Multinational Firms in the U.S. Economy: Insights from Newly Integrated Microdata

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Introduction

- Ongoing effort to link BEA survey microdata to the Census Business Register

- BEA Direct Investment Surveys
  - Surveys of U.S. Direct Investment Abroad (BE-10/11) – collect data on U.S. parents (own at least ten percent of a foreign entity) and their foreign affiliates
  - Surveys of Foreign Direct Investment in the United States (BE-12/15) – collect data on U.S. affiliates at least ten percent owned by a foreign person
  - Detailed data source on direct investment and activities of multinational entities

- Census Business Register (BR)
  - Record of all U.S. business establishments and companies with paid employees sourced from tax filings
  - Sampling frame for economic censuses and Census employer business surveys

Census-BEA Data Linking Project

- U.S. Parent Crosswalk (BE-10/BE-11 linked to BR)
  - Completed: 2007-2013
  - In progress: 1997-2006; 2014-2017*

- U.S. Affiliate of Foreign Parent Crosswalk (BE-12/BE-15 linked to BR)
  - Completed 1997-2012
  - In progress: 2013-2017*

* BEA has published aggregated 2018 data but has not transferred that microdata to the FSRDC (thus it is not available for linking)

Prior Linking of BEA-Census Surveys and Related Research

- Periodic linking has been done between U.S. affiliate survey and Census records
  - Howenstine and Zeile (1992) provide the first comprehensive view of U.S. affiliates in the broader U.S. economy using linked BEA and Census data from 1987
  - U.S. affiliate data linking subsequently done every five years (1987, 1992, 1997, 2002, 2007). Was discontinued after 2007 to redirect resources to a BEA-BLS linking project.

- Much less has been done using U.S. parent records
  - Doms and Jensen (1998) expand on earlier analysis of linked affiliate data, incorporating a limited classification of domestic firms with foreign exposure as a proxy for U.S. parents
  - Some linking of U.S. parent and Census records was done via joint BEA-Census-NSF project linking BEA and Business R&D and Innovation Survey (BRDIS) data

Benefits of the Current Project

- More comprehensive than prior linking and will be more broadly available for research
  - This work incorporates and builds on prior links
  - Current links bring in both U.S. affiliate and U.S. parent data and will span at least twenty years
  - Links will be available to FSRDC researchers working on approved projects
- Linked data facilitates expanded scope of research and in the future will potentially lead to new published statistics
  - Facilitates comparisons of multinational and direct investment linked firms with firms in the broader U.S. economy
  - Combine additional information about linked firms
  - Establishment-level detail from Census data enables more granular analysis of activity by industry and sub-national geography
  - Internal research projects at both BEA and Census are currently examining the development of new statistics based on linked microdata

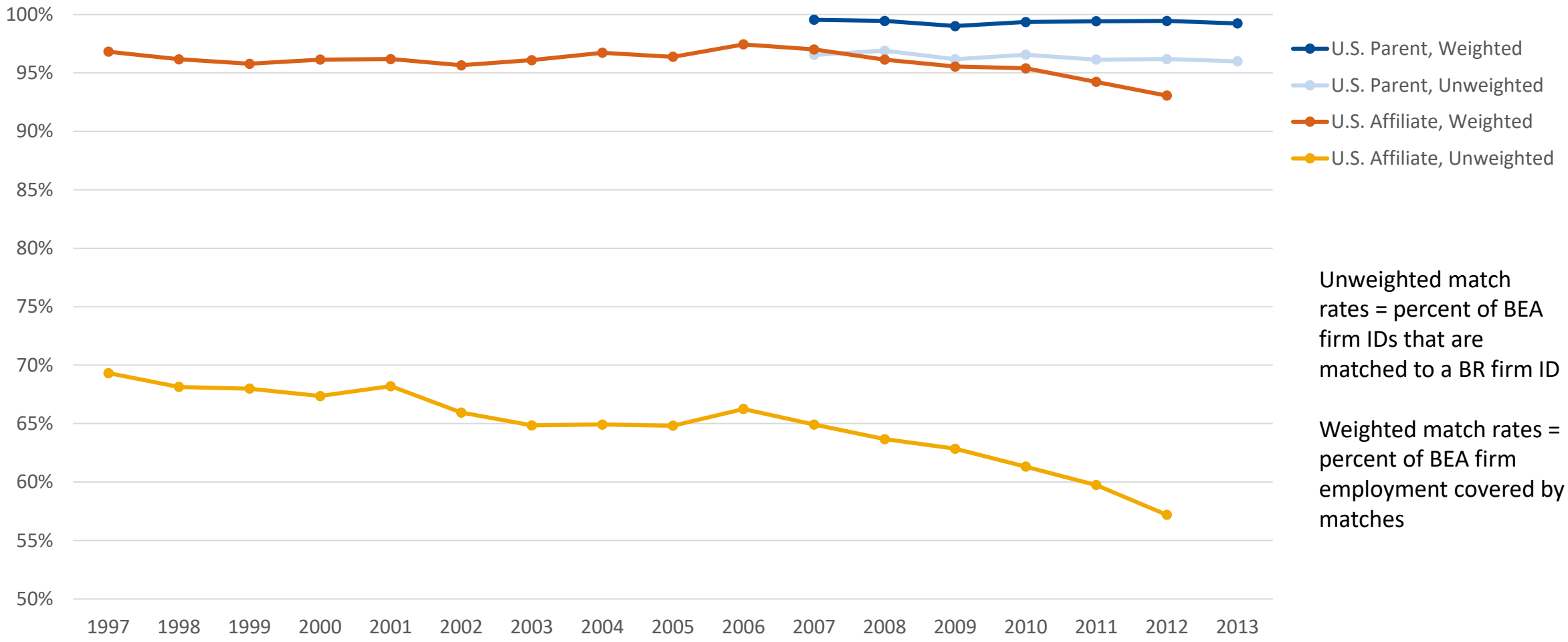
Linking Methodology

- Census BR firm IDs are linked to BEA firm IDs from each survey and for each year

- Methodology follows the LFTTD matching methodology in Kamal and Ouyang (2020)
  - Employer Identification Number (EIN) matching
  - Deterministic and probabilistic name and address matching
  - Clerical matching for select years
  - Machine learning

- Algorithm developed to prioritize a unique match when a BEA ID links to multiple Census IDs
  - Uses combinations of matching EIN, name, state, and/or sector

Annual Match Rates by Survey



Unweighted match rates = percent of BEA firm IDs that are matched to a BR firm ID

Weighted match rates = percent of BEA firm employment covered by matches

On average, more than half of the unmatched U.S. affiliates are in the real estate industry (industry 5310)

Distribution of Matched Employment

Distribution of LBD/BEA Employment Ratios by Employment Size Class				
Employment Size Class	**1997**	**2002**	**2007**	**2012**
Parent Crosswalk				
Less than 1,000			4.719	23.9
1,000-10,000			1.296	1.135
10,000+			1.058	1.044
Affiliate Crosswalk				
Less than 1,000	63.38	223.4	124.2	155.8
1,000-10,000	1.497	1.939	1.68	1.28
10,000+	0.9234	1.055	1.122	0.9092

- BEA and Census employment aligns closely for the largest firms
- Large employers account for the largest share of employment (and small employers for the smallest) in the BEA data
- This indicates agreement by employment for the most economically important firms

Match Validation

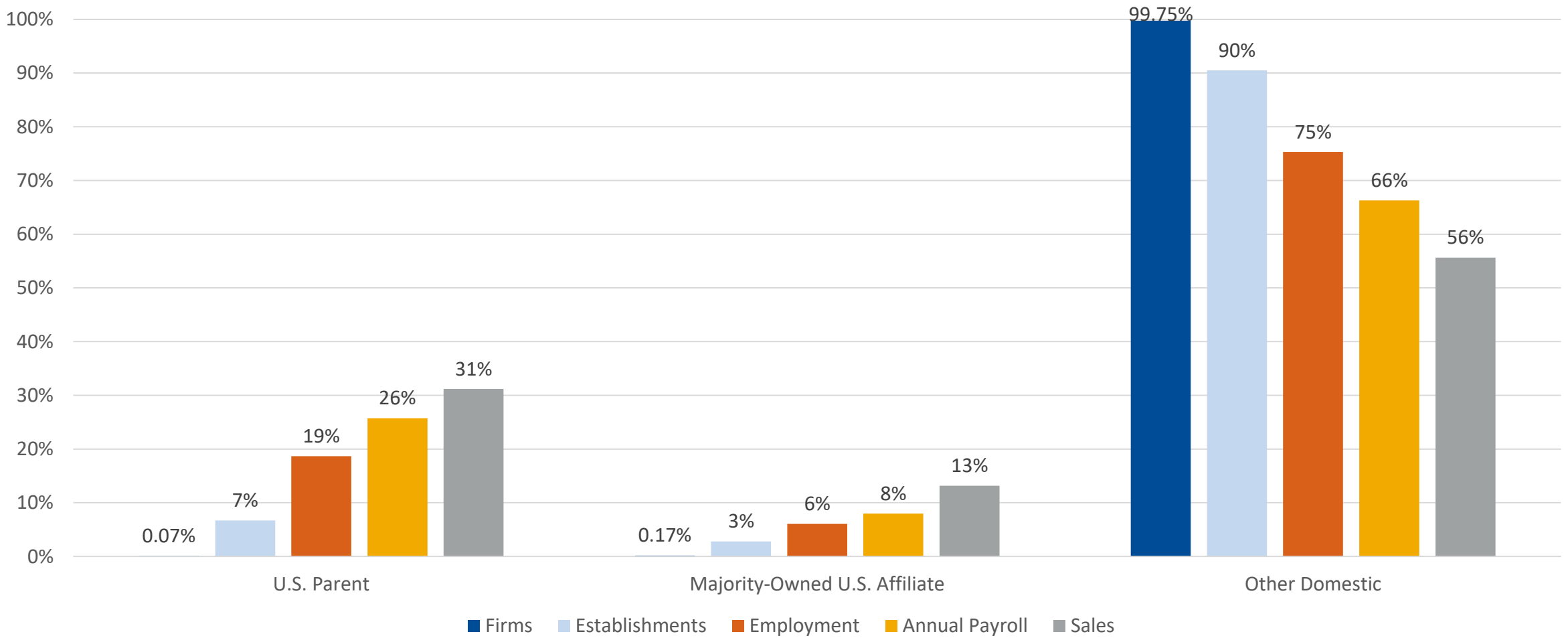
- Matches are highly consistent with prior clerical linking matches
- Compared to 2010 Business R&D and Innovation Survey (BRDIS) to BEA linking
  - Over 99.4% of U.S. parents link to the same Census ID
  - Over 99.1% of U.S. affiliates link to the same Census ID
  - BRDIS links resulted from a multi-year, labor intensive process, involving reconciliation and linking work done by BEA, Census, and NSF. The matches were based on significant hand matching, validated by multiple analysts, and are believed to be of high quality.
- Compared to 2007 linking of U.S. affiliates and Census IDs
  - 96% of U.S. affiliates link to the same Census ID
- The agreement with prior matching work suggests the current methodology is yielding similarly high-quality matches

Application: Classifying U.S. Firms According to Ownership

- Early results from an application using data from the 2012 Economic Census (EC)
- Using the U.S. parent and a subset of the U.S. affiliate crosswalk files, we classify each EC firm into one of three mutually exclusive categories
  - U.S. Parent
  - Majority-Owned U.S. Affiliate (i.e., foreign-owned)
  - Other Domestic
- Census firms linked to BEA firms in both the parent and the affiliate crosswalks are classified as U.S. affiliates (i.e., foreign-owned), *unless*
  - The linked U.S. affiliate has a U.S. ultimate beneficial owner* *or*
  - The linked U.S. affiliate has negligible employment relative to the Census firm record and is not recognized as the same reporting unit as the U.S. parent

*The ultimate beneficial owner (UBO) is that entity, proceeding up a U.S. affiliate's ownership chain, beginning with and including the foreign parent, that is not owned more than 50 percent by another entity

Share of Economic Activity, 2012



Average Annual Payroll and Sales

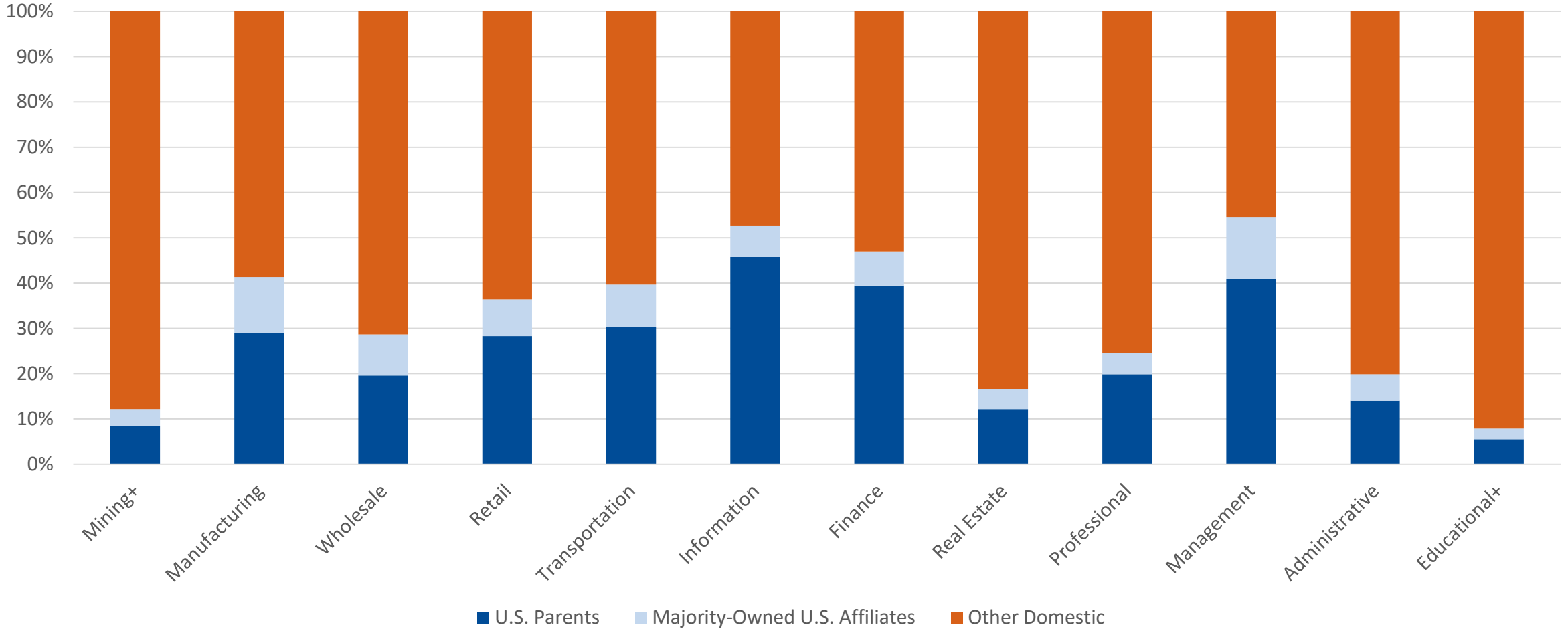
Average Annual Payroll and Sales per Worker, 2012

	U.S. Parents	Majority-Owned U.S. Affiliates	Other Domestic
Average Payroll Per Worker ($1,000s)	53.21	47.66	37.4
Demeaned	7.984	8.38	-2.054
Average Sales Per Worker ($1,000s)	553.7	556.3	231.7
Demeaned	219	214.6	-28.42

Demeaned values = the average difference in the establishment reported values and corresponding most detailed industry average.

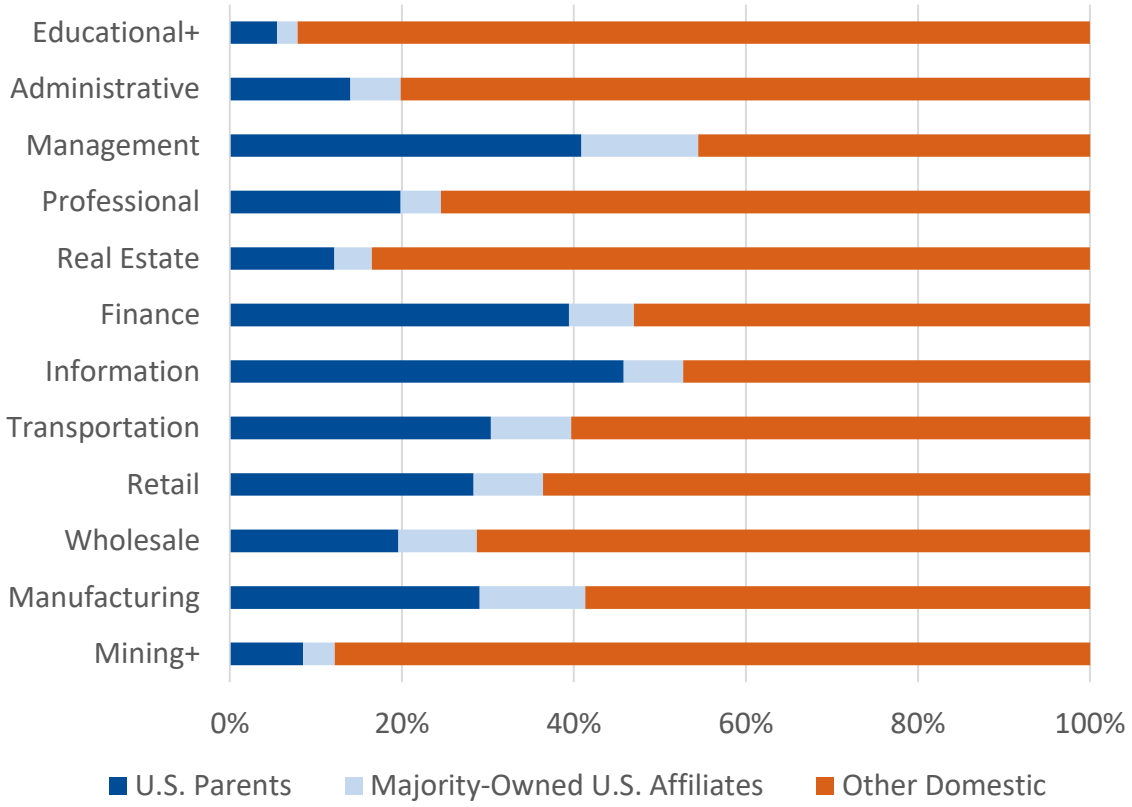
- Parents and affiliates have substantially higher payroll and sales per worker on average than other domestic companies
- Differences persist after adjusting for industry composition by computing demeaned averages
- Consistent with prior findings suggesting multinationals have higher productivity and employ higher skilled workers

Share of Employment by Sector, 2012

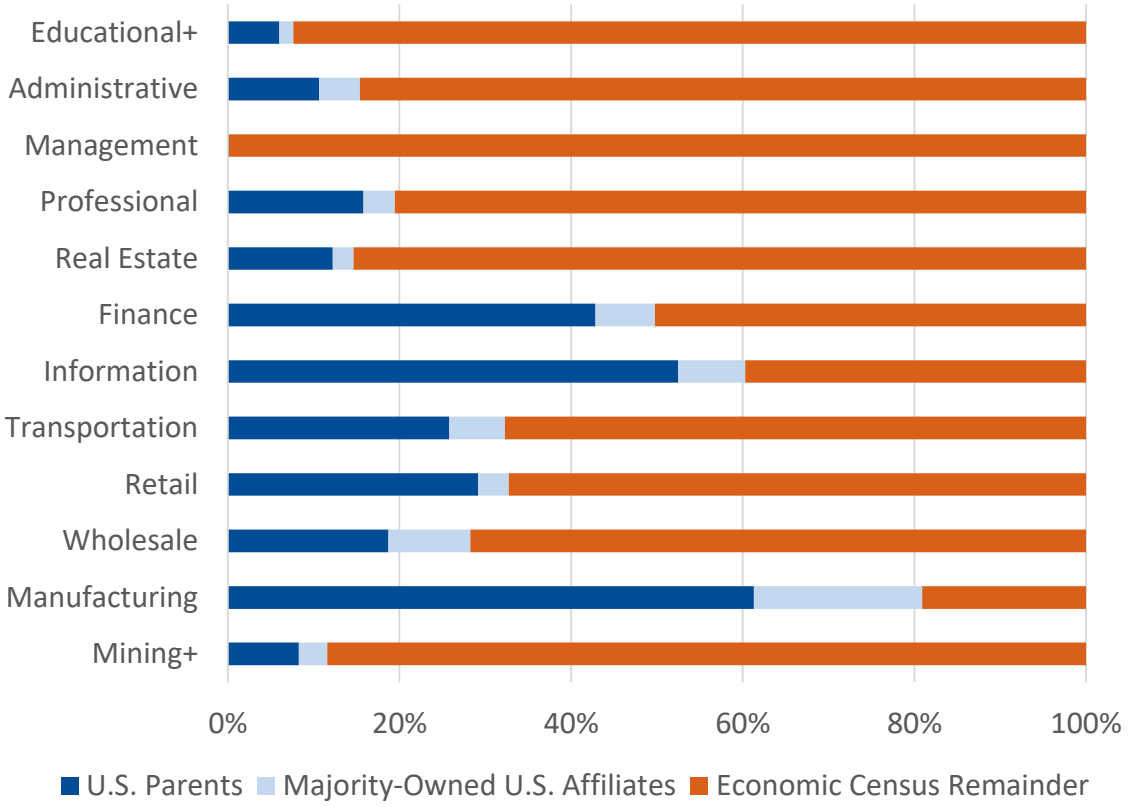


Share of Employment by Sector, 2012

Establishment-Based

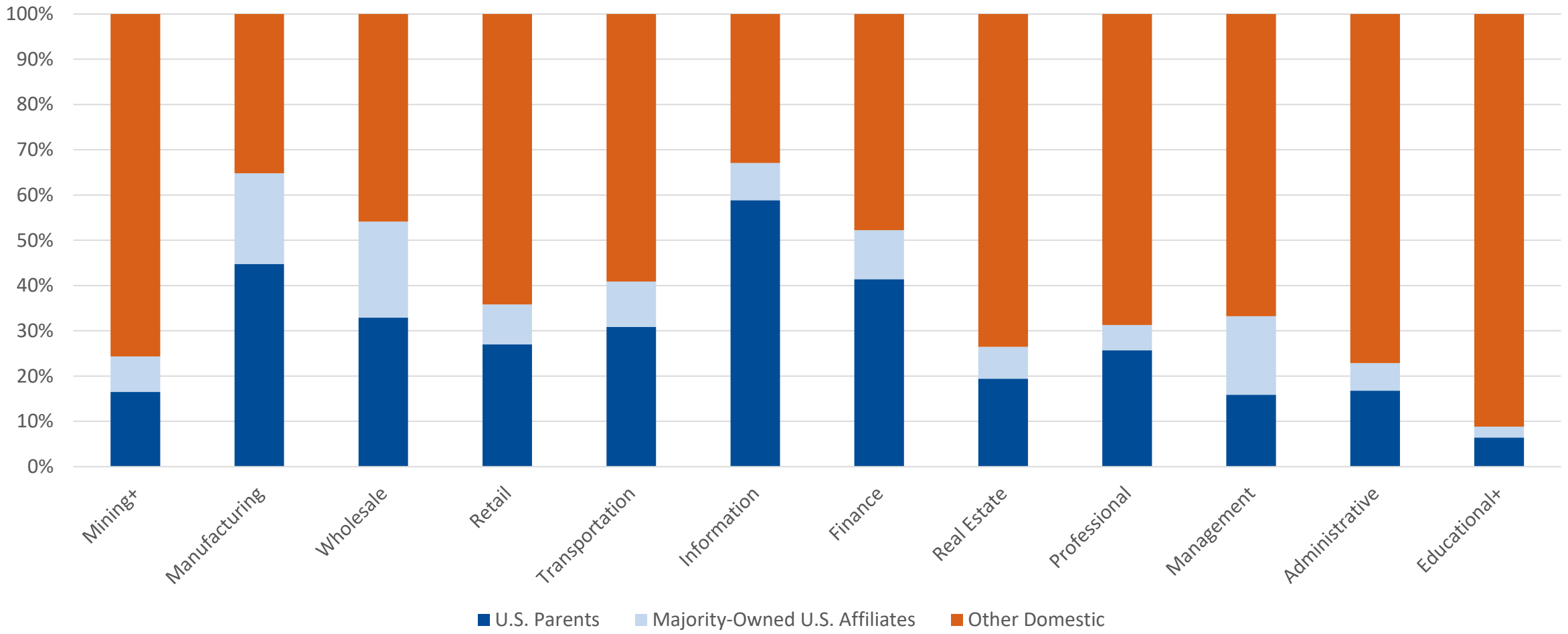


Enterprise-Based



Note: Enterprise-based numbers include some firms in both U.S. parent and U.S. affiliate totals. As a result, combined multinational totals are overstated. Enterprise-based U.S. affiliate employment for the management sector is included in educational+.

Share of Sales by Sector, 2012



Thank you!

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Appendix: Sector Groupings

Sector	Short Name	Full Name
21-23	Mining+	Mining, Quarrying, and Oil and Gas Extraction; Utilities; Construction
31-33	Manufacturing	Manufacturing
42	Wholesale	Wholesale Trade
44-45	Retail	Retail Trade
48-49	Transportation	Transportation and Warehousing
51	Information	Information
52	Finance	Finance and Insurance
53	Real Estate	Real Estate and Rental and Leasing
54	Professional	Professional, Scientific, and Technical Services
55	Management	Management of Companies and Enterprises
56	Administrative	Administrative Support and Waste Management and Remediation Services
61-81	Educational+	Educational Services; Health Care and Social Assistance; Arts, Entertainment, and Recreation; Accommodation and Food Services; Other Services (except Public Administration)