

Determinants of Change in Service Employment in the United States 1998-2005: Findings Based on a New Classification of Industries

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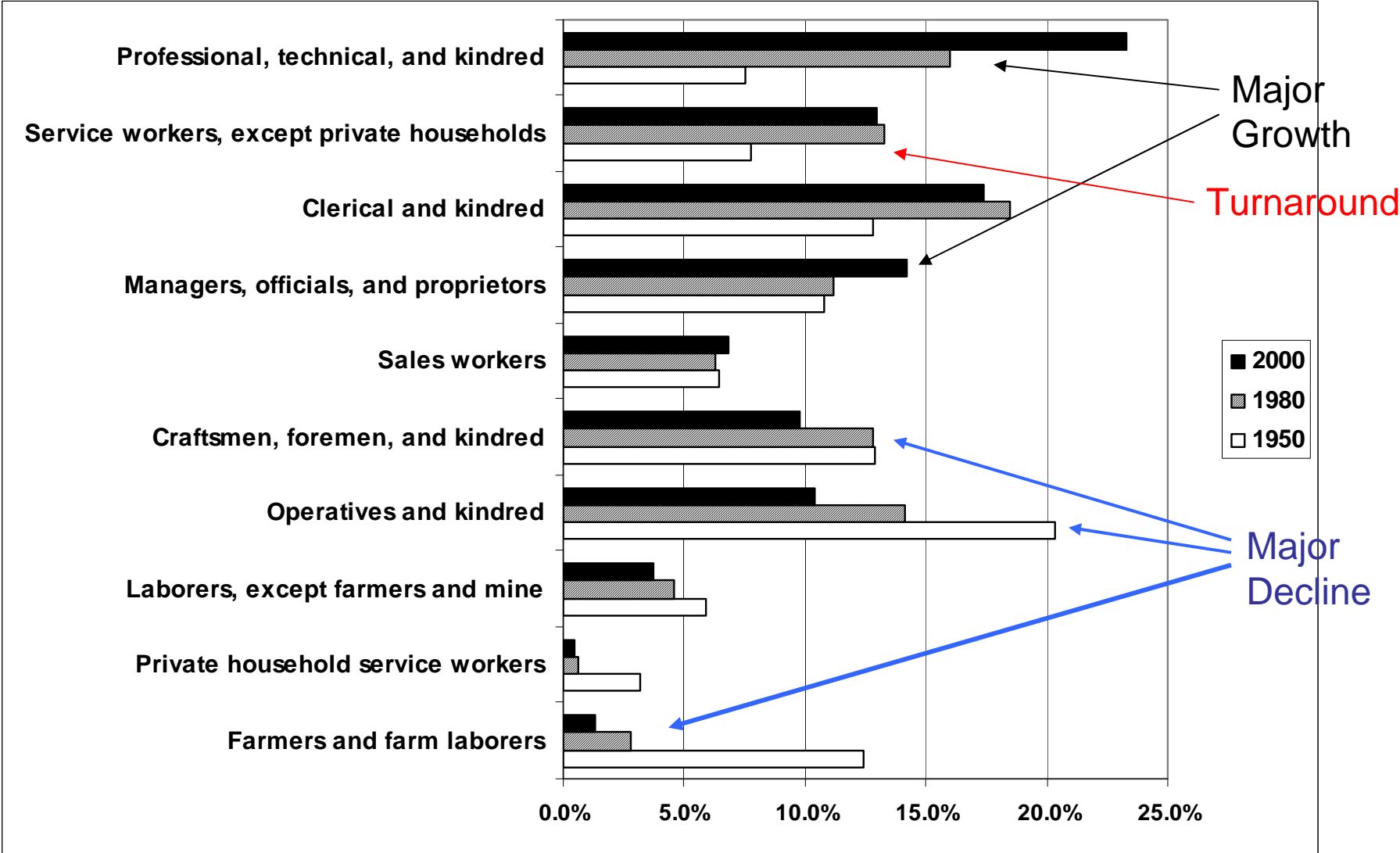
Outline

- 1. Introduction
- 2. Background
 - Selected Literature
 - My 2007 RESER paper
 - Extensions of the classification
- 3. Trends 1998-2005 & Correlates of State Growth
- 4. Concluding Comments

1. Background

- A brief history of industry classification schemes
 - Fisher, Clark, Browning & Singelmann, Greenfield, Noyelle & Stanback, Ochel & Wegner, Petit, Rubalcaba-Bermejo
- The increasing attention on occupations and emerging industries
 - Florida, Markusen et.al., Scott, Beyers, Malecki & Moriset, Zook, Scott
- Hence, a need to revisit industry classifications with industry-x-occupation data
 - Implied by Daniels & Bryson

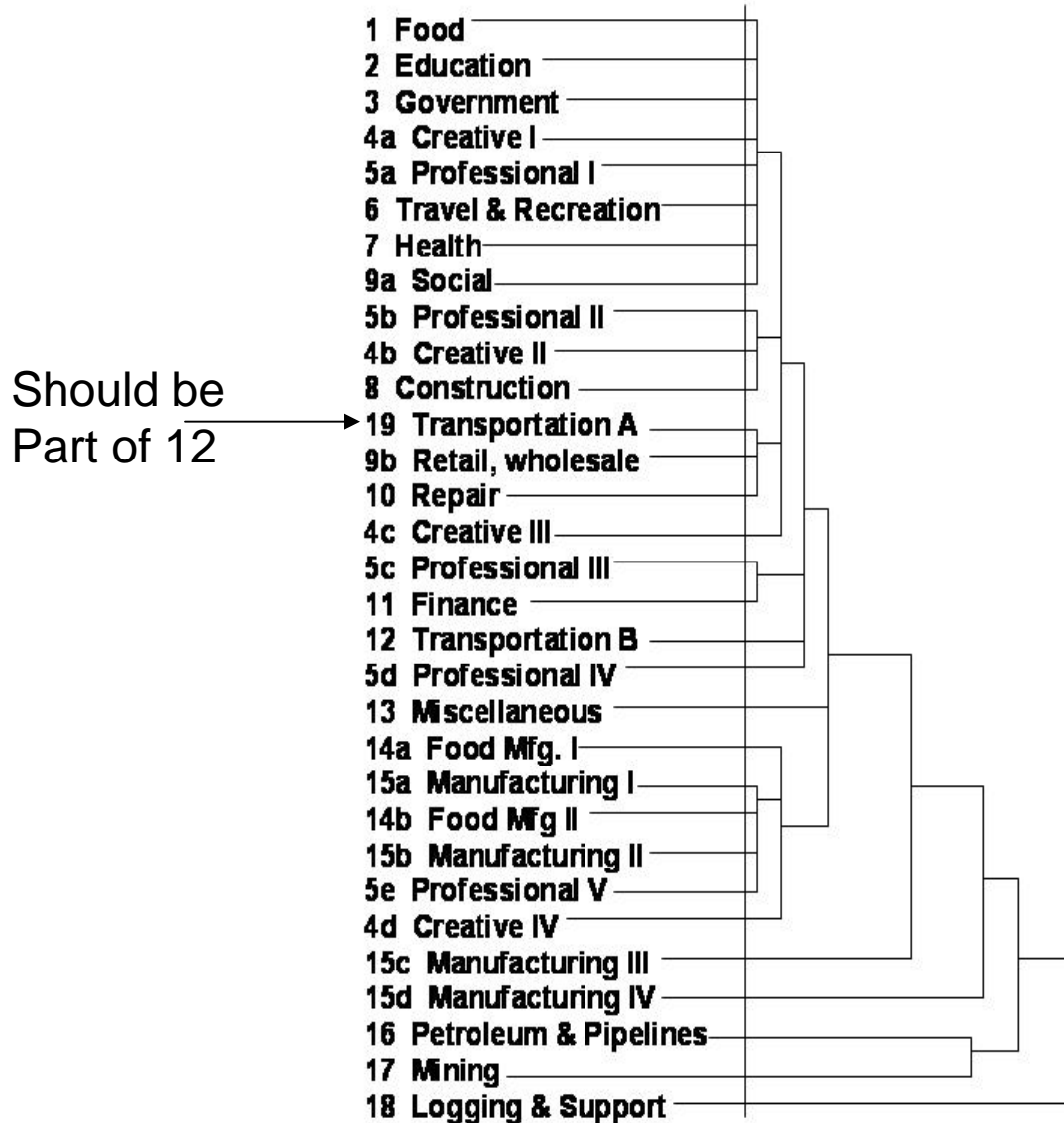
Wyatt & Hecker's Industry-x-Occupation Data



My 2007 RESER Classification

- Used 2006 Bureau of Labor Statistics industry-x-occupation matrix
- 295 industries and 75 occupations
- Used hierarchical cluster analysis (Wards Algorithm)
- Yielded 18 industry groups, with distinctive occupational structures
- My 2007 paper is available for those interested
- The next figures present key characteristics of these clusters

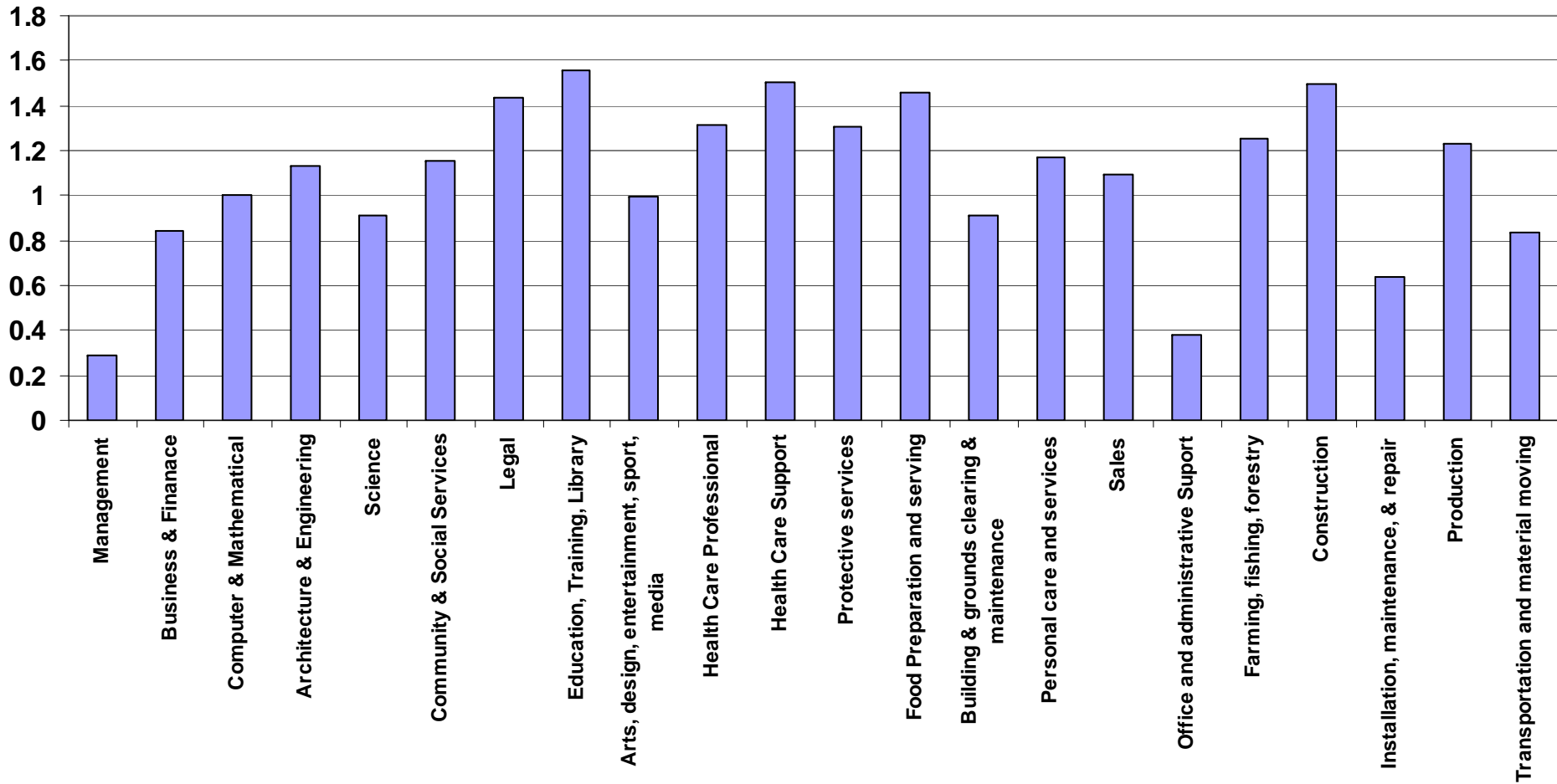
Dendrogram from Cluster Analysis



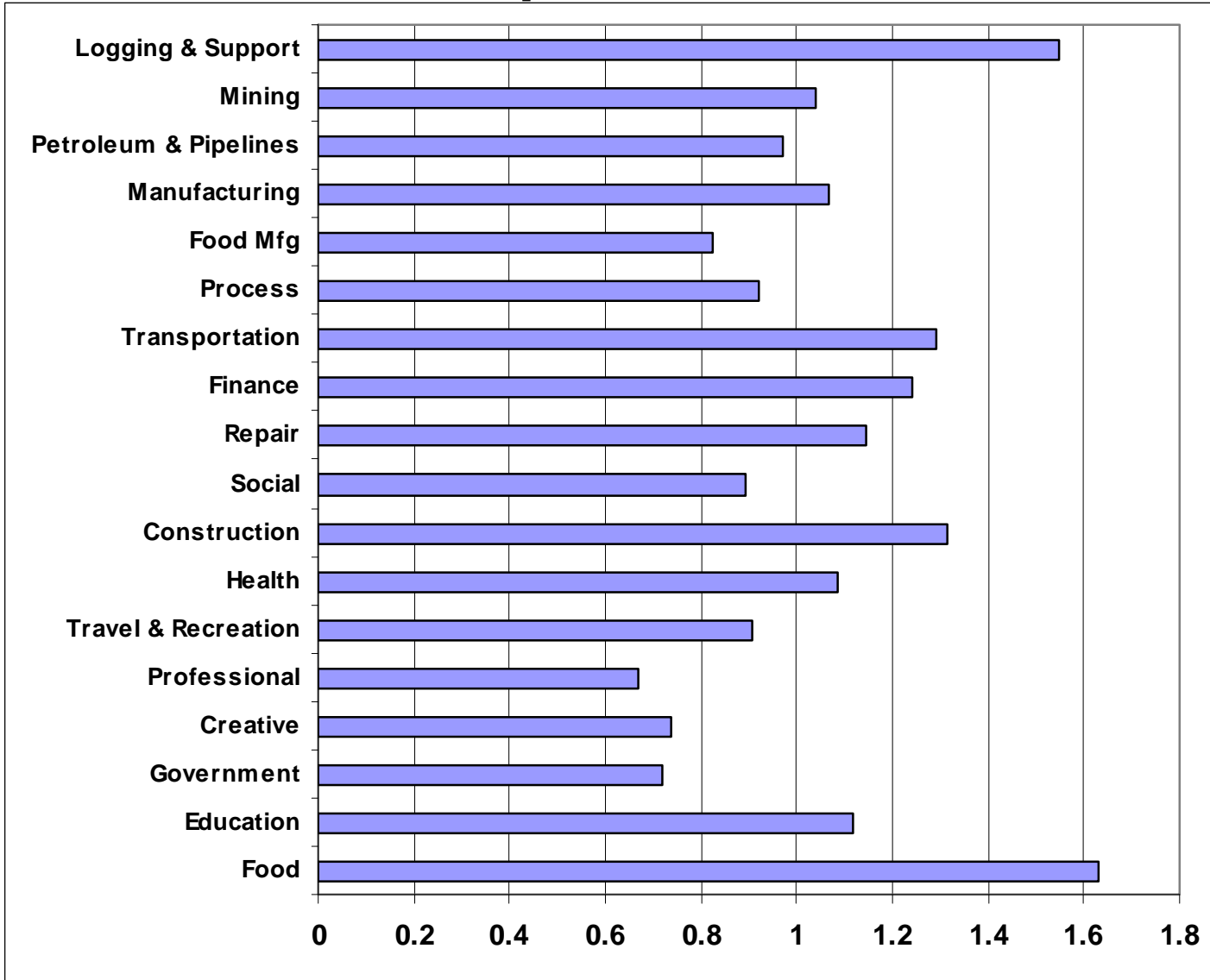
Summary Occupational Quotients by Cluster

		Management	Business & Finance	Computer & Mathematical	Architecture & Engineering	Science	Community & Social Services	Legal	Education, Training, Library	Arts, design, entertainment, sport, media	Health Care Professional	Health Care Support	Protective services	Food Preparation and serving	Building & grounds clearing & maintenance	Personal care and services	Sales	Office and administrative Support	Farming, fishing, forestry	Construction	Installation, maintenance, & repair	Production	Transportation and material moving
Food	1	0.50	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.12	10.58	0.21	0.03	0.28	0.05	0.00	0.00	0.04	0.06	0.30
Education	2	0.94	0.37	0.60	0.09	1.44	1.58	0.03	9.48	0.93	0.39	0.11	0.39	0.45	1.33	0.62	0.02	0.61	0.06	0.07	0.31	0.02	0.34
Government	3	1.09	1.57	0.85	1.24	2.11	4.57	3.17	0.39	0.40	0.68	0.59	10.07	0.14	0.96	1.42	0.07	1.16	0.74	1.13	0.98	0.24	0.30
Creative	4	1.42	1.07	7.18	0.90	0.87	0.02	0.18	0.34	9.30	0.02	0.00	0.14	0.11	0.16	0.71	1.43	1.11	0.20	0.05	1.78	0.90	0.46
Professional	5	1.46	2.35	1.61	3.06	3.08	0.21	4.73	0.10	1.04	0.51	0.39	1.74	0.11	2.89	0.29	0.57	1.43	0.54	0.39	0.77	0.64	0.76
Travel & Recreation	6	0.76	0.34	0.10	0.03	0.14	0.22	0.02	0.20	1.37	0.03	0.11	1.31	2.42	5.27	8.01	0.43	0.94	0.18	0.04	1.13	0.12	0.46
Health	7	0.74	0.27	0.20	0.02	0.53	3.59	0.02	0.46	0.12	6.39	7.15	0.18	0.37	0.83	3.74	0.05	0.96	0.00	0.02	0.18	0.07	0.08
Construction	8	1.03	0.63	0.04	0.54	0.04	0.00	0.01	0.00	0.07	0.00	0.00	0.03	0.00	0.18	0.00	0.18	0.53	0.01	13.36	1.74	0.16	0.52
Social	9	0.79	0.44	0.21	0.18	0.17	0.69	0.04	0.05	0.46	0.32	0.10	0.08	0.11	0.25	0.24	4.04	1.17	1.01	0.10	1.46	0.35	2.09
Repair	10	0.56	0.40	0.21	0.10	0.04	0.00	0.01	0.00	0.02	0.00	0.00	0.04	0.00	0.18	0.00	0.94	0.68	0.00	0.04	11.57	0.52	3.19
Finance	11	1.73	5.42	2.20	0.02	0.45	0.04	1.40	0.00	0.25	0.13	0.02	0.10	0.00	0.09	0.00	0.58	3.08	0.01	0.00	0.06	0.00	0.00
Transportation	12	0.57	0.29	0.10	0.07	0.16	0.01	0.02	0.00	0.07	0.02	0.00	0.12	0.04	0.11	1.15	0.18	0.68	0.18	0.24	1.47	0.18	9.88
Misc.	13	1.36	1.19	0.99	4.34	4.16	0.00	0.23	0.00	0.23	0.05	0.00	0.22	0.00	0.16	0.00	0.19	0.94	0.05	0.80	5.50	3.25	0.61
Food Mfg	14	0.52	0.20	0.05	0.10	0.30	0.00	0.00	0.00	0.24	0.17	0.05	0.06	0.94	0.31	0.02	2.41	0.92	1.77	0.02	0.65	3.54	2.00
Manufacturing	15	1.13	0.70	0.84	3.57	0.56	0.00	0.04	0.00	0.38	0.02	0.00	0.06	0.00	0.18	0.00	0.31	0.56	0.27	0.37	1.21	7.27	1.04
Petroleum & Pipelines	16	1.09	0.70	0.27	2.76	3.02	0.00	0.00	0.00	0.03	0.04	0.00	0.05	0.00	0.07	0.00	0.16	0.82	0.55	1.50	2.78	5.40	1.07
Mining	17	1.24	0.89	0.41	2.31	3.16	0.00	0.60	0.00	0.04	0.08	0.00	0.04	0.00	0.06	0.00	0.12	0.56	0.10	7.53	2.08	1.13	2.16
Logging & Support	18	0.35	0.08	0.02	0.01	0.62	0.00	0.00	0.01	0.04	0.01	0.00	0.05	0.00	0.41	0.62	0.05	0.33	211.95	0.03	0.53	0.16	1.80

Coefficient of Occupational Specialization



Indices of Cluster Occupational Specialization



3. Trends and Patterns in the United States 1998-2005 & Correlates of State Growth

- Developed employment data by state for all clusters for 1998 and 2005
- Data included employed and self-employed people
- Some summary graphics & analyses are presented
- This section also explores correlates of state growth trends viz-a-viz the clusters

Employment Trend by Cluster

	<u>1998</u>	<u>2005</u>	<u>Change</u>	<u>Change</u> %
Food	7,908,842	9,394,854	1,486,012	18.8%
Education	2,317,688	2,498,175	180,487	7.8%
Government	129,052	171,686	42,634	33.0%
Creative	8,224,712	9,438,000	1,213,288	14.8%
Professional	22,388,085	27,052,198	4,664,113	20.8%
Travel & Recreation	4,049,768	4,403,528	353,761	8.7%
Health	15,733,026	18,760,459	3,027,433	19.2%
Construction	8,044,512	9,222,764	1,178,252	14.6%
Social & Retail/Wholesale	21,684,646	23,842,154	2,157,508	9.9%
Repair	1,467,051	1,524,078	57,027	3.9%
Finance	5,986,479	7,164,584	1,178,105	19.7%
Transportation	3,704,833	5,548,201	1,843,369	49.8%
Process	1,057,668	918,831	-138,837	-13.1%
Food Mfg	4,896,453	4,371,522	-524,929	-10.7%
Manufacturing	14,286,106	11,113,374	-3,172,732	-22.2%
Petroleum & Pipelines	154,475	160,880	6,405	4.1%
Mining	579,258	597,010	17,752	3.1%
Logging & Support	<u>323,641</u>	<u>311,934</u>	<u>-11,707</u>	-3.6%
Total	122,936,292	136,494,233	13,557,941	11.0%

Shift-Share Analysis

- Provides a way of highlighting state performance
- Competitive Shift +/- 2.6 million jobs, or almost 20% of change – strong redistribution over a short 7 year time period
- Maps of competitive shifts & Table 3 presenting key contributors to major competitive shifts – dominated by services and construction – not manufacturing as in many earlier analyses

Key Contributors to Competitive Shifts

Big Negative Competitive Shifts ($> -100,000$)

Michigan-Trade & Social; Construction

New York – Professional, Construction

Illinois – Professional, Trade & Social

Ohio – Trade & Social, Professional

Pennsylvania – Professional, Health

Massachusetts – Health, Professional

Big Positive Competitive Shifts ($>100,000$)

California – Trade & Social, Construction

Nevada – Professional, Trade & Social

Arizona – Construction, Trade & Social,
Professional

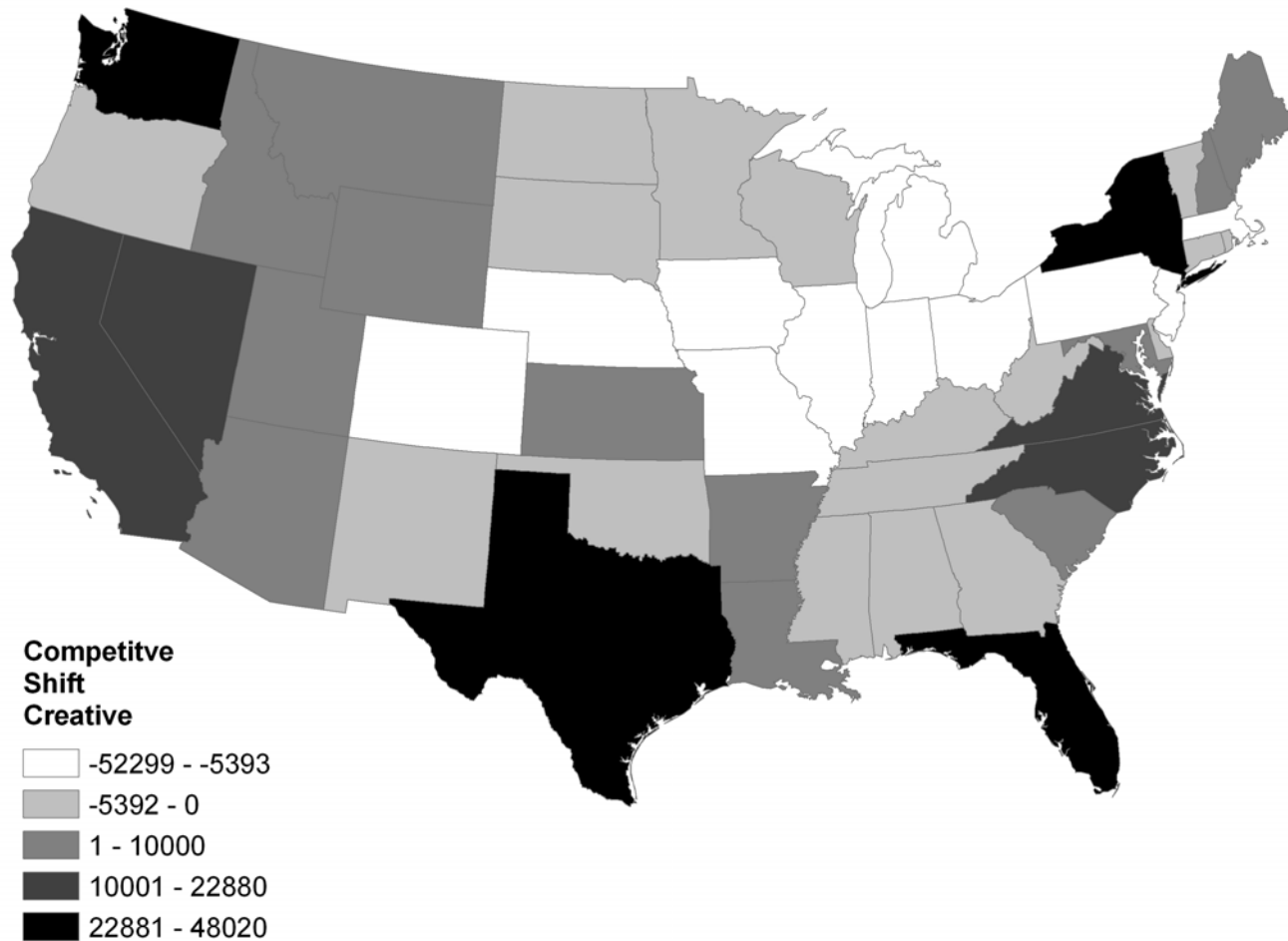
Texas – Trade & Social, Health

Florida – Professional, Construction

Georgia – Professional, Trade & Social

Virginia – Professional, Trade & Social

Competitive Shift- Creative Cluster



Correlates of state growth patterns

- Exploratory analysis at this stage
- Growth, the Atkinson & Correa New Economy Index, a High-Tech measure, and measures from the cluster analysis
- Indexed like location quotients
- Table 4 reports no explanation from the New Economy or High-Tech measures
- Table 4 also reports better explanations with the cluster measures, although not all are positive relationships, and many significant inter-cluster correlations

Correlates of State Growth

Correlations

		GROWTH	INDEX	HITECHLQ	PROF05	CREAT05	TRAVEL05	CONSTR05	HEALTH05
GROWTH	Pearson Correlation	1	-.024	-.449**	.243	-.145	.650**	.714**	-.541**
	Sig. (2-tailed)	.	.868	.001	.089	.314	.000	.000	.000
	N	50	50	50	50	50	50	50	50
INDEX	Pearson Correlation	X -.024	1	.757**	.682**	.847**	-.089	-.173	-.286*
	Sig. (2-tailed)	.868	.	.000	.000	.000	.539	.229	.044
	N	50	50	50	50	50	50	50	50
HITECHLQ	Pearson Correlation	X -.449**	X .757**	1	.563**	.727**	-.446**	-.395**	-.156
	Sig. (2-tailed)	.001	.000	.	.000	.000	.001	.005	.278
	N	50	50	50	50	50	50	50	50
PROF05	Pearson Correlation	.243	X .682**	X .563**	1	.559**	.002	.020	-.563**
	Sig. (2-tailed)	X .089	.000	.000	.	.000	.989	.888	.000
	N	50	50	50	50	50	50	50	50
CREAT05	Pearson Correlation	-.145	X .847**	X .727**	X .559**	1	-.187	-.243	-.173
	Sig. (2-tailed)	X .314	.000	.000	.000	.	.194	.090	.229
	N	50	50	50	50	50	50	50	50
TRAVEL05	Pearson Correlation	.650**	X -.089	X -.446**	X .002	X -.187	1	.367**	-.417**
	Sig. (2-tailed)	X .000	.539	.001	.989	.194	.	.008	.002
	N	50	50	50	50	50	51	51	51
CONSTR05	Pearson Correlation	.714**	X -.173	X -.395**	X .020	X -.243	X .367**	1	-.321*
	Sig. (2-tailed)	X .000	.229	.005	.888	.090	.008	.	.022
	N	50	50	50	50	50	51	51	51
HEALTH05	Pearson Correlation	X -.541**	X -.286*	X -.156	X -.563**	X -.173	X -.417**	X -.321*	1
	Sig. (2-tailed)	.000	.044	.278	.000	.229	.002	.022	.
	N	50	50	50	50	50	51	51	51

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

X – No relation

X – Positive Relation – Significant

X - Negative Relation - Significant

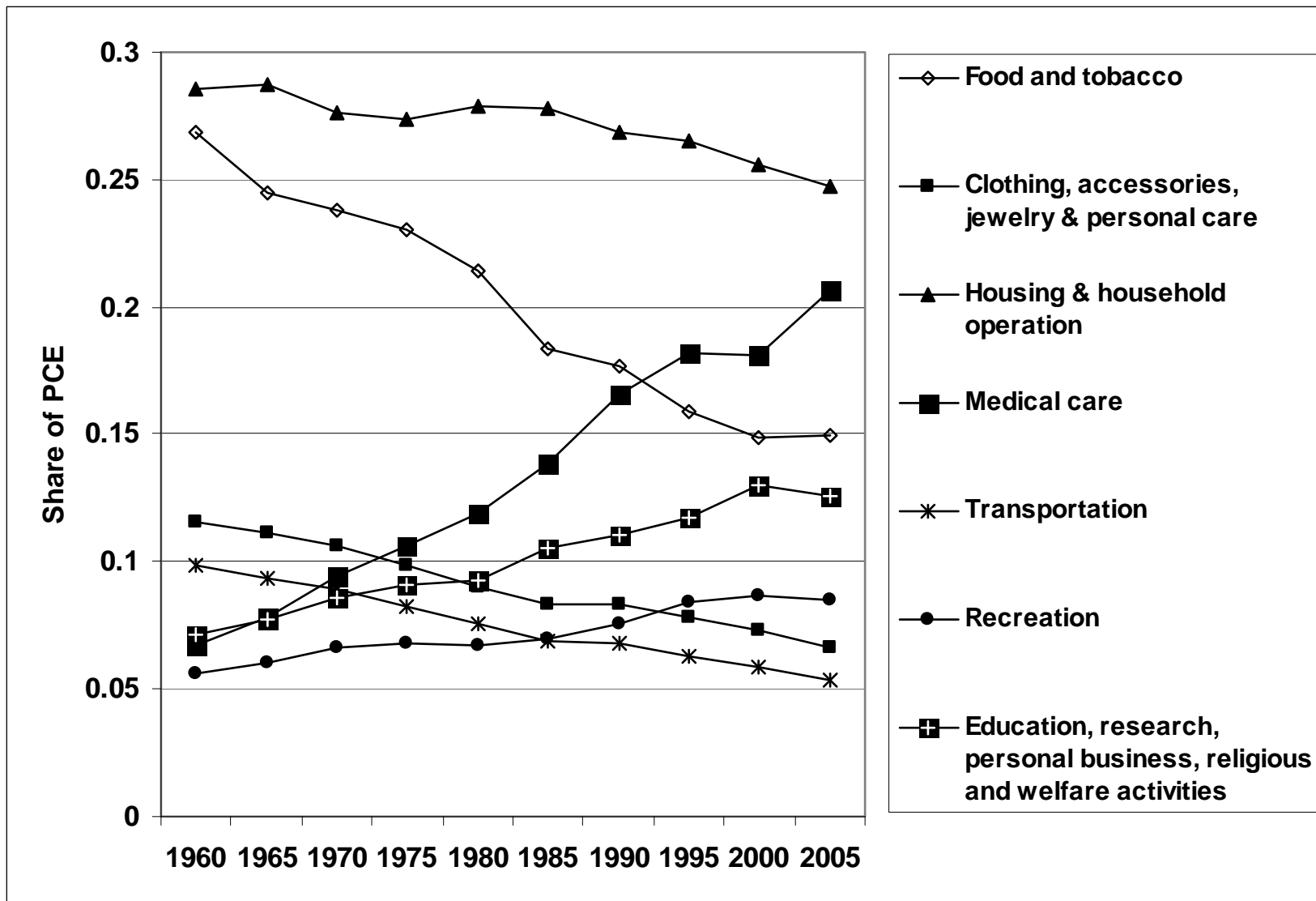
The Role of Industrial Markets

- Early industry classifications differentiated between consumer and intermediate markets
- Using the U.S. GDP Accounts to estimate markets by cluster
- Clear differences emerge in Table 5
- Trends are probably affected by shifting patterns of consumption, as reported in Figure 8
- Markets of some key clusters are mixed between households, exports, industry & government
- Further work is needed to tease out relationships discussed in this part of the paper

Markets by Cluster

Cluster	% Intermediate	% Consumption	% Other Final Demand
1 Food	21.1%	78.9%	0.1%
2 Education	9.7%	90.2%	0.1%
4 Creative	59.8%	23.5%	16.7%
5 Professional	74.5%	20.7%	4.8%
6 Travel & Recreation	29.8%	69.7%	0.5%
7 Health	2.4%	97.7%	0.0%
8 Construction	10.7%	0.0%	89.3%
9 Retail, Wholesale, Social	34.5%	54.9%	10.5%
10 Repair	37.5%	61.1%	1.4%
11 Finance	54.3%	46.2%	-0.5%
12 Transportation	59.1%	29.5%	11.3%
13 Process	70.8%	27.6%	1.7%
14 Food Manufacturing	45.4%	56.3%	-1.7%
15 Manufacturing	62.8%	29.2%	8.0%
16 Petroleum & Pipelines	69.8%	36.5%	-6.3%
17 Mining	136.7%	0.1%	-36.8%
18 Logging & Support	96.8%	1.0%	2.2%

Trends in Consumption



4. Concluding Comments (1)

- This paper has built on results reported in 2007 at RESER. The data base has been extended, and more analyses have been completed
- It extends the single-cluster work of scholars like Markusen to the whole economy
- It reports on differences in state performance related to cluster concentration
- It suggests a relationship between changing patterns of consumption, intermediate use, exports, but this relationship needs to be explored in more detail
- Simultaneous consideration of demand, supply, occupations, trade, and geography need to be developed further

Concluding Comments (2)

- In the case of the U.S., this type of analysis needs to be extended to geographic units smaller than states, such as BEA economic areas or Metropolitan Areas
- Similar analysis is needed in other countries, such as here in Europe, but it is recognized that data availability is a challenge
- It is very difficult for scholars to assemble data according to schema such as developed in this paper; statistical agencies should reconsider how they group data based on basic underlying records, or how their search-engines are configured to allow more creative aggregations of data by scholars interested in data from perspectives like that developed in this paper