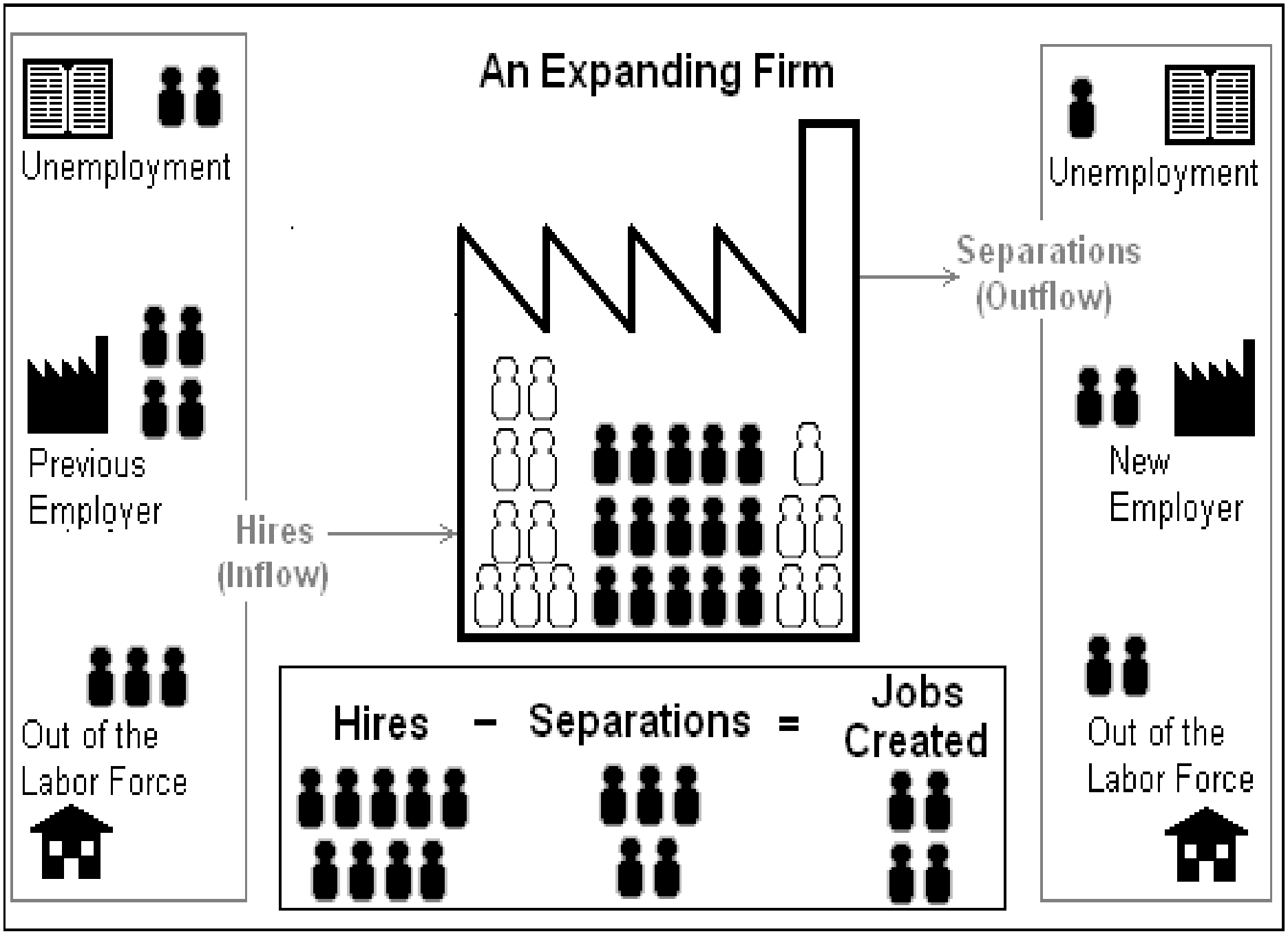
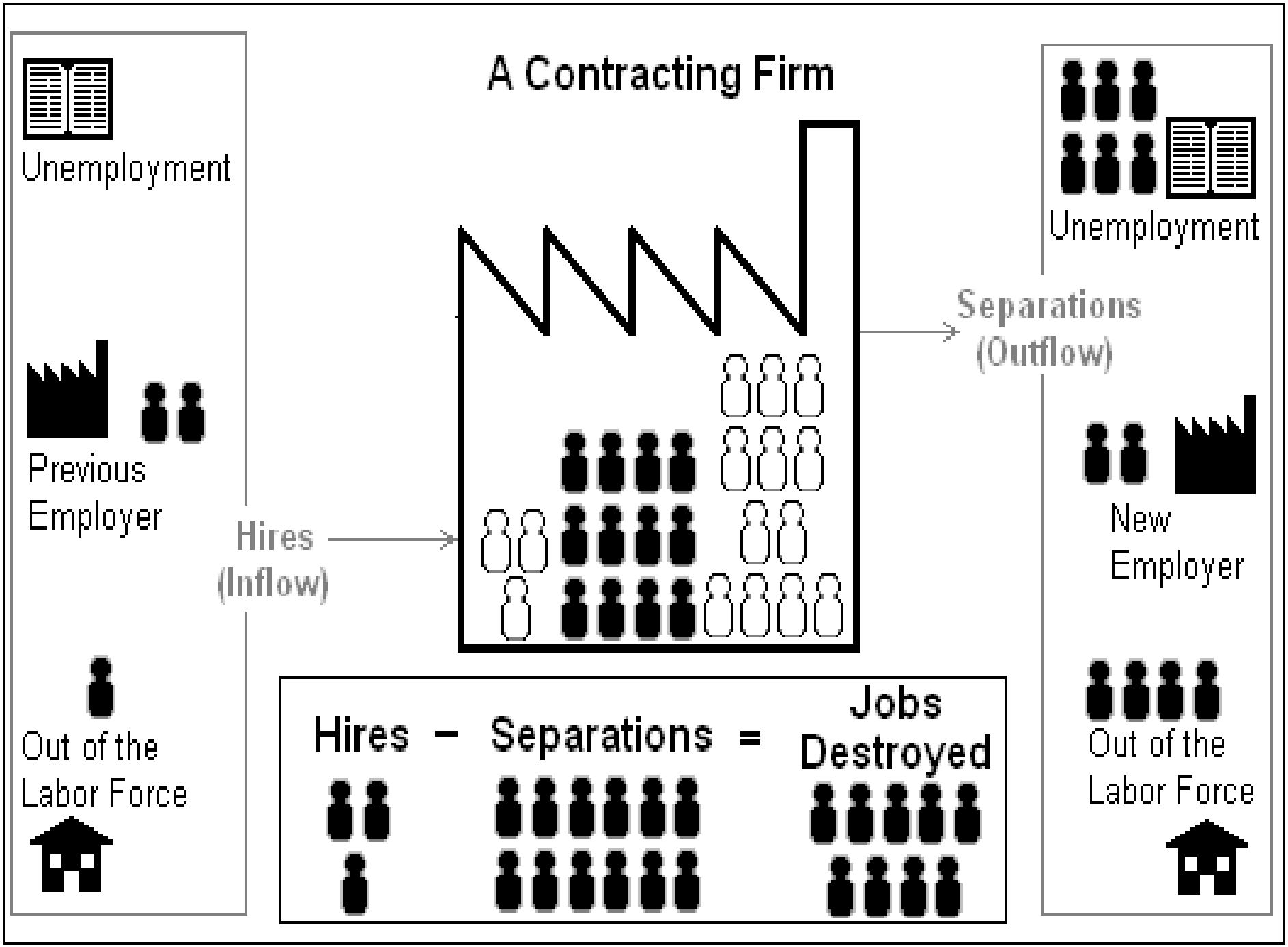
Basic Facts on Reallocation

Introduction

- Shocks:
  - Business Cycle Shocks “common” to all sectors although not common response.
  - Sectoral shocks: Industry and region
  - Idiosyncratic shocks
- Frictions:
  - Search/matching
  - Adjustment costs (capital/labor)
  - Technology adoption costs
  - Entry/exit
- Importance for macro:
  - Growth vs. Fluctuations (Emerging vs. Advanced)
  - Nonlinear micro + Heterogeneity
  - Non-representative agent approach


An Expanding Firm
Unemployment
Previous Employer
Out of the Labor Force
Hires (Inflow)
Separations (Outflow)
Unemployment
New Employer
Out of the Labor Force
Hires – Separations = Jobs Created


A Contracting Firm
Unemployment
Previous Employer
Out of the Labor Force
Hires (Inflow)
Separations (Outflow)
Unemployment
New Employer
Out of the Labor Force
Hires − Separations = Jobs Destroyed

Job Creation and Destruction

- Job Creation: Employment gains from expanding and new businesses.
- Job Destruction: Employment losses from contracting and exiting businesses.
- Job Flows are SUBSET of worker flows!
- Measuring job flows requires longitudinal business data
  - Data infrastructure projects at Census (LBD, LEHD) http://lehd.dsd.census.gov/, http://www.bls.gov/bdm/home.htm, http://www.bsos.umd.edu/econ/haltiwanger/download.htm, http://www.ces.census.gov/ces.php/home

$$g_{jkt} = (E_{jkt} - E_{jkt-1}) / X_{jkt}$$

$$X_{jkt} = .5(E_{jkt} + E_{jkt-1})$$

$$POS_{skt} = \sum_{g_{jkt} \geq 0,\, j \in s} (X_{jkt} / X_{skt}) g_{jkt}$$

$$NEG_{skt} = \sum_{g_{jkt} < 0,\, j \in s} (X_{jkt} / X_{skt}) |g_{jkt}|$$

$$NET_{skt} = POS_{skt} - NEG_{skt}$$

$$SUM_{skt} = POS_{skt} + NEG_{skt}$$

$$EXCESSJ_{skt} = SUM_{skt} - |NET_{skt}|$$

$$ACC_{jkt} = a_{jkt} / X_{jkt}$$

$$SEP_{jkt} = s_{jkt} / X_{jkt}$$

$$EXCESSW_{jkt} = ACC_{jkt} + SEP_{jkt} - |g_{jkt}|$$

$$EXCACC_{jkt} = ACC_{jkt} - |\max(g_{jkt}, 0)|$$

$$EXCSEP_{jkt} = SEP_{jkt} - |\min(g_{jkt}, 0)|$$

$$ACC_{skt} = \sum_{j \in s} (X_{jkt} / X_{skt}) ACC_{jkt}$$

$$SEP_{skt} = \sum_{j \in s} (X_{jkt} / X_{skt}) SEP_{jkt}$$

$$EXCESSW_{skt} = \sum_{j \in s} (X_{jkt} / X_{skt}) EXCESSW_{jkt}$$

j=firm/establishment, k=worker type, s=sector

Basic Facts

- Magnitude
  - Relationship to worker flows
- Productivity Dynamics?
- Concentration
- Persistence
- Idiosyncratic Shocks
- Cyclicality
- By Plant Characteristics
- Along the way: U.S. vs. Europe vs. Emerging vs. Transition

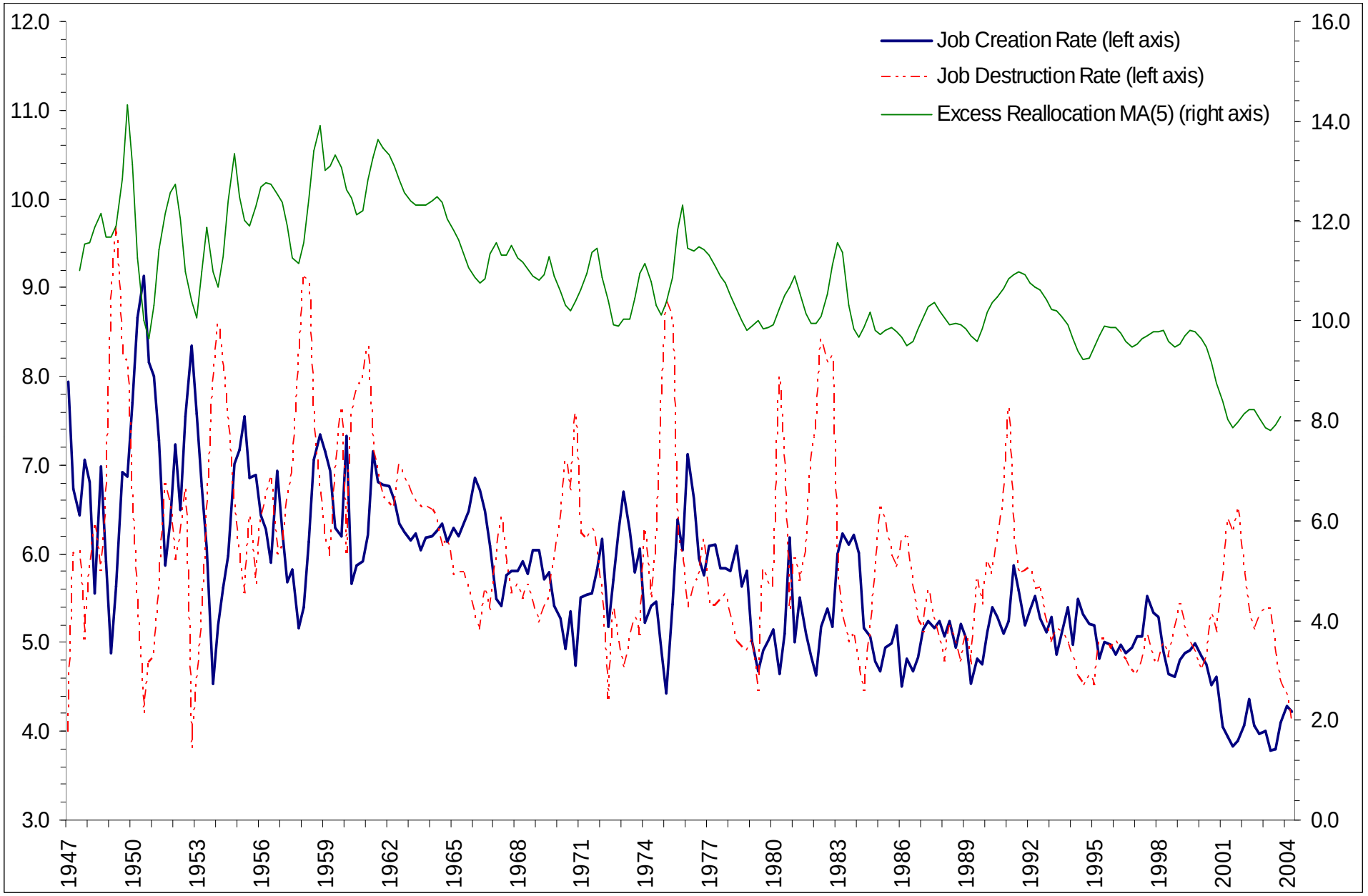
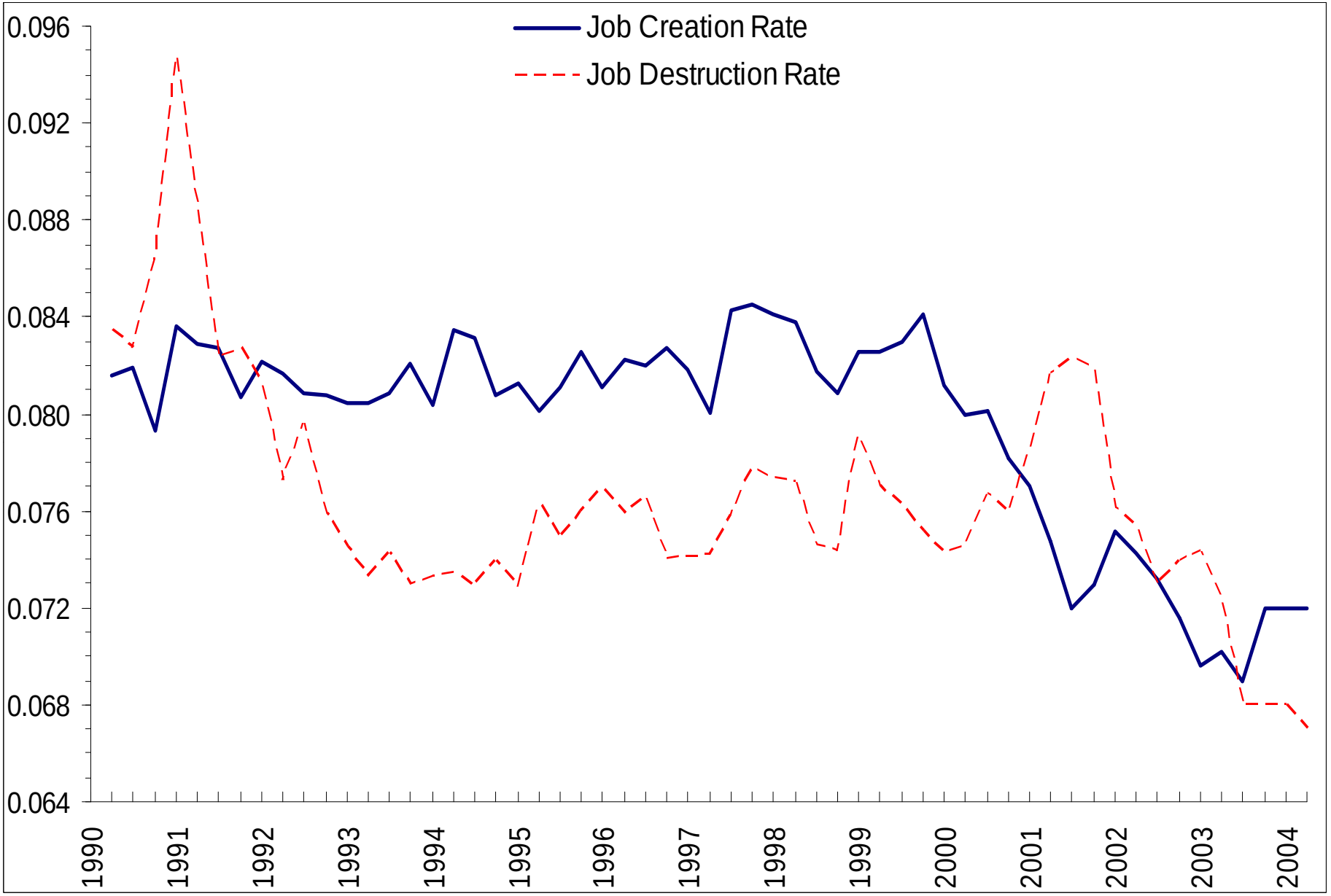


Figure 5. Quarterly Job Flows in Manufacturing, Seasonally Adjusted, 1947-2004



Quarterly Job Flows in the U.S. Private Sector, Seasonally Adjusted, 1990-2004

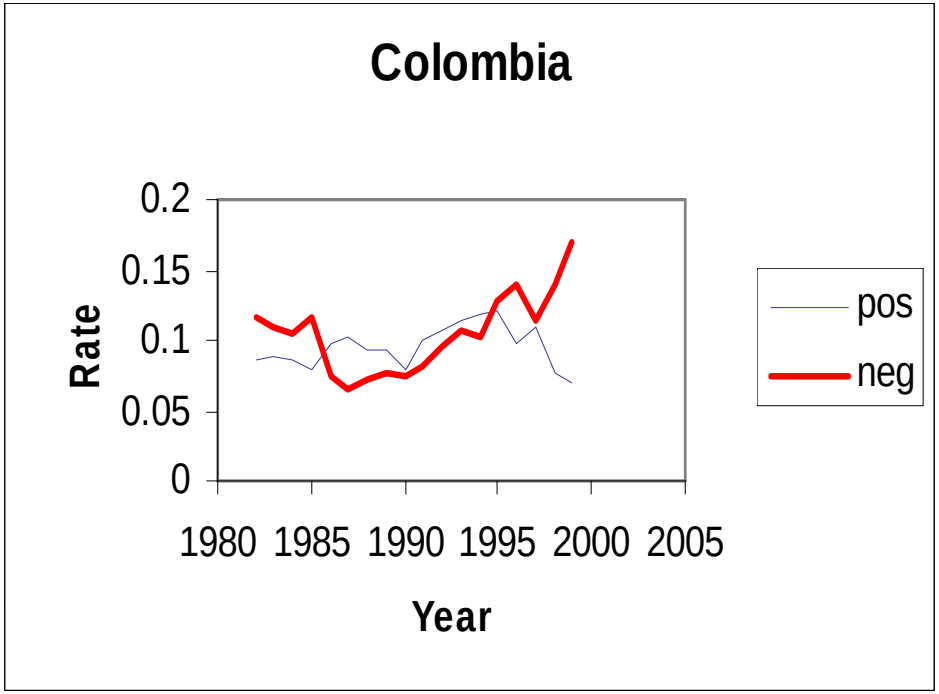
Magnitude

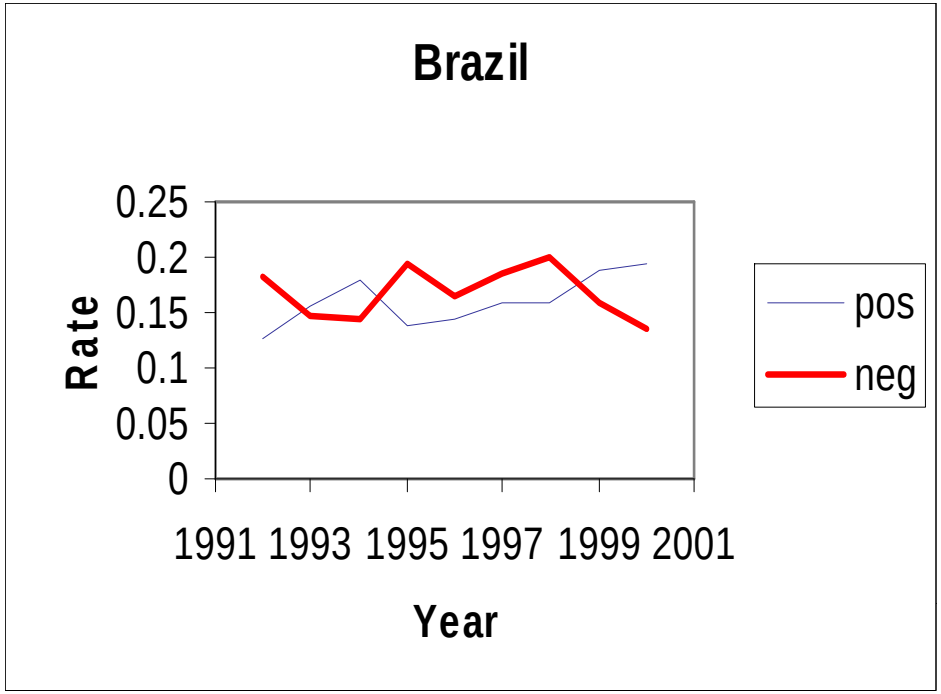
- Quarterly: Approximately 6%
- Annual: Approximately 11%
- Five-year: Approximately 35%
- Ten-year: Approximately 60%
- Varies SUBSTANTIALLY by industry and plant characteristic
- Important transitory and permanent components
- About 1/3 to 1/2 of Worker Flows

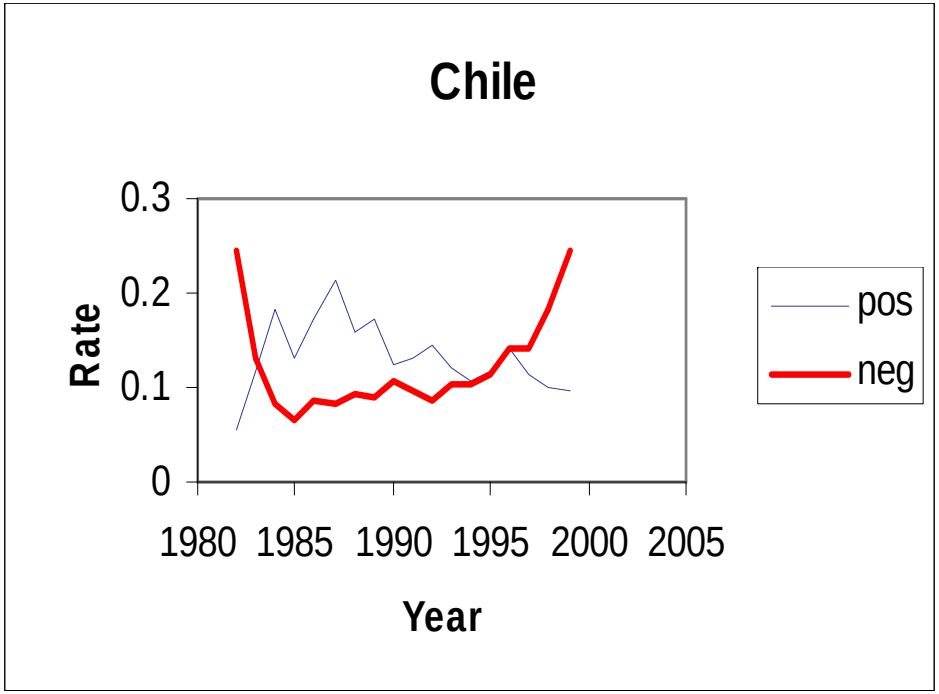
A. Job Flow Rates				
Data Source	*Time Period*	*Sampling Interval*	*Job Creation*	*Job Destruction*
JOLTS, continuous units	December 2000 – January 2004	Monthly	1.5	1.5
BED	March 1990 – June 2003	Quarterly	8.0	7.7
B. Worker Flow Rates			*Hires*	*Separations*
Data Source	*Time Period*	*Sampling Interval*		
JOLTS, continuous units	December 2000 – January 2004	Monthly	3.2	3.1
LEHD, selected states, full-quarter cases	1993:2 to 2003:3,	Quarterly	13.2	10.7
LEHD, selected states, cumulative flows	1993:2 to 2003:3	Quarterly	25.0	24.0

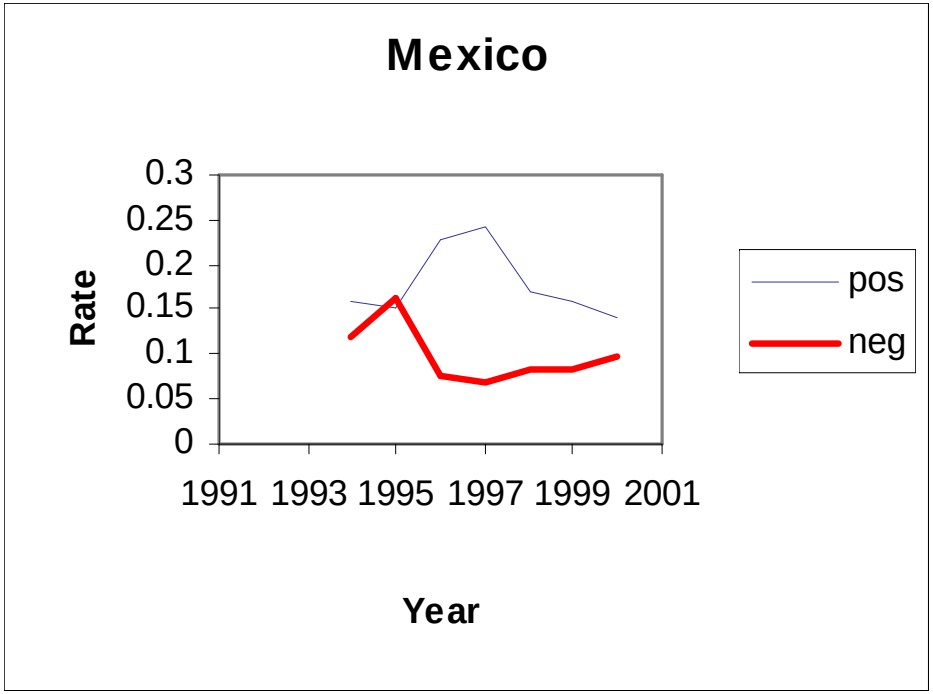
Table: Gross Reallocation of Outputs and Inputs in U.S. Manufacturing and Retail Trade					
Measure	Creation (Expansion) Rate	Share of Creation (Expansion) Due to Entrants	Destruction (Contraction) Rate	Share of Destruction (Contraction) Due to Exits	Fraction of Excess Reallocation Within 4-digit Industry
Manufacturing, 1977-87					
Real Gross Output	49.4	0.44	34.4	0.61	0.80
Employment	39.4	0.58	45.8	0.62	0.75
Capital Equipment	46.1	0.42	37.1	0.51	0.71
Capital Structures	44.9	0.44	48.4	0.42	0.69
Retail Trade, 1987-97					
Employment	70.3	0.85	55.7	0.83	0.96
Real Output	72.6	0.81	46.6	0.80	0.98
Source: Tabulations from the Census of Retail Trade **and Census of Manufacturers**					

Country	Period	Coverage	Employer Unit	Job Creation	Job Destruction	Net Growth
Australia	1984-85	Manufacturing	Establishments	16.1	13.2	3.9
Canada	1974-92	Manufacturing	Establishments	10.9	11.1	-0.2
Canada	1983-91	All Employees	Firms	14.5	11.9	2.6
Chile	1976-86	Manufacturing	Establishments	13.0	13.9	-1.0
Colombia	1977-91	Manufacturing	Establishments	12.5	12.2	0.3
Denmark	1983-89	Private Sector	Establishments	16.0	13.8	2.2
Denmark	1981-91	Manufacturing	Establishments	12.0	11.5	0.5
Estonia	1992-94	All Employees	Firms	9.7	12.9	-2.2
Finland	1986-91	All Employees	Establishments	10.4	12.0	-1.6
France	1984-92	Private Sector	Establishments	13.9	13.2	0.6
France	1985-91	Manufacturing	Firms	10.2	11.0	-0.8
France[1]	1985-91	Nonmanufacturing	Firms	14.3	11.8	2.4
Germany	1983-90	All Employees	Establishments	9.0	7.5	1.5
Germany(Lower Saxony)	1979-93	Manufacturing	Establishments	4.5	5.2	-0.7
Italy[2]	1984-93	Private Sector	Firms	11.9	11.1	0.8
Israel	1971-72	Manufacturing	Establishments	9.7	8.2	1.5
Morocco	1984-89	Manufacturing	Firms	18.6	12.1	6.5
Netherlands	1979-93	Manufacturing	Firms	7.3	8.3	-1.0
New Zealand	1987-92	Private Sector	Establishments	15.7	19.8	-4.1
Norway	1976-86	Manufacturing	Establishments	7.1	8.4	-1.2
Sweden	1985-92	All Employees	Establishments	14.5	14.6	-0.1
USA	1973-93	Manufacturing	Establishments	8.8	10.2	-1.3
USA[3]	1979-83	Private Sector	Establishments	11.4	9.9	1.4
USA[c]	1979-83	Manufacturing	Establishments	10.2	11.5	-1.3
United Kingdom	1985-91	All Employees	Firms	8.7	6.6	2.1


Colombia
0.2
0.15
0.1
0.05
0
Rate
1980 1985 1990 1995 2000 2005
Year
pos
neg


Brazil
0.25
0.2
0.15
0.1
0.05
0
Rate
1991 1993 1995 1997 1999 2001
Year
pos
neg


Chile
0.3
0.2
0.1
0
Rate
1980 1985 1990 1995 2000 2005
Year
pos
neg

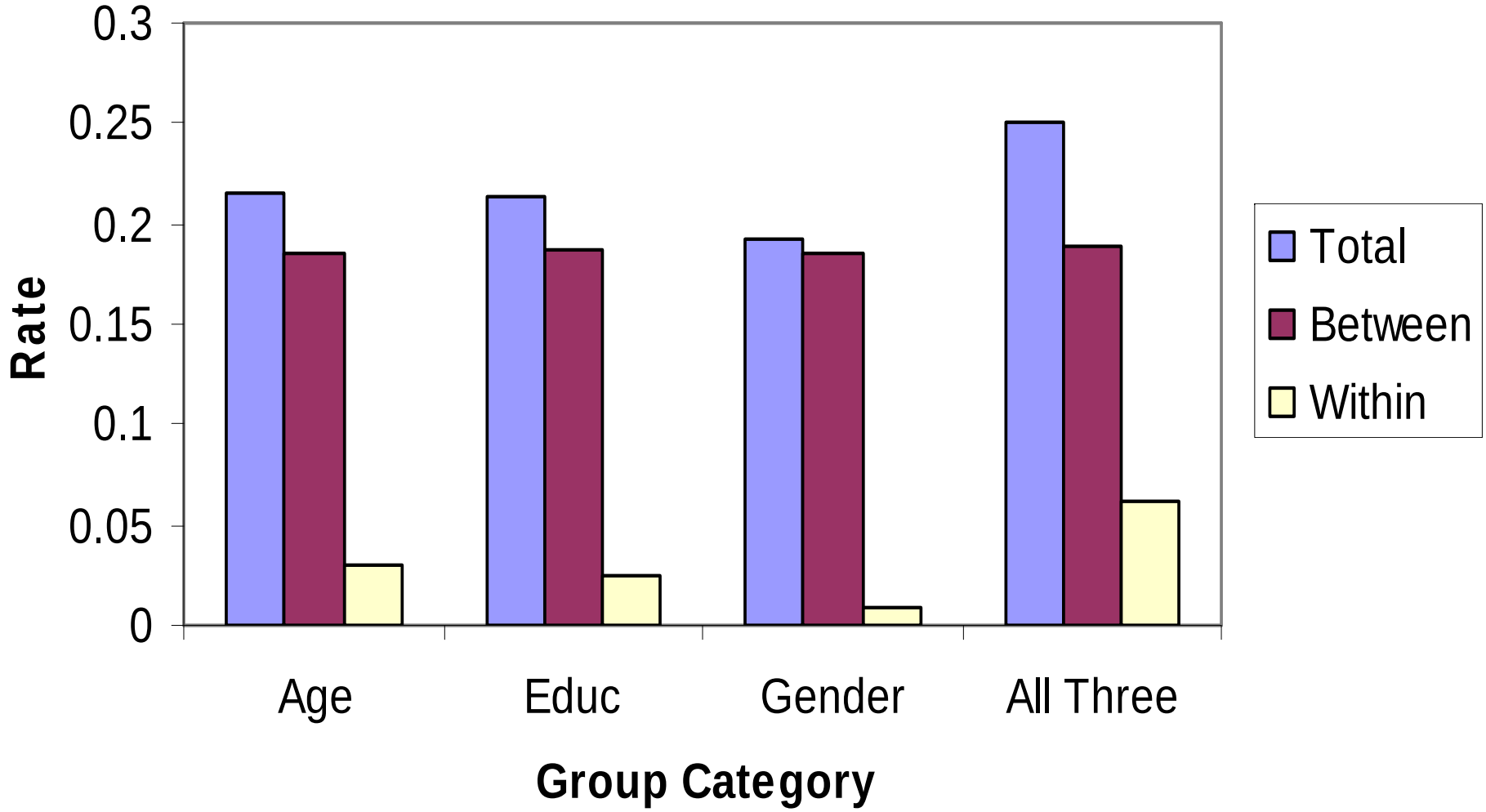

Mexico
0.3
0.25
0.2
0.15
0.1
0.05
0
Rate
1991 1993 1995 1997 1999 2001
Year
pos
neg

Average Quarterly Job Flow Rates in the BED, 1990:2 – 2003:2

	Job Creation	*Job Destruction*	*Net Growth*
Total Private	8.0	7.7	0.3
Resources	19.7	19.8	-0.1
Construction	14.3	14.0	0.4
Manufacturing	4.9	5.3	-0.4
Wholesale Trade	6.8	6.7	0.1
Retail Trade	8.1	7.9	0.2
Transportation & Utilities	6.7	6.4	0.3
Information	6.9	6.6	0.3
Financial Activities	6.7	6.4	0.3
Professional & Business Services	9.9	9.1	0.8
Education & Health	5.6	4.9	0.7
Leisure & Hospitality	10.9	10.4	0.5
Other Services	8.9	8.6	0.3

Study	Coverage	Employer Unit	Between Reallocation Rate	Within Reallocation Rate
Hamermesh et al (1996), Table 2	Netherlands, All Sectors, 1988-90	Firms	6.2	0.8
Largarde et al (1994), Table 1	France, All Sectors, 1984-91	Establishments	7.9	6.7
Dunne et al (1997), Table 5	USA, Manufacturing 1972-88	Establishments	19.2	2.7

Slovenia. Total, Within Firm and Between Firm Job Reallocation (By Worker Type)



Country/State	Coverage	Sampling Frequency	Accession Rate	Job Creation Rate	Separation Rate	Job Destruction Rate
USA (Selected States)	Private Sector	Quarterly	22.3	7.1	21.4	6.4
USA (Selected States)	Manufacturing	Quarterly	24.7	5.8	24.6	6.2
USA -- Maryland	Private Sector[1]	Quarterly	18.4	9.0	18.7	9.3
USA -- Maryland	Manufacturing	Quarterly	12.9	7.5	14.2	8.8
Denmark	Manufacturing	Annual	28.5	12.0	28.0	11.5
Netherlands	Manufacturing[2]	Annual	16.3	7.3	15.7	8.3
Norway	Manufacturing	Annual	21.0	11.0	23.0	13.0
Norway	Banking and Insurance	Annual	21.0	12.5	22.0	14.5

Productivity Decomposition

$$P_{it} = \sum_{e \in i} s_{et} P_{et}$$

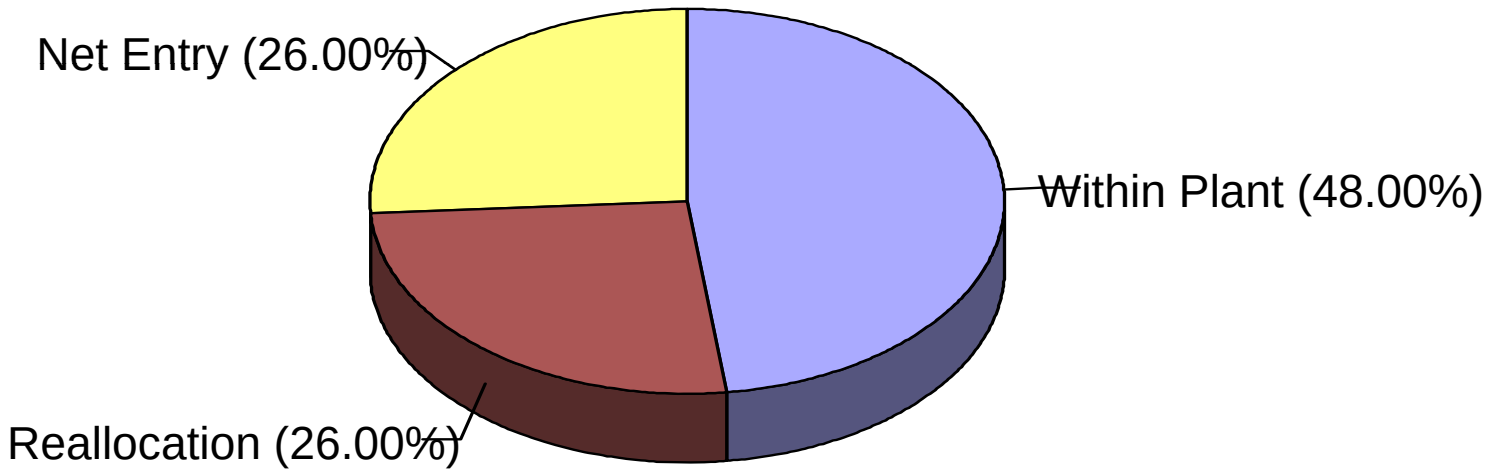
Within, Between, Cross, Entry and Exit effects

$$\Delta P_{it} = \sum_{e \in C} s_{et-k} \Delta P_{et} + \sum_{e \in C} \Delta s_{et} (P_{et-k} - P_{it-k}) + \sum_{e \in C} \Delta P_{et} \Delta s_{et} + \sum_{e \in N} s_{et} (P_{et} - P_{it-k}) - \sum_{e \in X} s_{et-k} (P_{et-k} - P_{it-k})$$

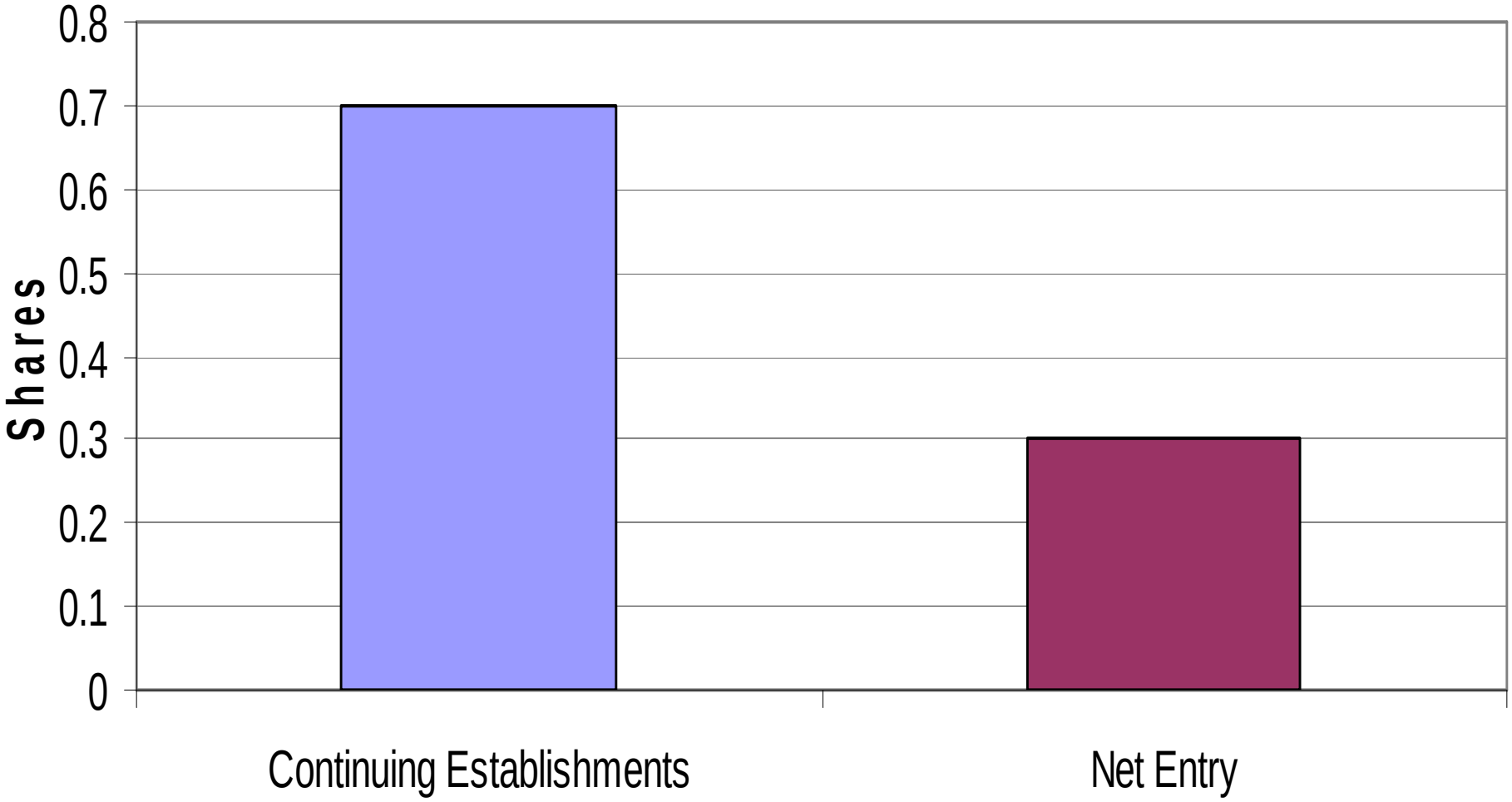
Key Issues: 1. Longitudinal links
2. Horizon
3. Measurement

Decomposition of TFP in U.S. Mfg

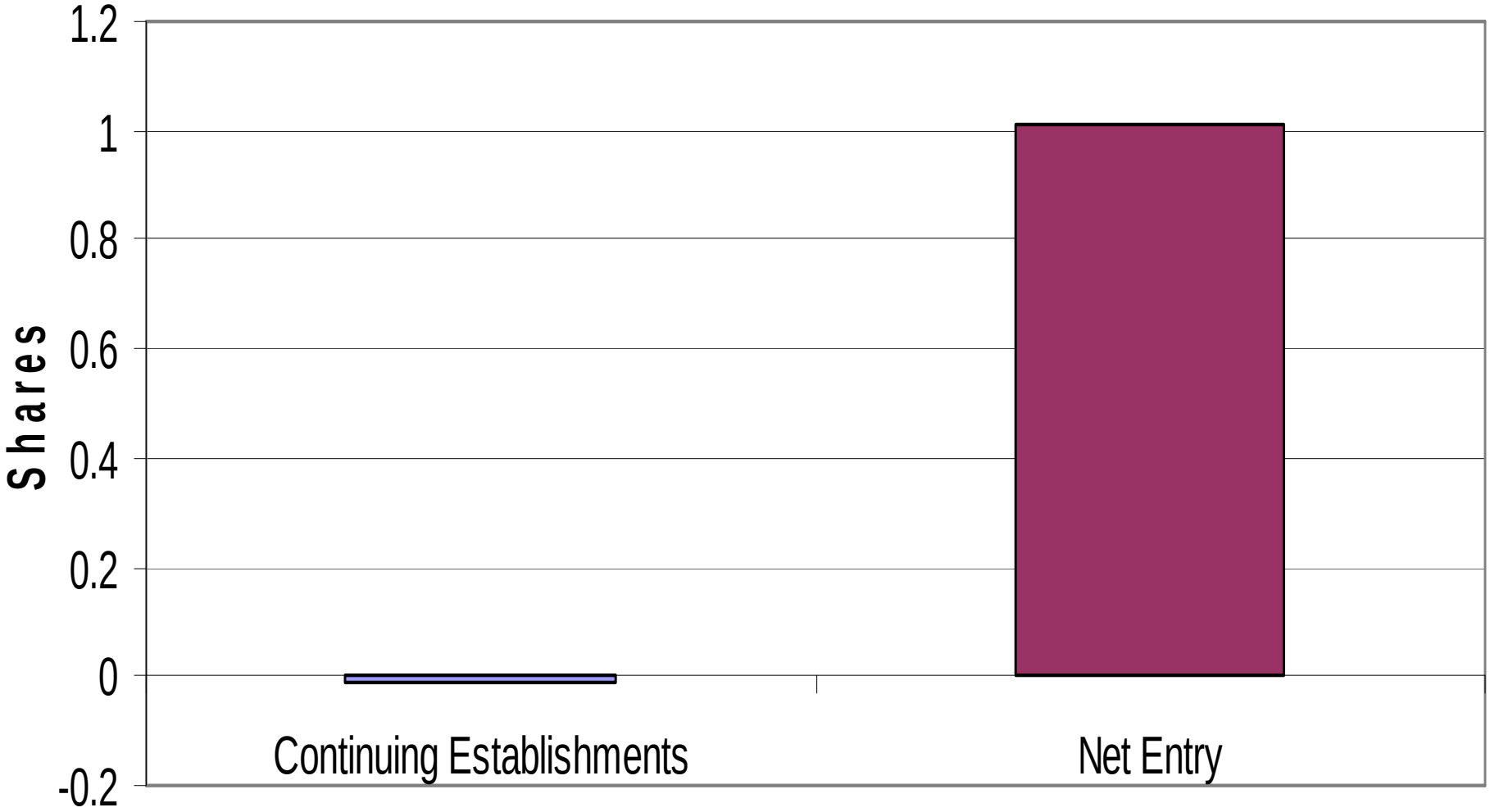
1977-1987



Contribution of Continuing Establishments vs. Net Entry to U.S. Manufacturing Labor Productivity Growth, 1977-87



Contribution of Continuing Establishments vs. Net Entry to U.S. Retail Trade Labor Productivity Growth, 1987-97

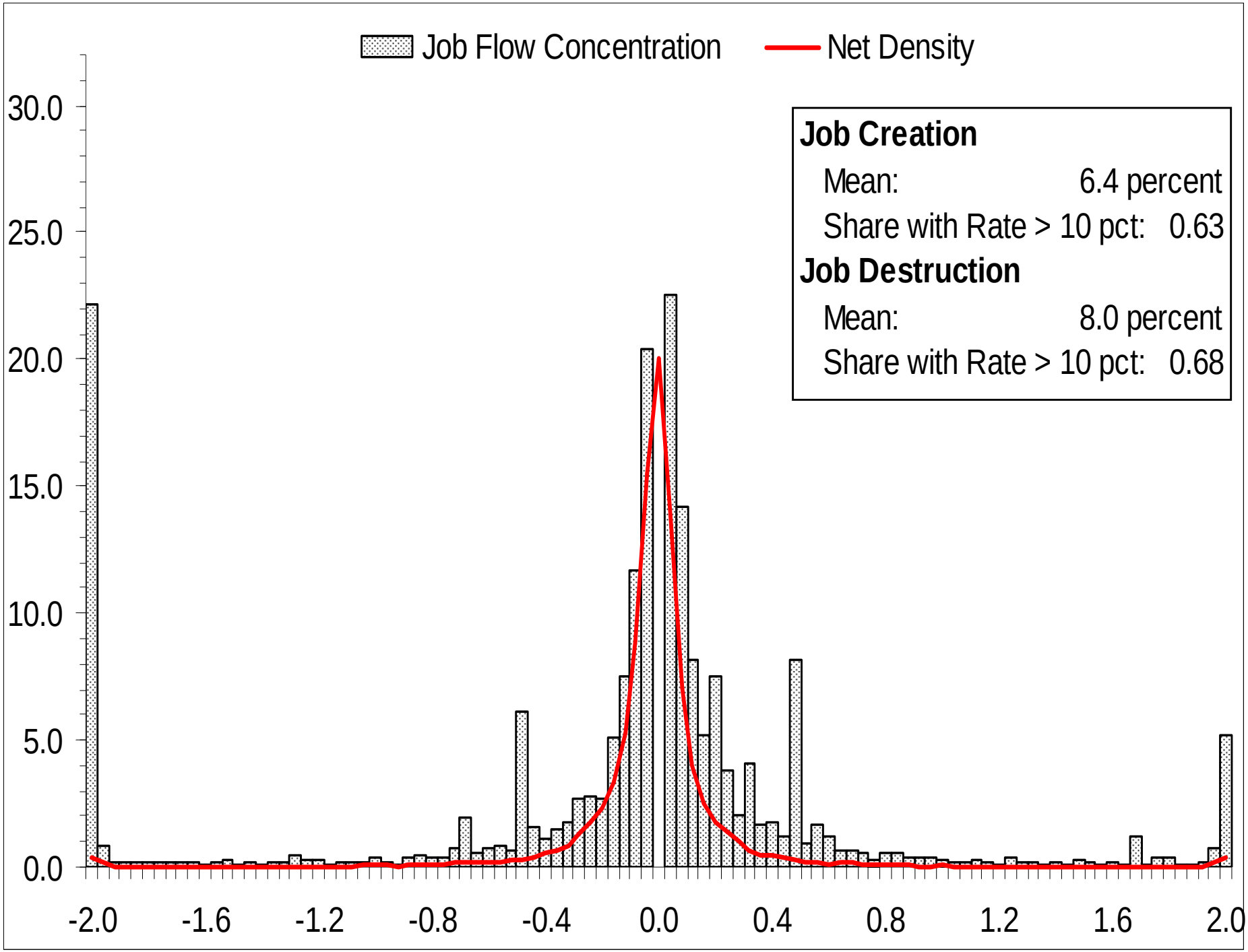


Comments on Decomposition in Literature

- Some question about how to interpret aggregate index defined in this manner
  - Typical check (e.g., BHC and FHK) to see how this index performs relative to standard aggregate measures
    - Common result – magnitudes very similar and correlations high
  - Not clear what correct aggregate index is
    - Standard aggregate indexes not well-justified on theoretical grounds (e.g., Fisher – conditions under which aggregate production function exists are very stringent)
  - Standard decomposition summarizes activity weighted micro distribution taking into account unbalanced panel

Concentration

- For Manufacturing, more than 2/3 of creation/destruction accounted for by large (greater than 25% changers). Births account for 20% of annual creation, Deaths account for 25% of annual destruction.
- For non-mfg, entry/exit play an even larger role.
- Contribution of entry/exit larger over longer horizons.
- Importance:
  - Job flows can't be fully accommodated by attrition/worker flows
  - Adjustment costs?


Job Flow Concentration
Net Density
Job Creation
Mean: 6.4 percent
Share with Rate > 10 pct: 0.63
Job Destruction
Mean: 8.0 percent
Share with Rate > 10 pct: 0.68
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-2.0
-1.6
-1.2
-0.8
-0.4
0.0
0.4
0.8
1.2
1.6
2.0

Country	Percent of Job Creation or Destruction Accounted for by Plants with Growth Rates in the Indicated Interval					
	[-2,-1)	[-1,-.2)	[-0.2,0)	(0,0.2]	(0.2,1]	(1,2]
United States	32.9	44.0	23.1	30.7	45.1	24.2
Canada	77.7		22.3	24.8	75.2	
Denmark	45.9	33.7	20.4	23.4	37.4	39.1
Israel	84.7		15.3	21.8	78.2	

Persistence

- Measured as the fraction of the change that persists for 1 year.
- Roughly 50 percent of quarterly job flows persistent
- Roughly 70-80 percent of annual job flows persistent

Country	USA		Denmark		Netherlands		Norway	
Period	1973-88		1980-91		1979-93		1977-86	
Horizon	One Year	Two Years	One Year	Two Years	One Year	Two Years	One Year	Two Years
Job Creation	70.2	54.4	71.0	58.0	77.9	58.8	72.7	65.1
Job Destruction	82.3	73.6	71.0	58.0	92.5	87.3	84.2	79.8

Between vs. Within Sector Shifts

- Decomposition of Excess Reallocation into Between/Within Components.
- 4-digit industry accounts for 13% of Mfg.; less for other sectors.
- 2-digit, state accounts for 14% of Mfg;
- 2-digit, region, size, age, ownership (14,400 sectors in Mfg) accounts for only 39% of Mfg.
- Idiosyncratic Shocks Dominate!

Decomposition of excess job reallocation

$$EXCESSJ(k)_{st} = (SUM_{st} - |NET_{st}|) + (\sum_{j \in s}(X_{jt}/X_{st})(\sum_{k}(X_{jkt}/X_{jt})|g_{jkt}|) - |g_{jt}|)$$

Country	Period	Unit of Analysis	Number of Sectors	Average Number of Workers per Sector (in thousands)	Fraction Resulting from Shifts Between Sectors
USA	1972-88	plant	448/456	39.1[1]	0.13
USA	1972-88	plant	980	17.9	0.14
Denmark	1983-89	plant	8	196.1	0.00
Finland	1986-91	plant	27	48.9	0.06
Germany	1983-90	plant	24	1171.2	0.03
Italy	1986-91	firm	28	321.5	0.02
Netherlands	1979-93	firm	18	10.0	0.20
Sweden	1985-91	plant	28	112.4	0.03
Norway	1976-86	plant	142	2.4	0.06
France 1	1984-88	plant	15	883.3	0.06
France 2	1985-91	firm	600	36.6	0.17
France 3	1984-91	plant	100		0.12
New Zealand	1987-92	plant	28	27.5	0.01
Chile	1979-86	plant	69	3.7	12.2
Colombia	1977-91	plant	73	6.31	13.2
Morocco	1984-89	plant	61	4.0	16.9

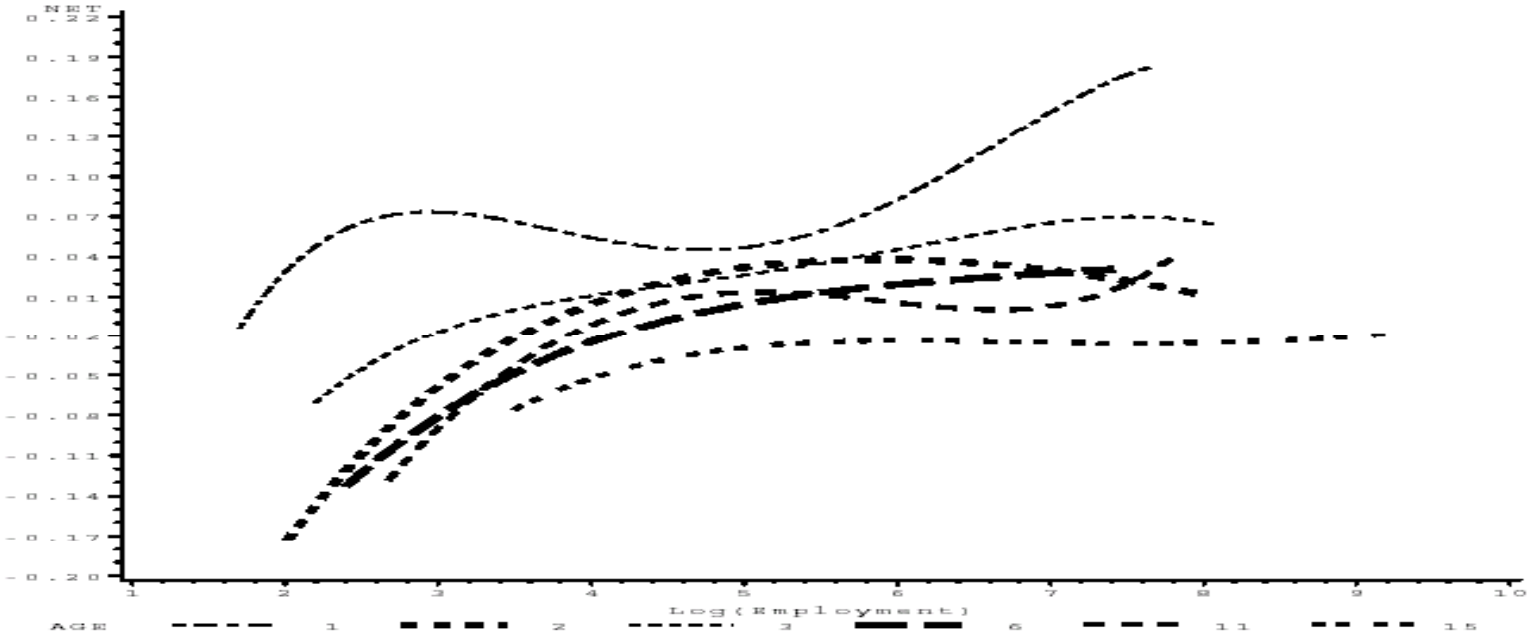
Sectoral Differences in Flows

- Non-manufacturing greater than manufacturing.
- Small, young, single unit, low wage businesses more likely to create and destroy jobs.
- These factors are highly interrelated!

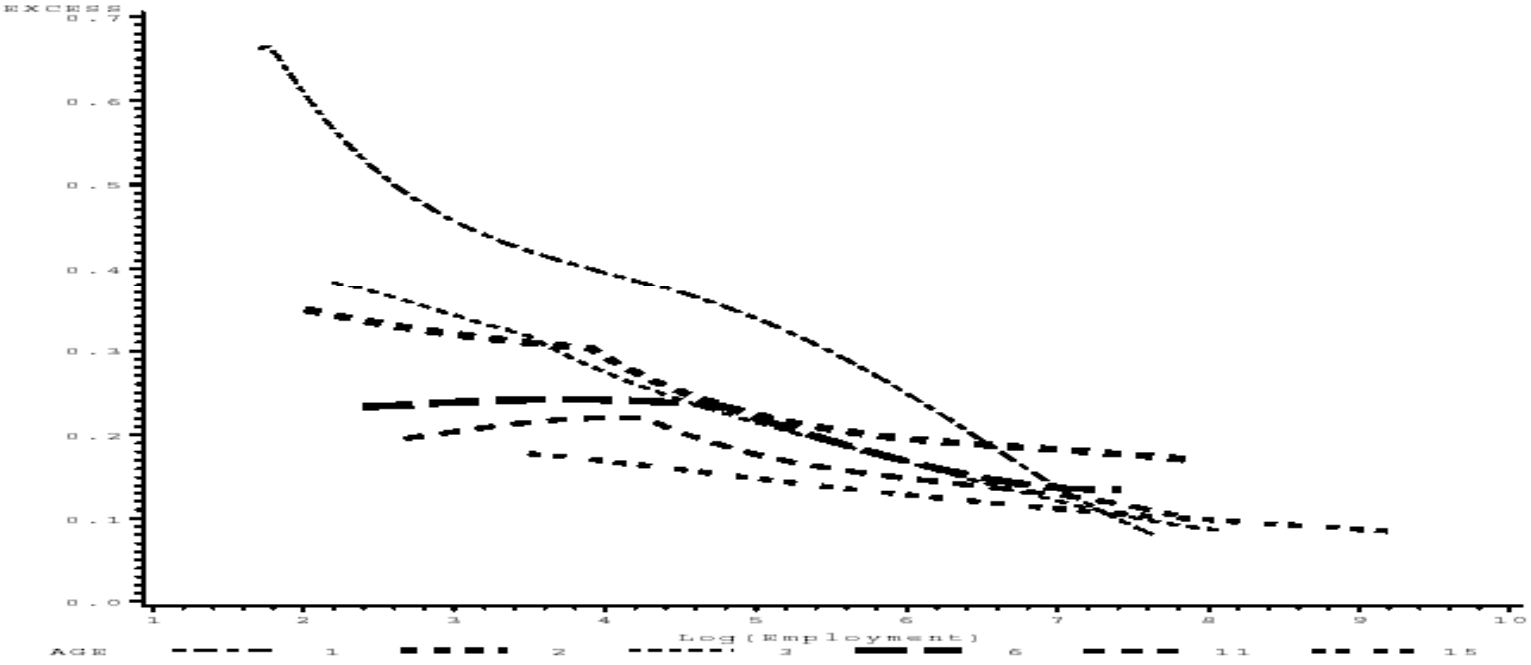
Country	USA	Canada	Netherlands	Norway
Industry Period	1974-92	1974-92	1979-93	1976-86
Food	17.9	19.5	18.4	15.3
Tobacco	12.7	12.3		
Textiles	16.9	21.3	19.1	18.3
Apparel	25.2	27.8	23.4	
Lumber	25.8	26.2	20.8	15.7
Furniture	20.7	27.7		
Paper	12.5	11.1	14.6	12.6
Printing	17.1	22.0	16.3	
Chemicals	14.0	18.7	12.1	12.7
Petroleum	14.2	15.6	10.1	13.2
Rubber	20.3	21.5	12.1	
Leather	22.4	24.2	17.5	
Stone, Clay, Glass	20.4	23.0	15.6	
Primary Metals	16.0	13.3	5.2	6.3
Fabricated Metals	20.0	27.7	18.8	18.7
Nonelectric Machinery	20.5	27.8	16.4	
Electric Machinery	19.5	24.6	11.3	
Transportation	18.4	20.6	14.6	
Instruments	10.5		19.7	
Miscellaneous	14.4	28.1	28.5	18.3
Total Manufaturing	19.0	21.9	15.6	15.5

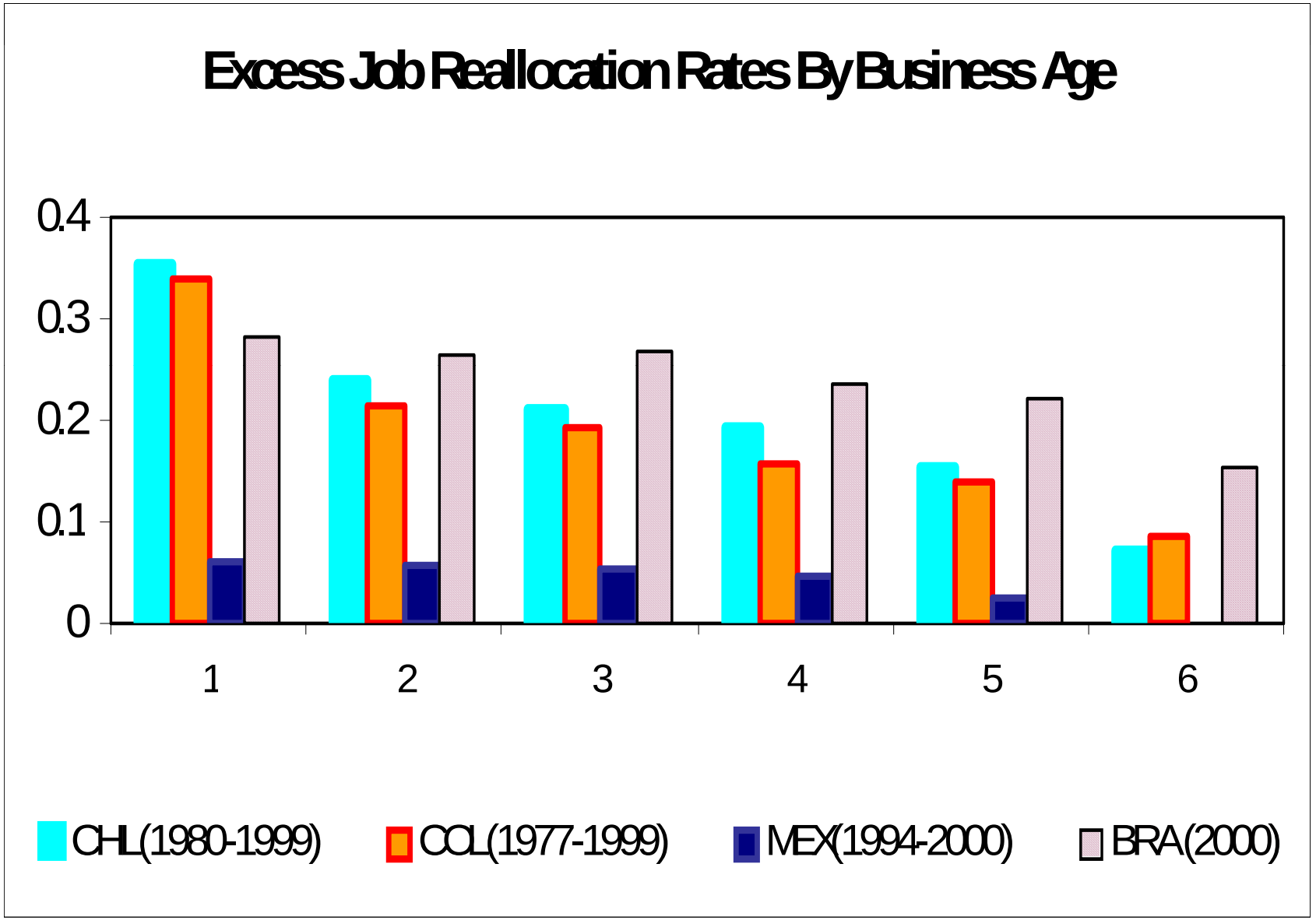
Figure 3.2

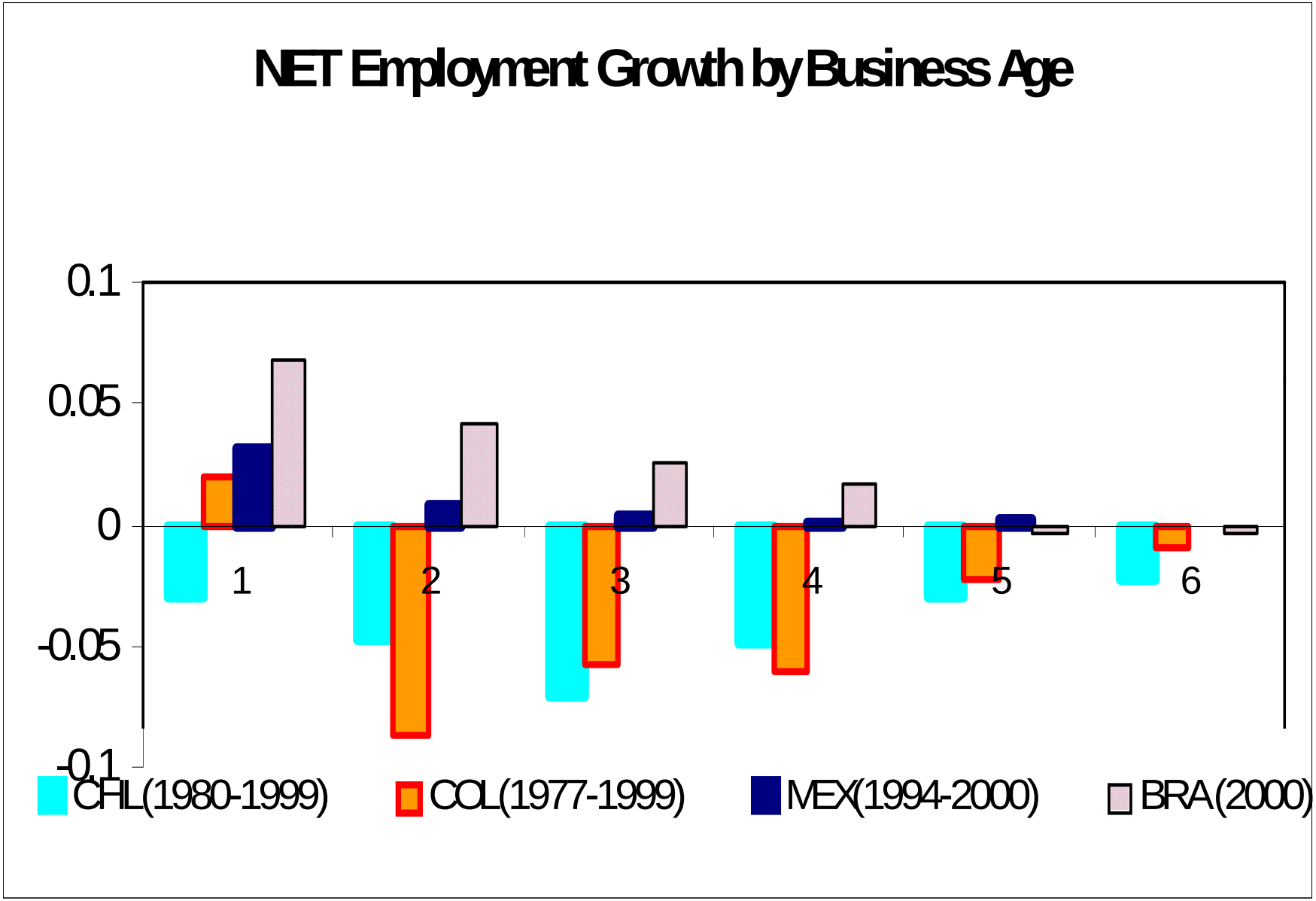
Net Growth Rate for Age Classes, by Employer Size

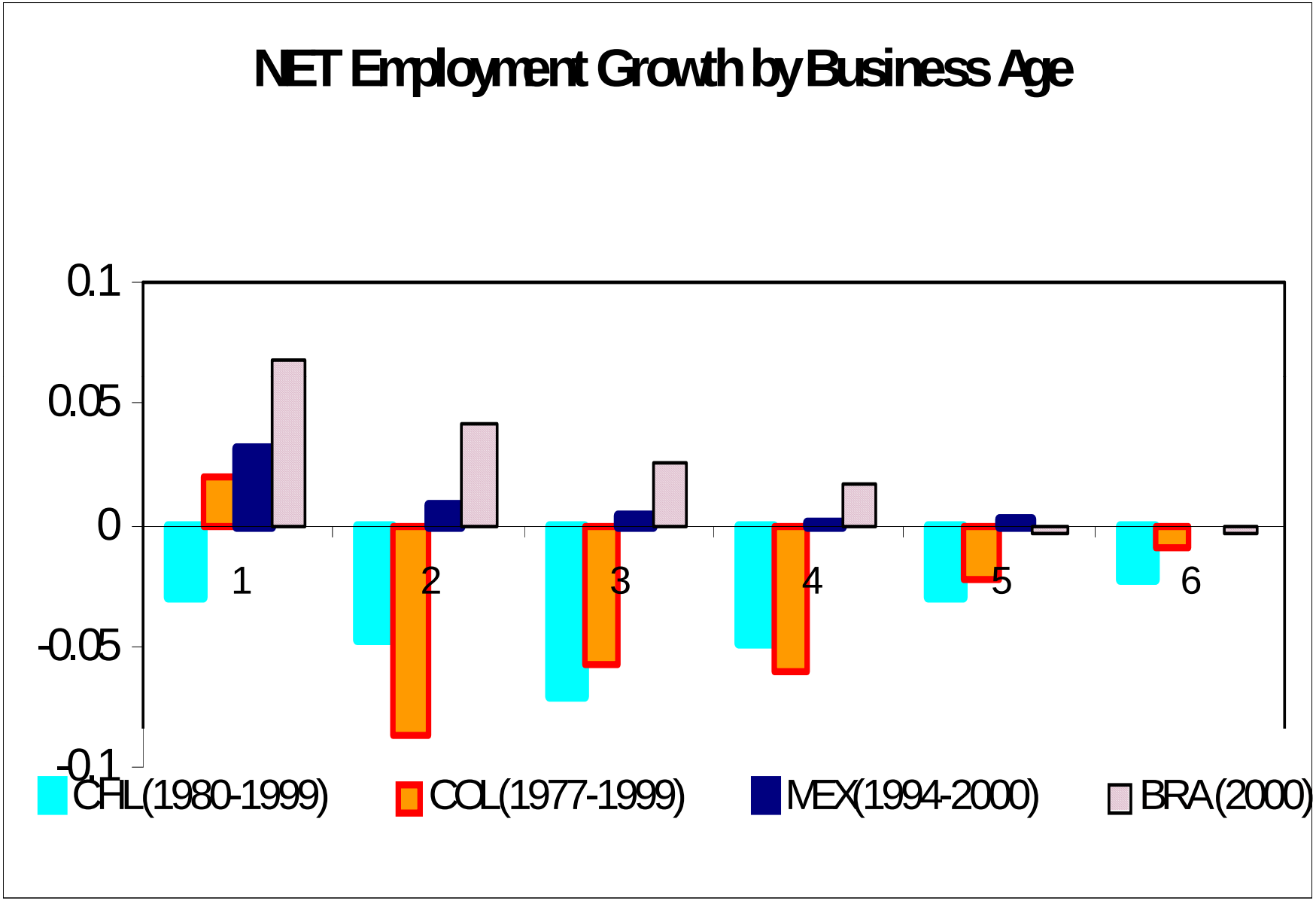


Excess Job Reallocation for Age Classes, by Employer Size



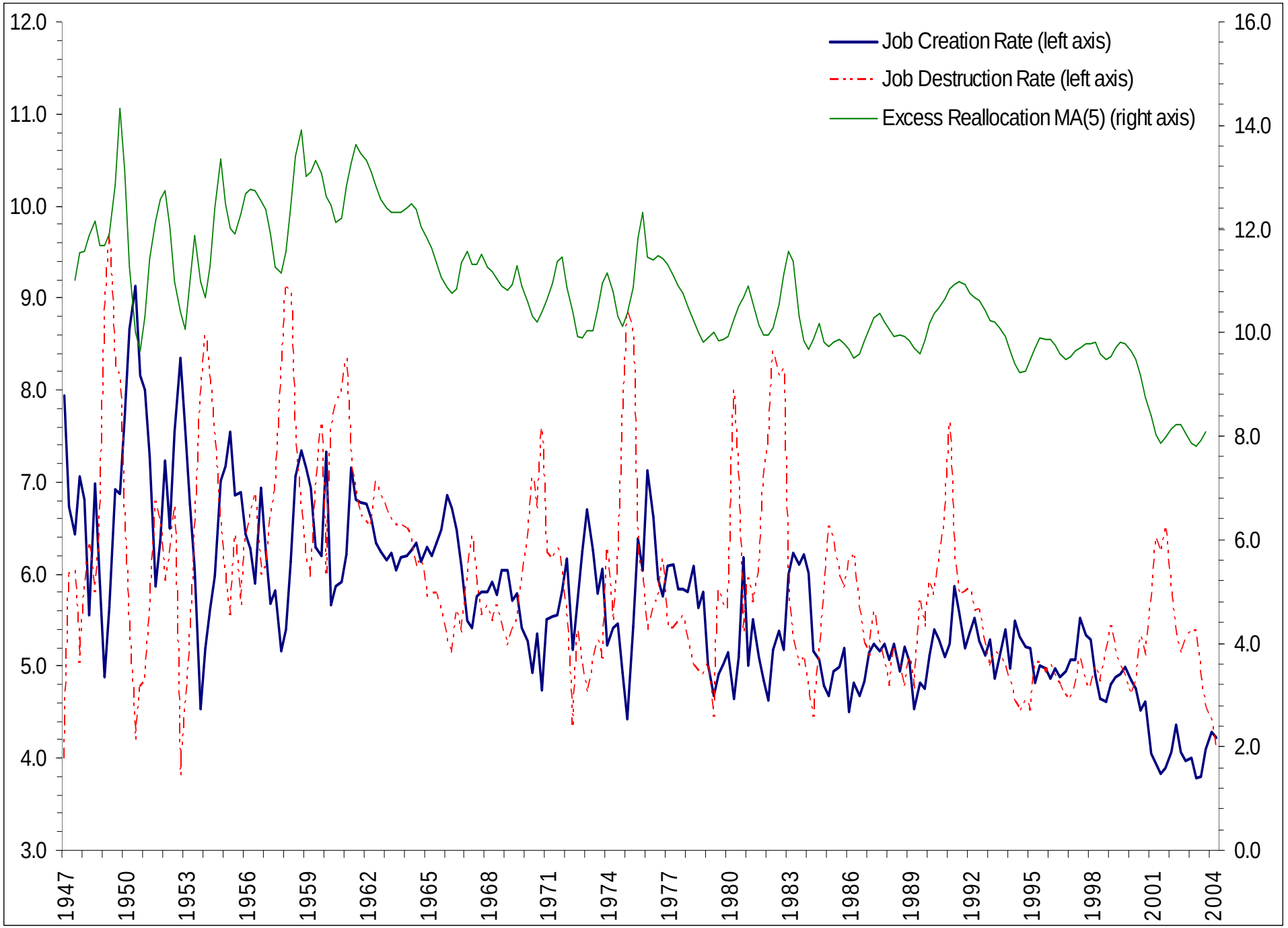

Excess Job Reallocation Rates By Business Age
0.4
0.3
0.2
0.1
0
1
2
3
4
5
6
CHL(1980-1999)
COL(1977-1999)
MEX(1994-2000)
BRA(2000)


NET Employment Growth by Business Age
0.1
0.05
0
-0.05
-0.1
1
2
3
4
5
6
CHL(1980-1999)
COL(1977-1999)
MEX(1994-2000)
BRA(2000)


NET Employment Growth by Business Age
0.1
0.05
0
-0.05
-0.1
1
2
3
4
5
6
CHL(1980-1999)
COL(1977-1999)
MEX(1994-2000)
BRA(2000)

Cyclicality

- Recessions are times of reorganization especially in manufacturing and especially for large, mature businesses in manufacturing.
- Spikes in permanent job destruction are key characteristic of recessions in manufacturing
  - Open question about most recent recession


Job Creation Rate (left axis)
Job Destruction Rate (left axis)
Excess Reallocation MA(5) (right axis)
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
1947
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004

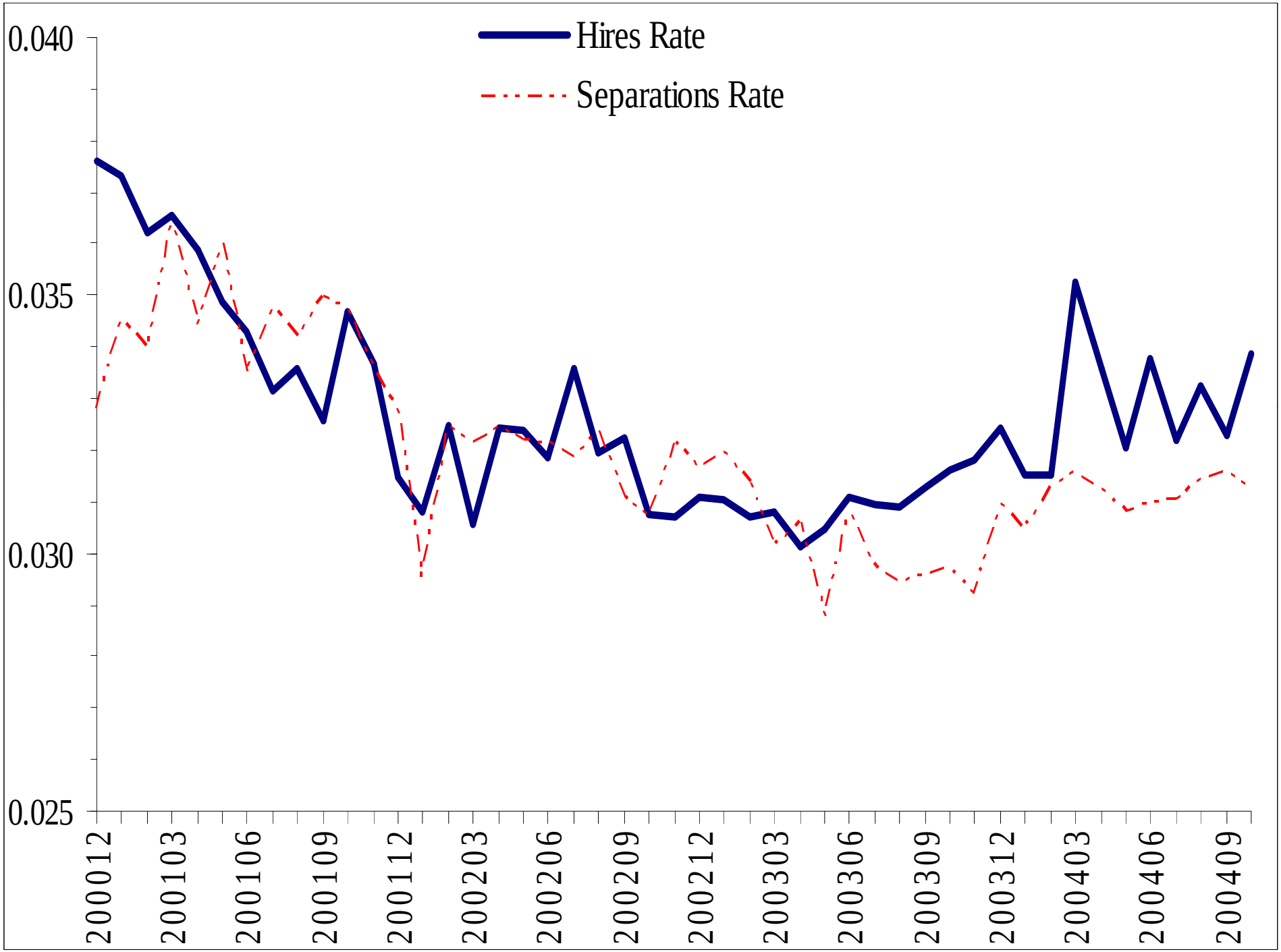

Hires Rate
Separations Rate
0.040
0.035
0.030
0.025
200012
200103
200106
200109
200112
200203
200206
200209
200212
200303
200306
200309
200312
200403
200406
200409

Figure 6.8: Job Creation and Job Destruction Across Countries

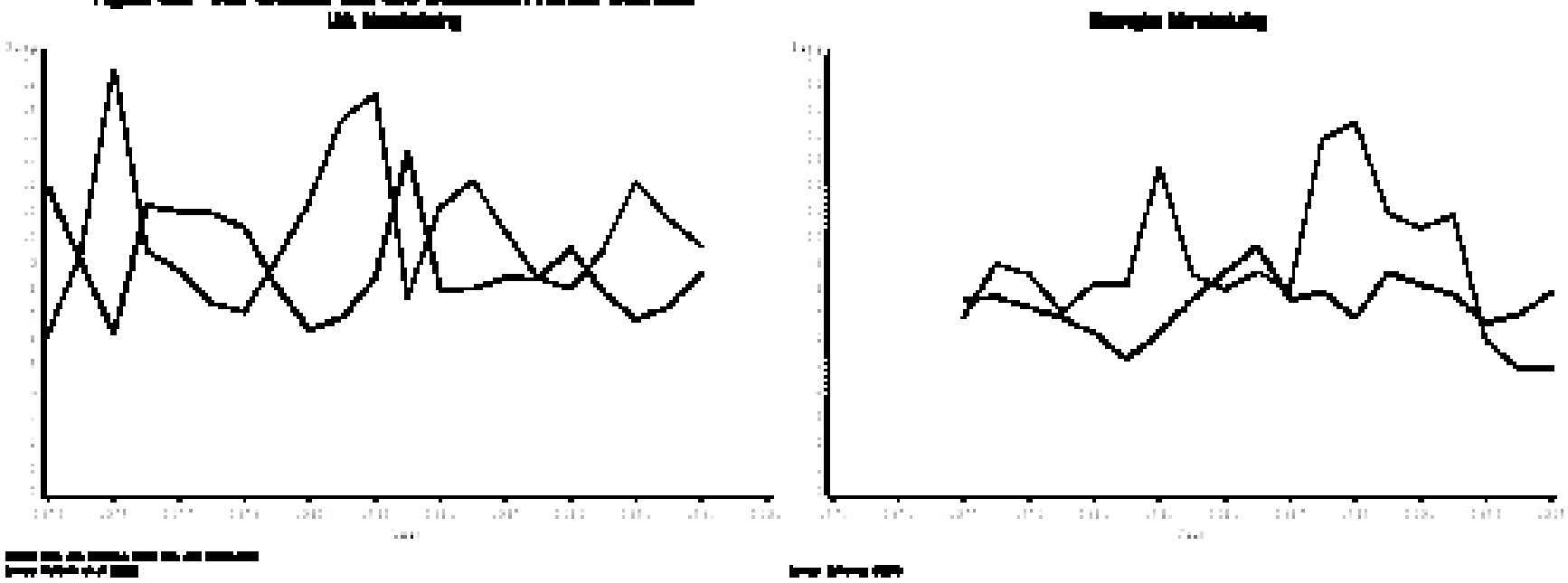
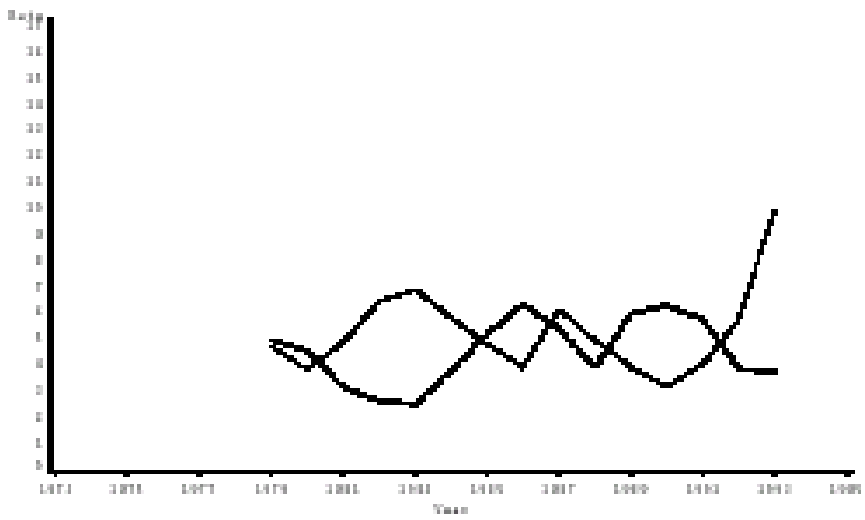
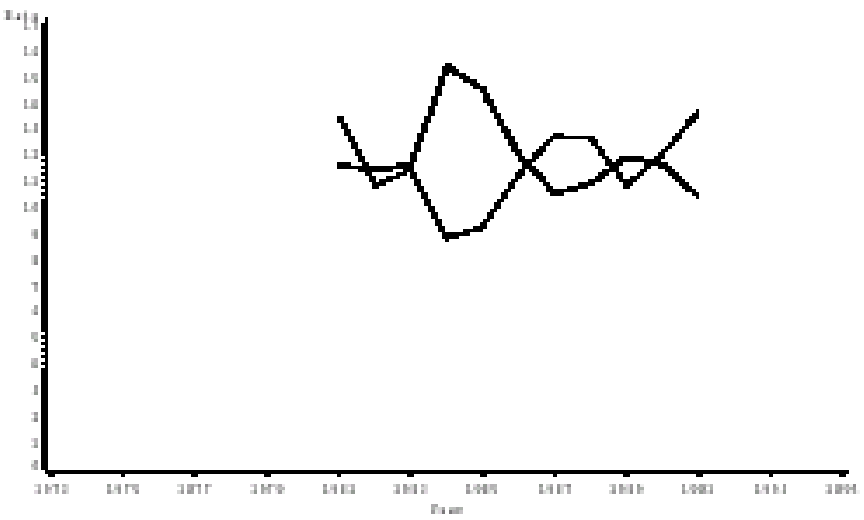
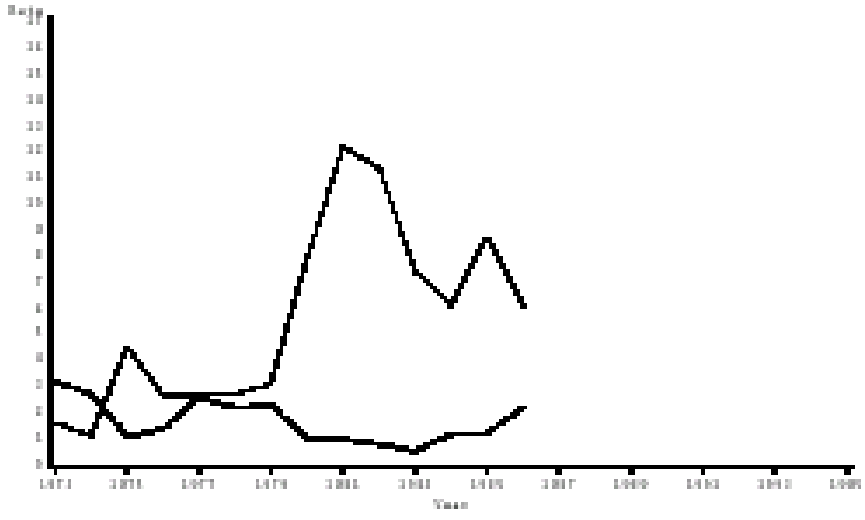
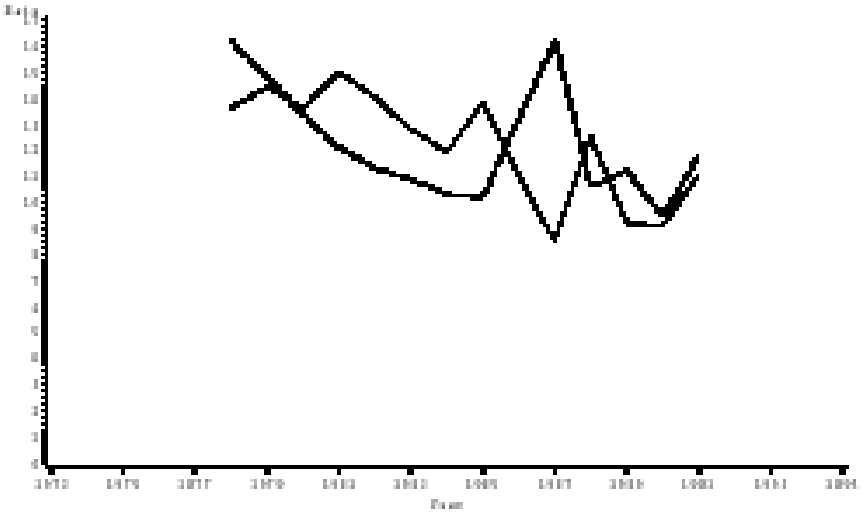


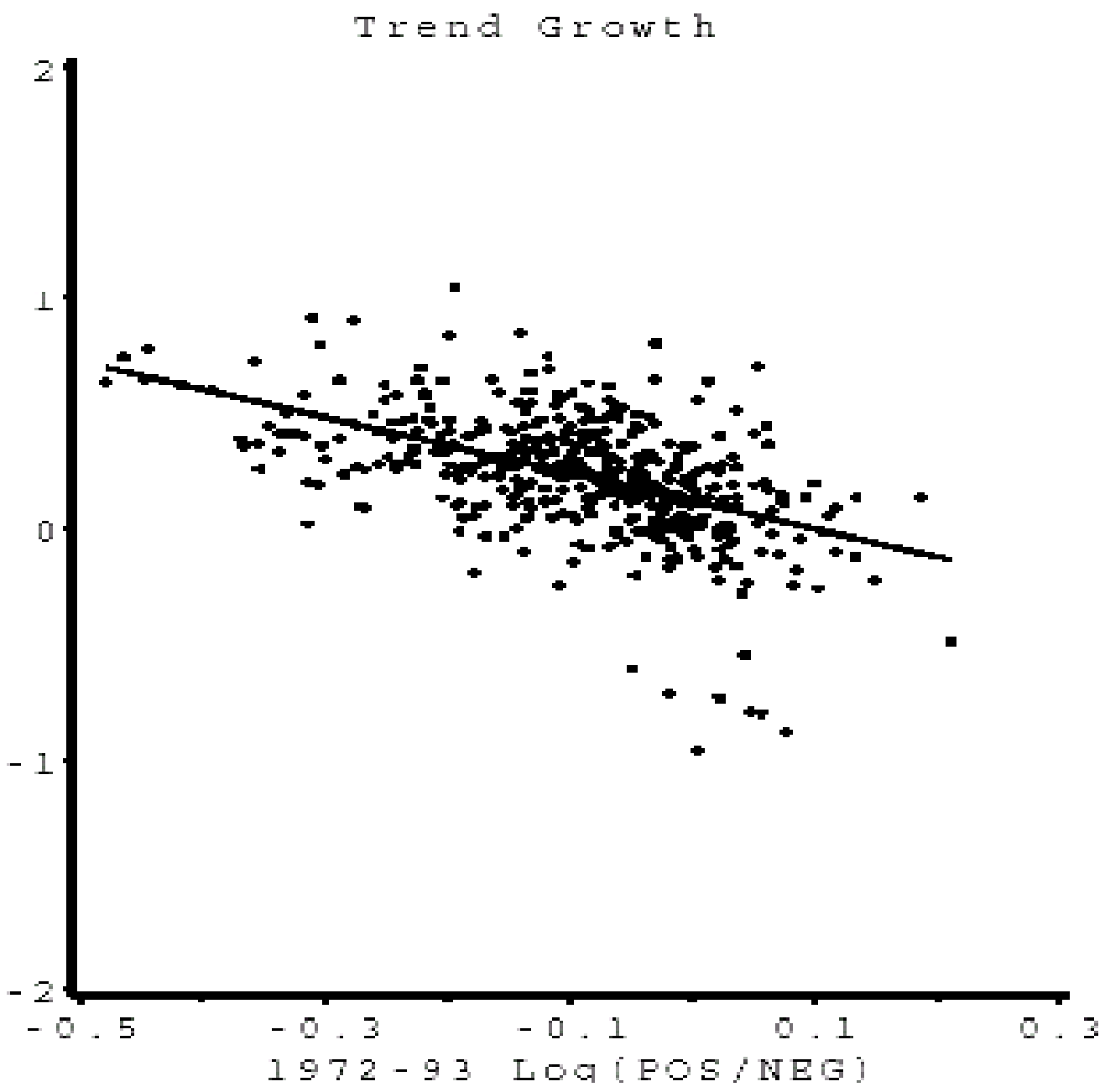
Figure 3.8 (cont'd): Job Creation and Job Destruction Across Countries



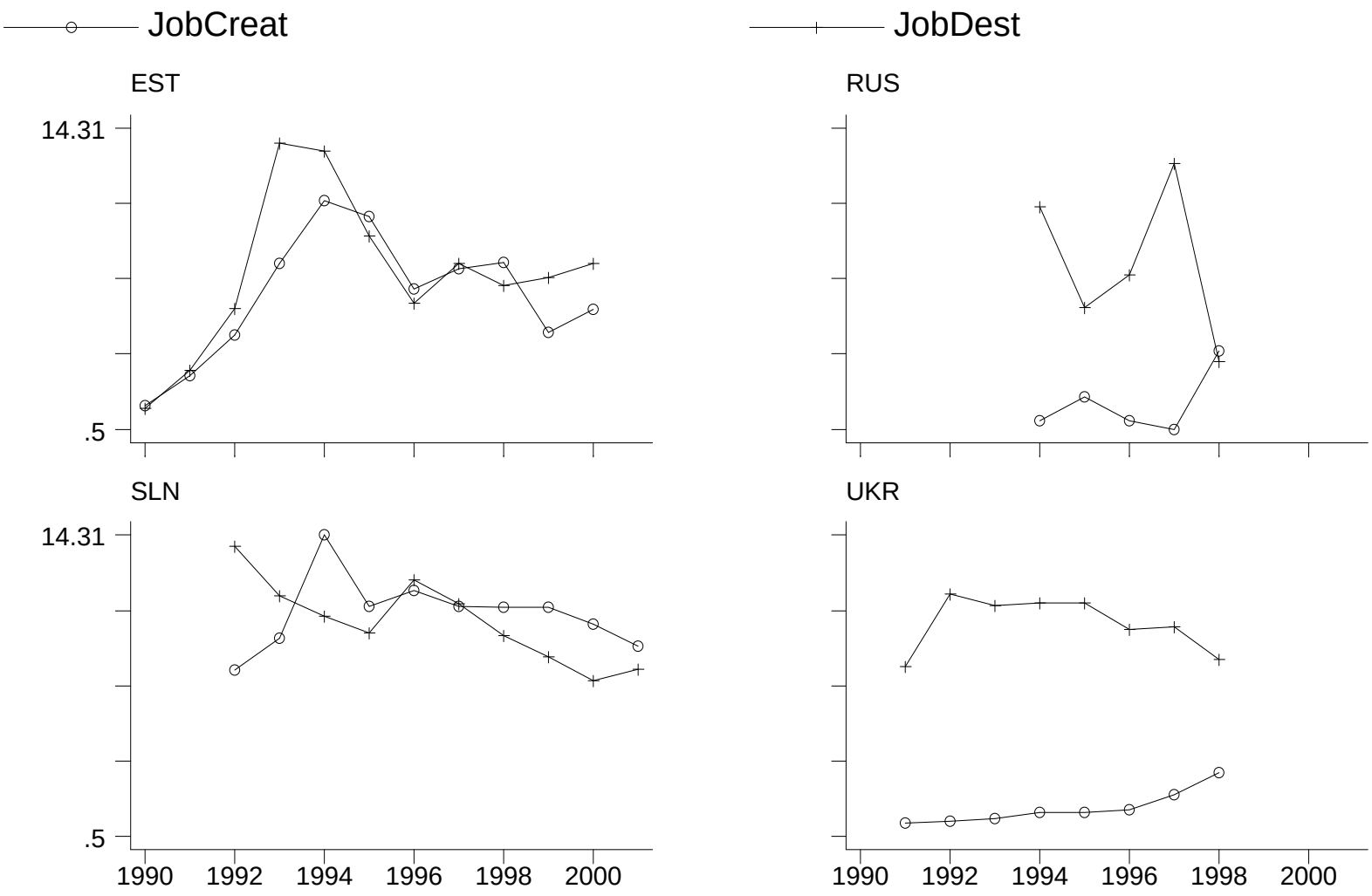







Trend Growth
2
1
0
-1
-2
-0.5
-0.3
-0.1
0.1
0.3
1972-93 Log(POS/NEG)


Plant Age
2
1
0
-1
-2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Emp. Fraction in Mature Plants



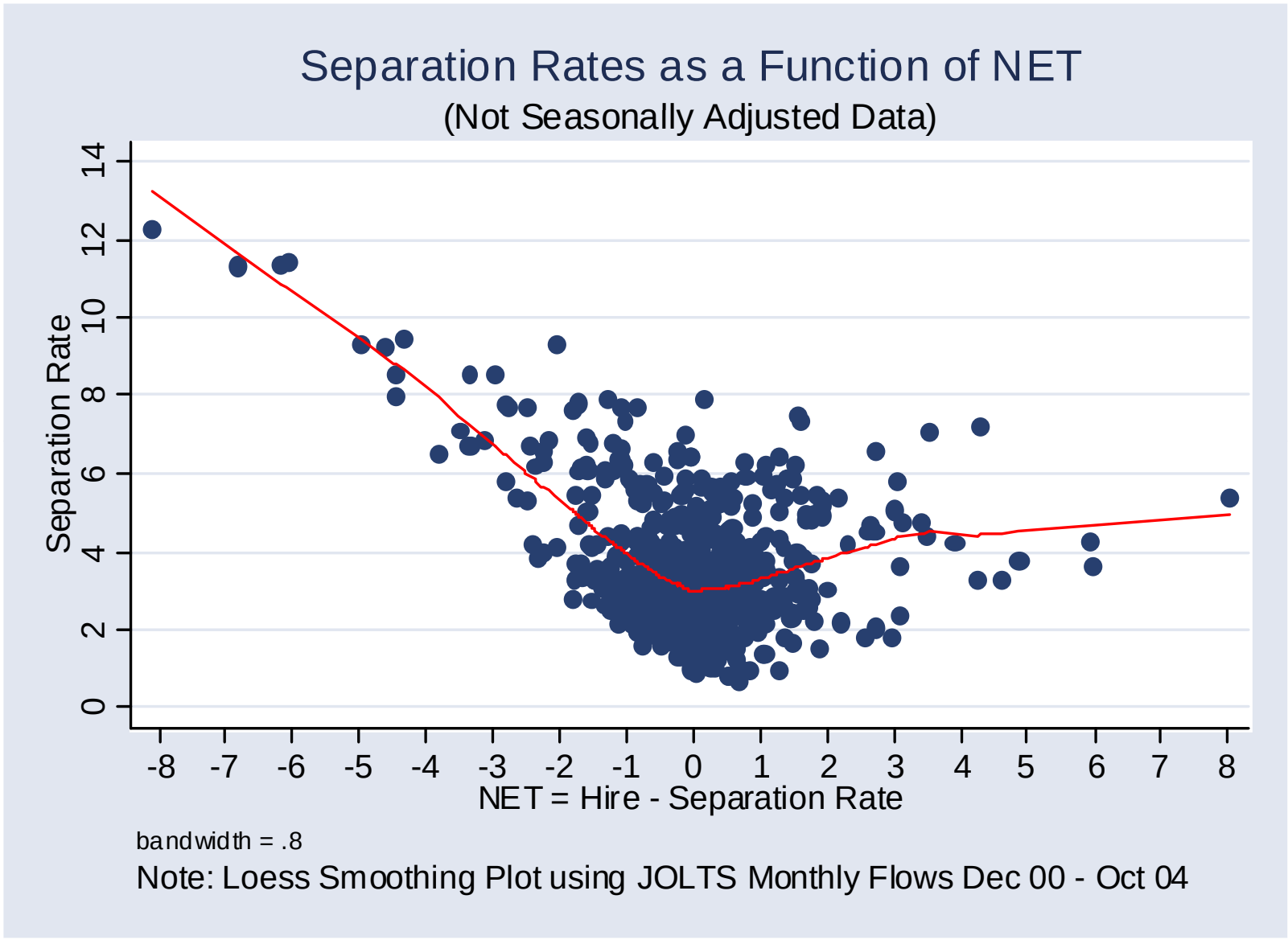
Job Flows in Selected Transition Economies

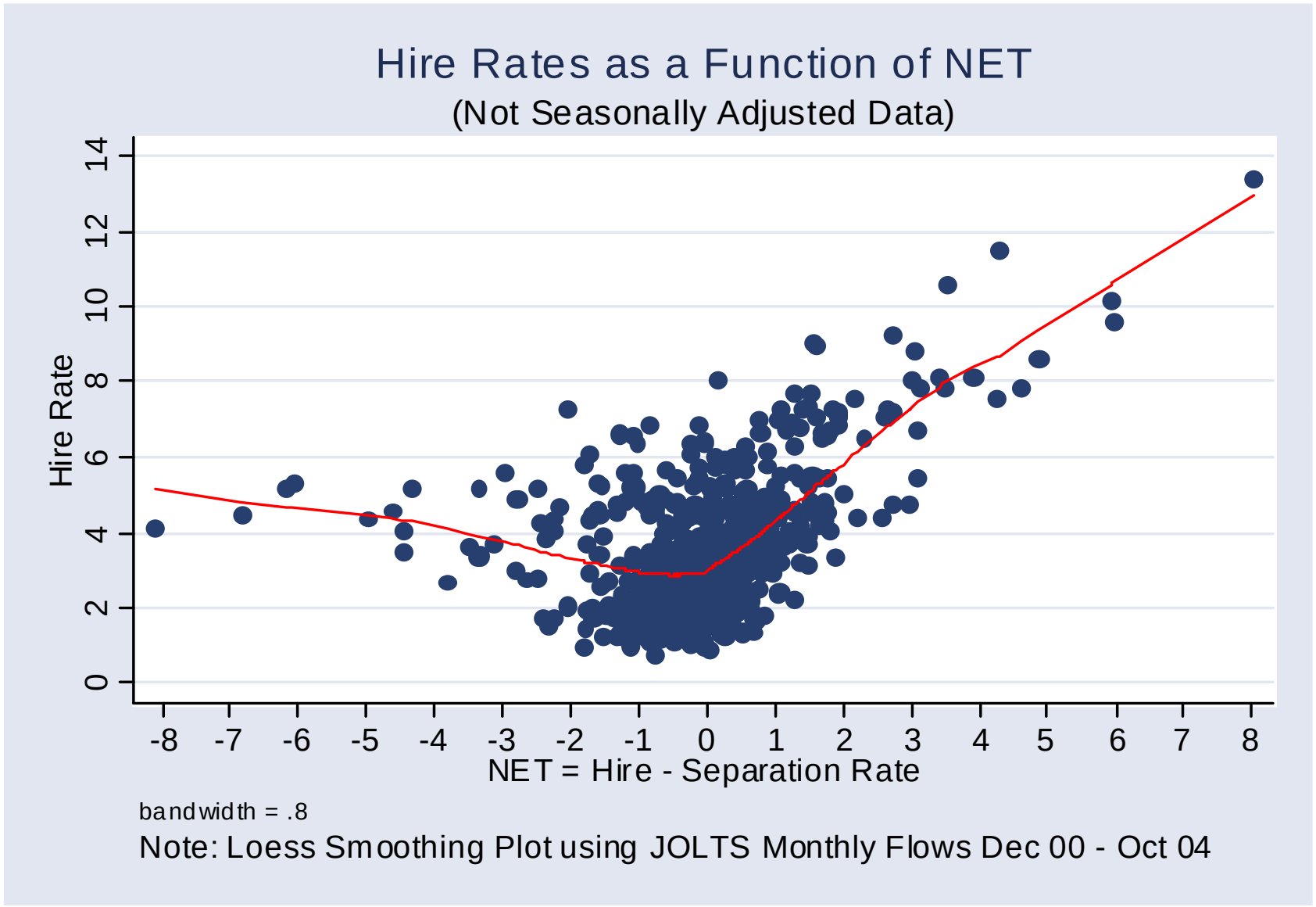
Cyclical Link Between Job and Worker Flows

Micro Nonlinearity + Heterogeneity = Complex Aggregation

Overview

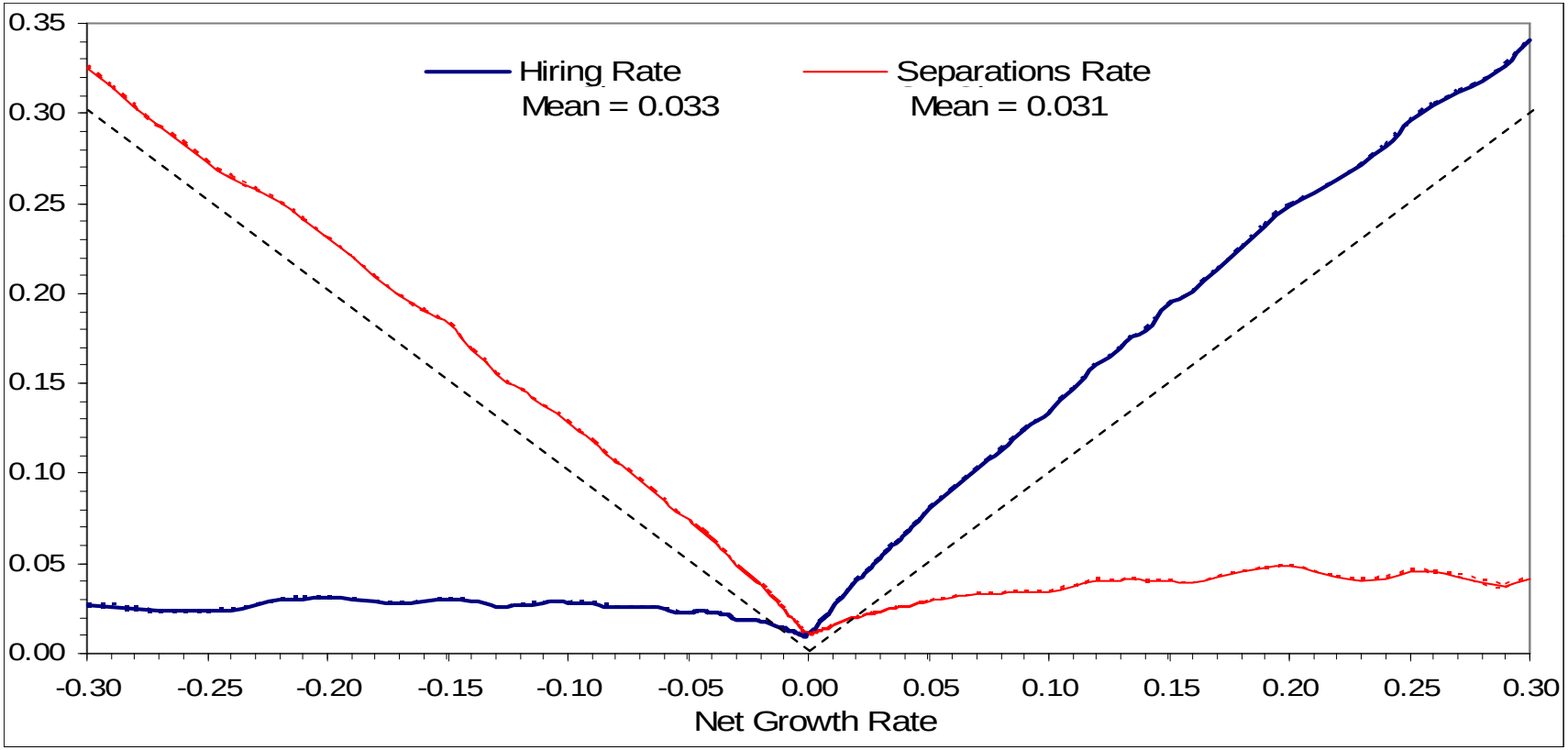
- Caution about drawing inferences for representative worker/firm based upon aggregate/industry evidence
- Aggregate behavior may reflect micro nonlinearities + heterogeneity
  - More than just compositional aggregation problems


Separation Rates as a Function of NET
(Not Seasonally Adjusted Data)
Separation Rate
0
2
4
6
8
10
12
14
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
NET = Hire - Separation Rate
bandwidth = .8
Note: Loess Smoothing Plot using JOLTS Monthly Flows Dec 00 - Oct 04



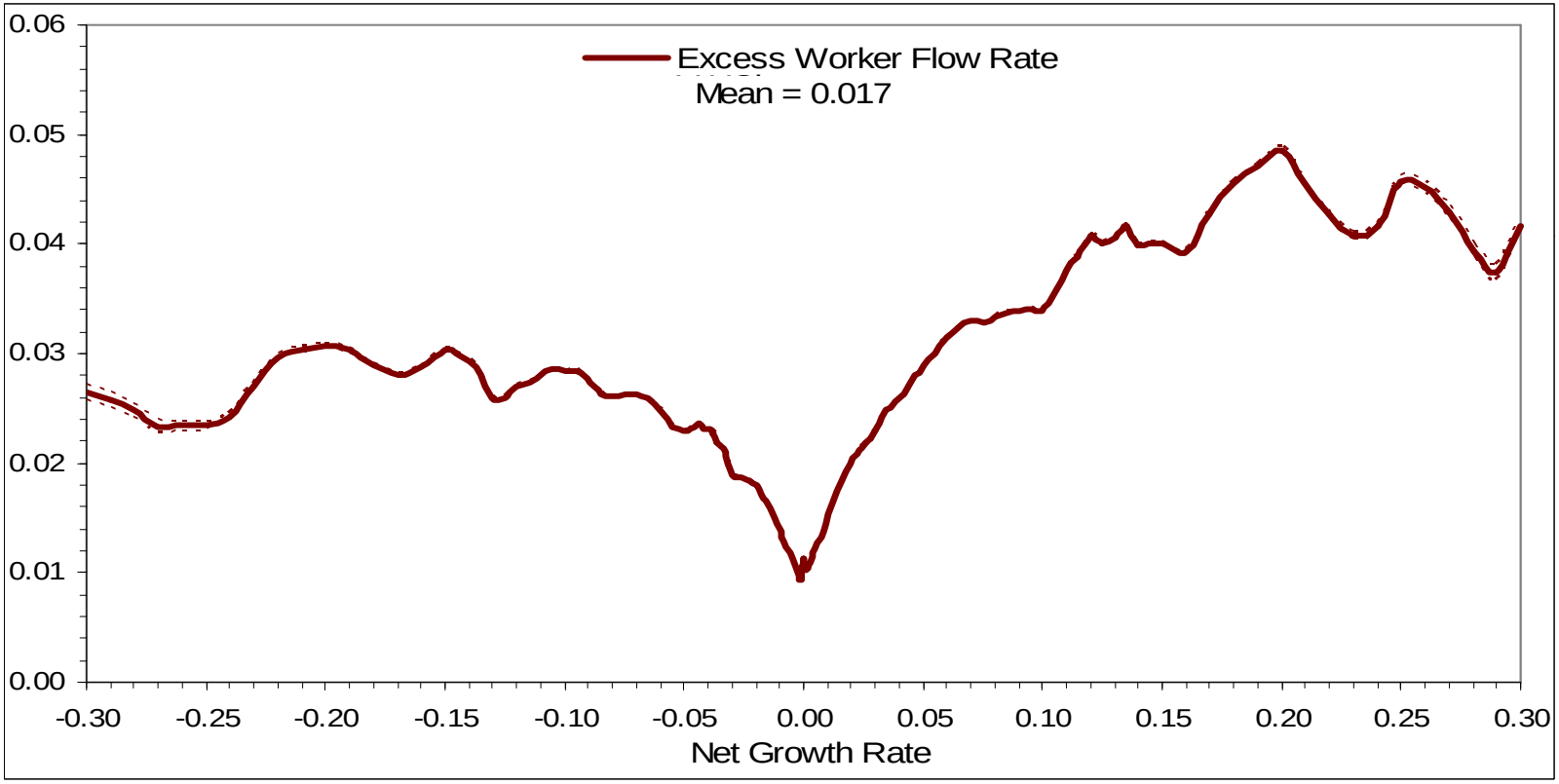
Note: Loess Smoothing Plot using JOLTS Monthly Flows Dec 00 - Oct 04

Worker & Job Flow Relations – Hires and Separations vs Net Growth



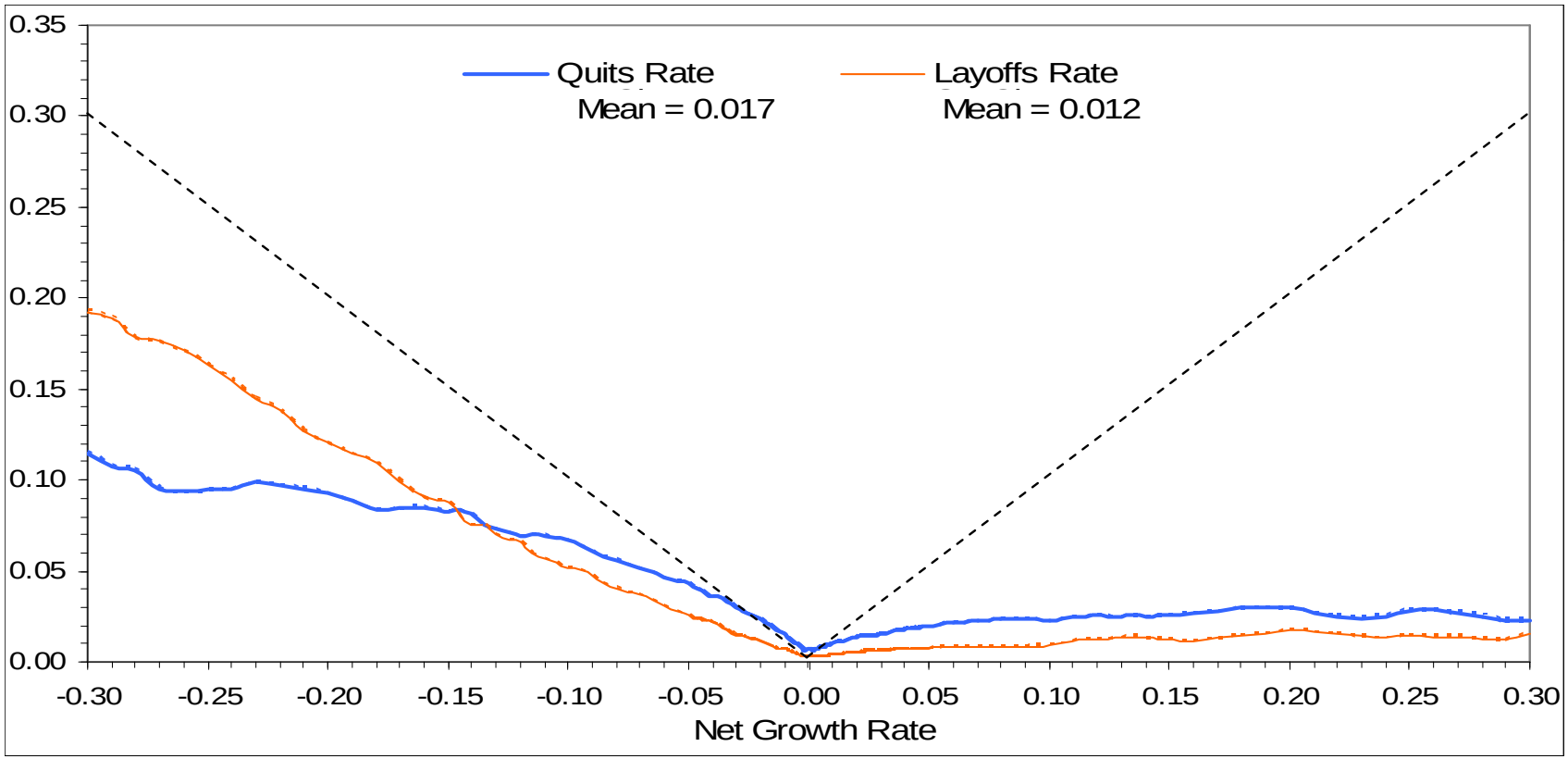
- Strong nonlinear relations of *H* and *S* to net growth
  - *H* rates rise sharply to right of 0, *S* rates rise sharply to left of 0
  - Considerable hires at contracting, separations at expanding estabs

Worker & Job Flow Relations – Excess Worker Flows vs Net Growth

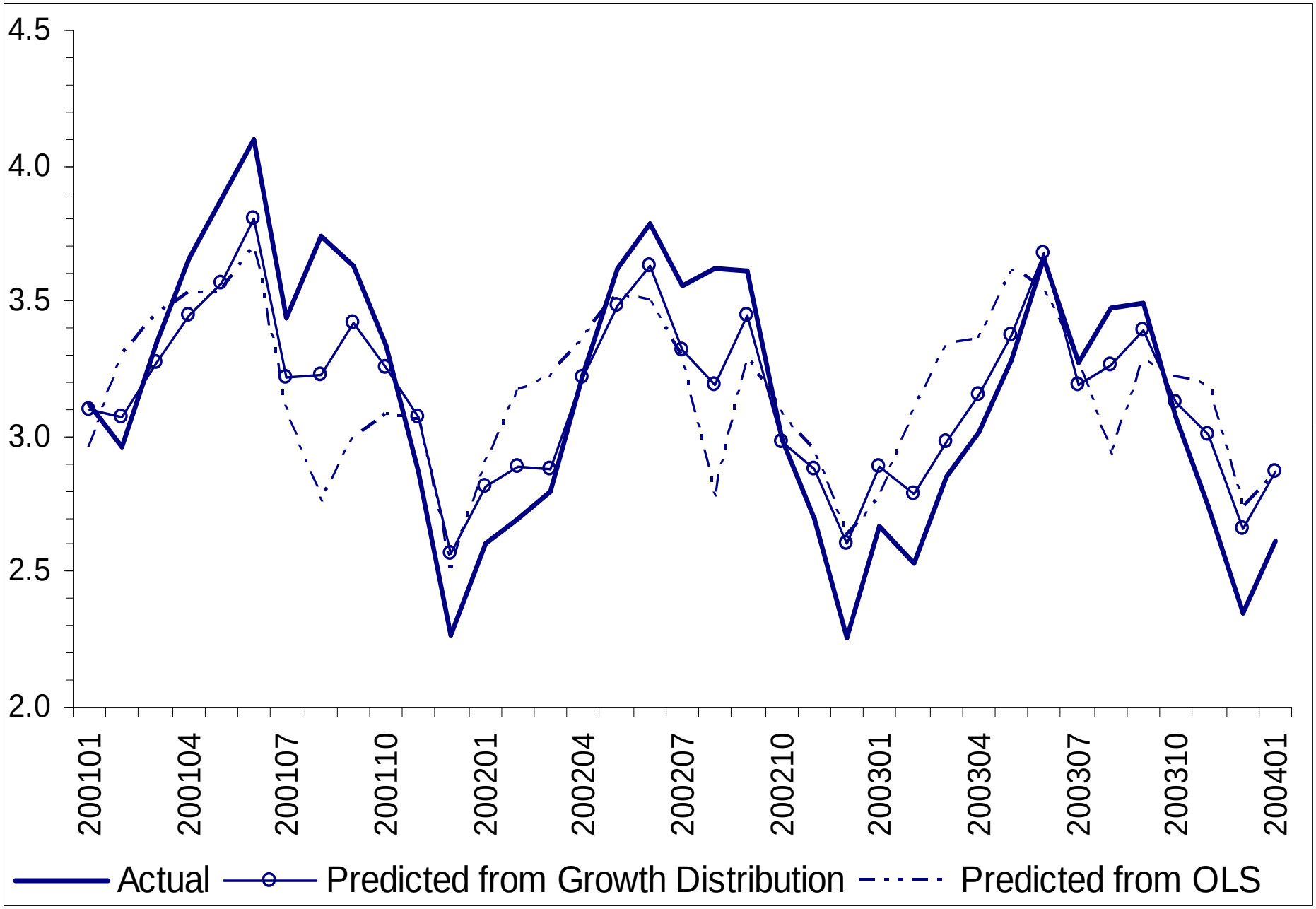


- Excess Flow ≡ $H - JC = S - JD$, highlights churning from last figure
  - Excess flows increase with the magnitude of net growth
  - Greater excess churning for expanding estabs (~ 4-5 pct vs 2-3 pct)

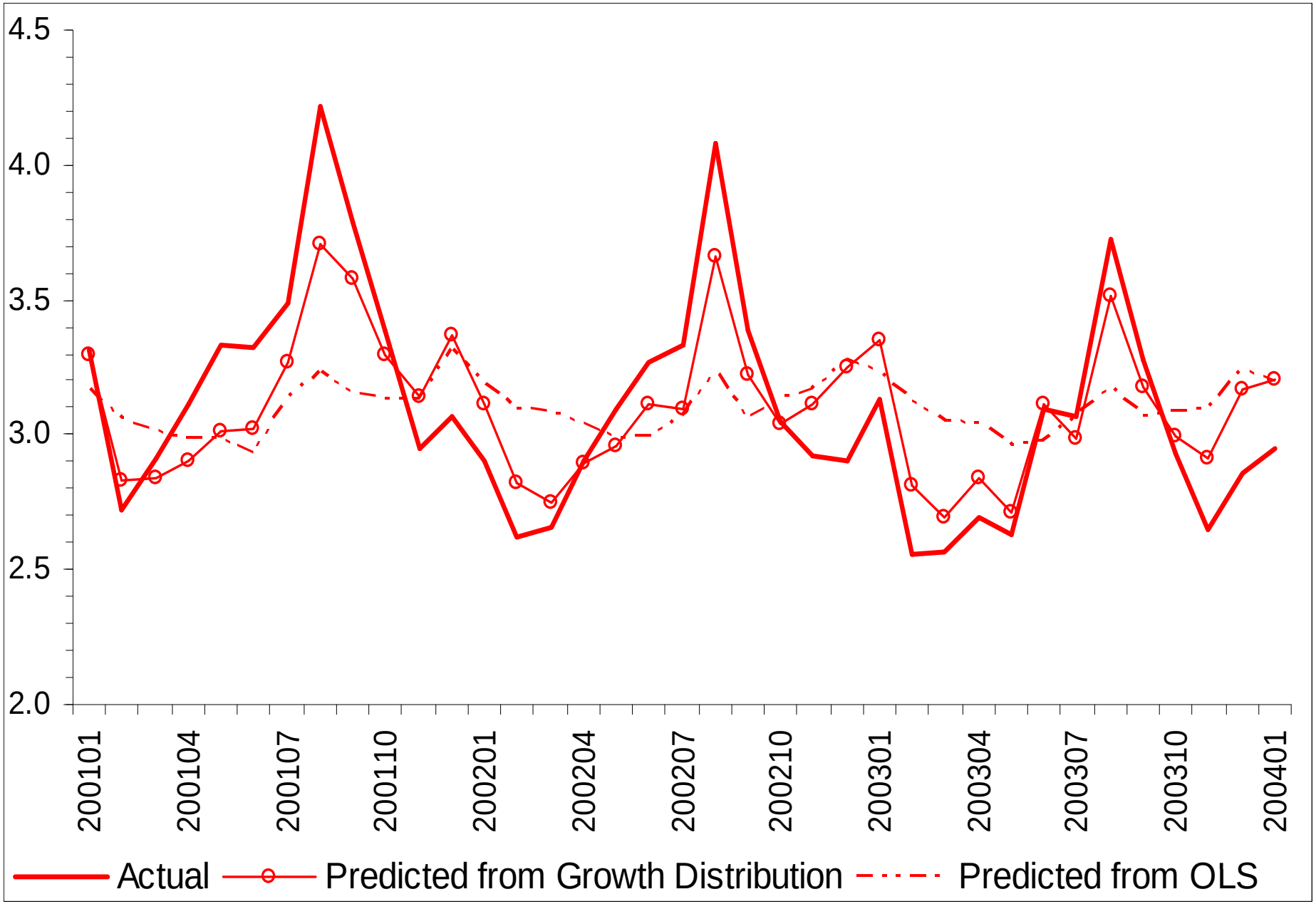
Worker & Job Flow Relations – Quits and Layoffs vs Net Growth



- Quits, Layoffs also exhibit strong nonlinear patterns
  - Quits dominate separations at expansions
  - Quits also account for many separations at contractions
  - Layoff/quit ratio rises as net growth rate becomes more negative


4.5
4.0
3.5
3.0
2.5
2.0
200101
200104
200107
200110
200201
200204
200207
200210
200301
200304
200307
200310
200401
Actual
Predicted from Growth Distribution
Predicted from OLS

Hires



Separations

Nonlinear aggregation

$$H = \int h(n)\, f(n)\, dn$$

$$S = \int s(n)\, f(n)\, dn$$

Cross sectional distribution shape and location matters
Concentration matters!

Taking stock

- Idiosyncratic shocks dominate
  - Technology
  - Taste
  - Cost
- Time varying intensity of reallocation shocks vs. changes in incentives?
- Efficiency?
  - Is it at least productivity enhancing?
    - Measurement issues for productivity
  - What market structure/institutions promote efficient reallocation?
    - Cautions:
      - Second Best and Creative Destruction

Taking stock Cont...

- Large scale job (and worker flows) driven by idiosyncratic shocks
- Varies by sector, cyclically, time period, country
- From here – two areas of focus:
  - Cyclicality:
    - Theory
    - More structured empirical analysis
  - Productivity and reallocation:
    - Theory
    - More structured empirical analysis