

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

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Date	September 2022
Abstract	This paper describes the construction of two confidential crosswalk files enabling a comprehensive identification of multinational firms in the U.S. economy. The effort combines firm-level surveys on direct investment conducted by the U.S. Bureau of Economic Analysis (BEA) and the U.S. Census Bureau's Business Register (BR) spanning the universe of employer businesses from 1997 to 2017. First, the <i>parent</i> crosswalk links BEA firm-level surveys on U.S. direct investment abroad and the BR. Second, the <i>affiliate</i> crosswalk links BEA firm-level surveys on foreign direct investment in the United States and the BR. Using these newly available links, we distinguish between U.S.- and foreign-owned multinational firms and describe their prevalence and economic activities in the national economy, by sector, and by geography.
Keywords	Multinational firms, records matching, machine learning
JEL Code	F10, F14, F23

1. The authors are grateful to Robert Ford and Steven Wilkinson for assistance with clerical review and Ricardo Limes for guidance with BEA surveys. We thank Laura Alfaro, Jennifer Bruner, Paul Farello, James Fetzer, Teresa Fort, J. Bradford Jensen, Shawn Klimek, Ray Mataloni, Abdul Munasib, Cristina Tello-Trillo, Stephen Yeaple, Dan Yorgason and seminar participants at the BEA Brown Bag series, and 2021 AEA, for helpful discussions.

1. Introduction

Multinational enterprises (MNEs) are the most globally engaged firms in an economy—they operate in domestic and foreign markets and may trade in goods and services with affiliated and unaffiliated firms. In 2019, U.S. parent companies accounted for 22% of total U.S. private sector employment; 23% of total private sector value added in the United States (U.S. Bureau of Economic Analysis, 2019a);² and exported 50% and imported 39% of all goods in 2019.³ The economic significance of MNEs underlines the importance of understanding their impacts on domestic firms, workers, and local economies. This requires comprehensive and reliable information on the multinational status and activities of firms. This paper focuses on identifying firms' multinational status. We describe the construction of two confidential crosswalks that permit a comprehensive identification of multinational firms operating in the United States.⁴

We identify multinational firms in the Census Bureau's Business Register (BR) from 1997 through 2017 by linking to surveys on the activities of multinational enterprises (AMNE) conducted by the U.S. Bureau of Economic Analysis (BEA). The *parent* crosswalk combines U.S. parents from BEA surveys of U.S. Direct Investment Abroad (outward surveys) and firms in the BR. The *affiliate* crosswalk combines U.S. affiliates of foreign parents from BEA surveys of Foreign Direct Investment in the United States (inward surveys) and firms in the BR. We employ deterministic and probabilistic matching routines using numeric tax identifiers, business names, business addresses, and complementary firm attributes (such as primary industry, state, zip code, employment) in the BEA surveys.

We match an average of 94% of U.S. parent firms in the outward surveys to the BR between 1997 and 2017. Weighted by employment reported on the BEA surveys, the average match rate in the *parent* crosswalk is 98%. We match an average of 84% of U.S. affiliates in the inward surveys to the BR between 1997 and 2017. Weighted by employment reported on the BEA surveys, the average match rate in the *affiliate* crosswalk is 97%. We document that most of the matches (about 94% on average) are obtained using numeric tax identifiers (Employer Identification Numbers) which increases confidence in the match quality.

²The U.S. Bureau of Economic Analysis conducts benchmark surveys of U.S. direct investment abroad every 5 years ending in 4 or 9. 2019 is the latest available benchmark survey.

³Authors' calculations using U.S. Bureau of Economic Analysis (2019b) and U.S. Census Bureau (2019b).

⁴The confidential multinational crosswalks are available to qualified researchers on approved projects through the Federal Statistical Research Data Centers (FSRDC). U.S. Census Bureau (2021a) provides information on the application process.

These newly available crosswalks offer two main advantages over prior inter-agency linking efforts. First, we construct crosswalks for both outward and inward direct investment activities for all years from 1997 to 2017.⁵ This work builds on two broad early linking efforts: (i) links between BEA's inward surveys and the Census Bureau's Business Register for 1987, 1992, 1997, 2002, and 2007 used to produce statistics on establishment level characteristics of U.S. affiliates of foreign parents ([U.S. Bureau of Economic Analysis, n.d.c](#)); and (ii) links between BEA's outward and inward surveys to the Business Enterprise Research and Development Survey conducted for National Center for Science and Engineering Statistics by the Census Bureau for 1997, 1999, 2004-2010 ([National Science Foundation, 2022, n.d.](#); [U.S. Bureau of Economic Analysis, n.d.d](#)). The first set of links only allowed the identification of U.S. affiliates of foreign parents and the second set of links only included firms that perform R&D. Therefore, collectively these links were not designed to allow identification of all multinational firms in the U.S. economy.

Second, we develop and implement an algorithm to assign mutually exclusive MNE status—U.S.-owned or foreign-owned—to linked firms.⁶ Approximately 5% of linked firms report on both the outward and inward BEA surveys and hence are simultaneously identified as U.S. parents and U.S. affiliates of foreign parents. These firms are currently included in both the inward and outward AMNE statistics published by BEA. Our algorithm, based on guidance from BEA's foreign investment survey methodologists and consistent with the BEA definition of U.S.-headquartered MNEs ([U.S. Bureau of Economic Analysis, 2017b](#), Part 3), classifies firms linked to both a U.S. parent and a U.S. affiliate as either U.S.-owned or foreign-owned based on ultimate country of ownership, voting ownership share, and reported employment. Thus the newly available links and classification enable the most comprehensive comparisons to date between U.S.-owned and foreign-owned MNEs and, more generally, between MNEs and non-MNEs.⁷

The crosswalks also offer two key advantages over using the BEA surveys alone. First, the BR collects information at the establishment level and the BEA surveys collect information at the firm or enterprise level. The establishment is a single physical location at which business activity is performed and classified into six-digit North American Industrial Classification System (NAICS) classifications based on its major activity. The ability to identify establishments under common firm ownership allows us to provide detailed industrial and geographic anatomy of multinational firms. Second, the BR contains the universe of non-farm, private sector establishments which enables the construction and comparison of establishment and firm characteristics between MNEs and non-MNEs.

⁵The series will be updated annually as new years of data become available.

⁶Firms not classified as either a U.S.-owned or foreign-owned MNE are classified as non-MNEs.

⁷We refer to BEA survey reporters that are being linked to the BR as "U.S. parents" or "U.S. affiliates"; and we refer to the matched multinational firms in the BR that are classified by our MNE status algorithm as "U.S.-owned" or "foreign-owned".

Using production data from the Economic Census and administrative merchandise trade transactions, we document that, on average from 1997 to 2017, although MNEs represent less than 1% of all firms in the U.S. economy, they account for disproportionate shares of U.S. economic activity: employment (22%), payroll (30%), sales (40%), goods exports (65%), and goods imports (60%). Within manufacturing, MNEs account for over 40% of total employment and payroll and over 60% of sales. MNEs' shares of employment, payroll, and sales are quite similar across the 50 states.

We find that among multinational firms, U.S.-owned MNEs are significantly larger than foreign-owned MNEs with respect to domestic U.S. operations: on average, they employ 8 times as many workers and have 5 times more sales. U.S.-owned MNEs own more establishments; operate in more broad sectors and detailed industries; have activities in more states and counties; and export and import higher number of products to a larger number of countries. Average pay per worker and sales per worker tend to be similar among both types of MNEs within broadly defined sectors and regions; however, there is a robust MNE premia compared to non-MNEs.

The rest of the paper is organized as follows. Section 2 describes the data sources. Section 3 describes the matching algorithm used to construct the crosswalks and Section 4 reports the associated match statistics. Section 5 describes the classification scheme and associated results to distinguish between “U.S.-owned” and “foreign-owned” MNEs that report in both the inward and outward BEA surveys. Section 6 characterizes the scope and scale of economic activity of U.S. multinational firms and Section 7 concludes.

2. Data

We rely on three data sources to construct the multinational crosswalks. First, the U.S. Census Bureau's Business Register (BR). Second, BEA surveys of U.S. Direct Investment Abroad (USDIA or outward surveys). Third, BEA surveys of Foreign Direct Investment in the United States (FDIUS or inward surveys).

We use the Economic Census (EC) to characterize multinationals' employment, sales, and payroll for the U.S. economy, across states, and across broad sectors. We use the Longitudinal Firm Trade Transactions Database (LFTTD) to characterize multinationals' goods trade compared with non-multinationals. We describe each of these data sources in turn below.

2.1. Census Bureau Data Sources

2.1.1. Business Register

The Business Register covers all U.S. business establishments and companies with paid employees. It is sourced from income and payroll tax filings reported to the Internal Revenue Service (IRS) and enhanced with Census Bureau collections to identify the establishments and firms associated with IRS tax Employer Identification Numbers (EINs). Thus, the BR provides detail about the particular tax units identified through tax records including the establishments and firms associated with those EINs. The BR contains limited information on firms and establishments operating in industries that are outside the scope of the Economic Census.⁸ The BR serves as the sampling frame for economic censuses and surveys, as a repository of administrative data, and as source data for Census public-use products including the County Business Patterns (U.S. Census Bureau, 2021d) and the Business Dynamics Statistics (U.S. Census Bureau, 2021b). DeSalvo, Limehouse and Klimek (2016) provide a detailed description of the sources and functions of the BR with a focus on the BR as a linking tool and bridge to other Census Bureau data. We use an augmented version of the BR called the County Business Patterns BR (CBPBR). The CBPBR augments the BR by combining the microdata used to construct the County Business Patterns and contains the universe of payroll active establishments. Chow, Fort, Goetz, Goldschlag, Lawrence, Perlman, Stinson and White (2021) describe the construction of the CBPBR and describes the improvements relative to the raw BR files.

2.1.2. Longitudinal Business Database

We also use the Longitudinal Business Database (LBD) to measure employment for evaluating match quality as discussed in Section 4.3. The LBD tracks non-farm business establishments with employees that operated in the United States beginning in 1976 through 2020.⁹ The LBD contains employment information for each establishment that is linked to a firm identifier allowing us to group together establishments under common firm ownership.

⁸These industries include: Agriculture, Forestry and Fishing, Railroads, U.S. Postal Service, Certificated Passenger Air Carriers, Elementary and Secondary Schools, Colleges and Universities, Labor Organizations, Political Organizations, and Religious Organizations. Public administration and governmental entities (NAICS sector 92) are also out of scope with the exception of state-run liquor stores, central reserve depository institutions, federal and federally-sponsored non-depository institutions and hospitals. The BR does not have information about the activity or location of the establishments associated with employers operating in the out-of-scope industries and only contains basic administrative data for these entities.

⁹The LBD is typically produced with an annual lag of $t - 2$ and becomes available in the fall.

2.1.3. Economic Census

We use the quinquennial Economic Census in 1997, 2002, 2007, 2012, and 2017 to document the characteristics of multinational firms in the U.S. economy.¹⁰ The U.S. Census Bureau conducts comprehensive surveys every 5 years, known as the Economic Census, that serve as the foundation for measuring all employer establishments in the U.S. economy ([U.S. Census Bureau, 2017](#)). We use information on establishment-level employment, sales, payroll, detailed industry, and geography. Each establishment is linked to a firm. Once a firm is assigned a multinational status using the *parent* or *affiliate* crosswalks, all establishments under common firm ownership are assigned the same multinational classification as the firm.

2.1.4. Longitudinal Firm Trade Transactions Database

The LFTTD links the universe of merchandise transactions to U.S. firms in the Census Bureau's Business Register ([Kamal and Ouyang, 2020](#)). Merchandise transactions are collected for export values at or above \$2,500 and import values at or above \$2,000. We use the LFTTD to obtain information on export and import values, number of destination and source countries, and number of exported and imported products at the HS6 level.

2.2. BEA Data Sources

2.2.1. U.S. Direct Investment Abroad

BEA surveys of U.S. Direct Investment Abroad (outward direct investment) collect data on U.S. parents and their foreign affiliates.¹¹ We use two surveys of outward direct investment: (1) the Annual Survey of U.S. Direct Investment Abroad (Form BE-11), and (2) the Benchmark Survey of U.S. Direct Investment Abroad (Form BE-10).¹² Together these surveys collect rich annual financial and operating data on reporting U.S. parents and on their foreign affiliates, which form the basis for BEA publications on

¹⁰Our analysis excludes the 1997 Census of Auxiliary Establishments which does not exist in future years and establishments with zero employment.

¹¹In particular, they cover U.S. persons (broadly defined to include U.S. companies) that own, directly or indirectly, 10% or more of the voting securities of an incorporated foreign business enterprise or an equivalent interest in an unincorporated foreign business enterprise. Data are collected on the reporting U.S. persons ("U.S. parents") and on their affiliates outside of the United States in which a U.S. person holds a 10% or more voting interest or equivalent ("foreign affiliates"). Exceptions and exemptions to filing requirements exist for certain private funds and below-filing-threshold entities ([U.S. Bureau of Economic Analysis, n.d.e](#)).

¹²There is a third survey of outward direct investment, the Quarterly Survey of U.S. Direct Investment Abroad (Form BE-577), which collects data on quarterly positions and transactions between U.S. reporters and their foreign affiliates. See [U.S. Bureau of Economic Analysis \(n.d.e\)](#) for additional details.

outward activities of multinational enterprises (AMNE) statistics ([U.S. Bureau of Economic Analysis, n.d.b](#)).

The comprehensive benchmark BE-10 survey replaces the annual BE-11 survey in years ending in 4 or 9 (“benchmark years”). The benchmark survey has broader filing requirements and asks for more detail than the annual surveys. In benchmark years, BE-10 filings are required from all entities subject to the survey reporting requirements. U.S. firms that are U.S. parents (own a foreign affiliate) at any point during the fiscal year are required to report on their domestic enterprise operations, with larger firms required to provide greater detail. The particular forms, and level of detail required, for foreign affiliates varies based on the foreign affiliate’s size, and on whether it is majority or minority owned by U.S. reporters. Size is measured as the greater of the absolute value of assets, sales or gross operating revenues, or net income for all reporting thresholds.

In non-benchmark years, only entities that are contacted by BEA and meet the filing requirements are required to file the BE-11. Filings are only required for foreign affiliates with a size threshold exceeding \$60 million (or if the foreign affiliate was established or acquired during the fiscal year, a threshold of more than \$25 million).¹³ U.S. parents are required to file if they have one or more foreign affiliates satisfying those requirements. In non-benchmark years, BEA uses imputation methods to produce “universe”-level microdata including records for exempt entities.¹⁴ The crosswalks described in this paper link both reported and imputed records for U.S. parents to the BR.

For both surveys, U.S. parent reporting is on a fully consolidated U.S. enterprise basis.¹⁵ Foreign affiliate reporting is generally on a fully consolidated basis within a country and industry. While most data on the reporting U.S. parent is collected at the consolidated enterprise level, some detail is collected by industry.¹⁶ In non-benchmark years, U.S. parent sales or gross operating revenues are collected by industry for up to 10 industries based on the industries with the highest sales. In benchmark years, U.S. parent employment is also collected by industry for the top 10 industries of largest sales.

¹³The specific filing requirements described here are based on current and recent years. Historical requirements can be found in BEA’s Archive of Survey Forms ([U.S. Bureau of Economic Analysis, n.d.g](#)).

¹⁴Imputation methods and the creation of universe-level files are discussed in [Terrie \(2022\)](#) and [U.S. Bureau of Economic Analysis \(2022, Chapter 3\)](#).

¹⁵The fully consolidated U.S. domestic business enterprise is defined as: (1) the U.S. business enterprise whose voting securities are not owned more than 50% by another U.S. business enterprise, and (2) proceeding down each ownership chain from that U.S. business enterprise, any U.S. business enterprise whose voting securities are more than 50% owned by the U.S. business enterprise above it. This consolidation excludes foreign branches and all other foreign affiliates. There are cases where portions of a domestic U.S. business enterprise have foreign ownership and as a result are not included in this consolidation. This is discussed further in Section 5.

¹⁶Industry level reporting is based on four-digit International Surveys Industry codes that are similar to NAICS codes ([U.S. Bureau of Economic Analysis, n.d.f](#)).

2.2.2. Foreign Direct Investment in the United States

BEA surveys of Foreign Direct Investment in the United States (inward direct investment) collect data on U.S. affiliates of foreign enterprises.¹⁷ We use two surveys on inward direct investment: (1) the Annual Survey of Foreign Direct Investment in the United States (Form BE-15), and (2) the Benchmark Survey of Foreign Direct Investment in the United States (Form BE-12).¹⁸ Together, these surveys collect rich annual financial and operating data on U.S. affiliates and form the basis for BEA publications of inward AMNE statistics ([U.S. Bureau of Economic Analysis, n.d.a](#)).

Similar in structure to the the outward surveys, the comprehensive benchmark BE-12 survey replaces the annual BE-15 survey in years ending in 2 or 7 (benchmark years). In benchmark years, BE-12 filings are required from all entities subject to the survey reporting requirements. The particular forms and level of detail required vary, and only select data items are required for U.S. affiliates below a \$20 million size threshold. Size is measured by the greater of the absolute value of assets, sales or gross operating revenues, or net income for all reporting thresholds.

In non-benchmark years, BE-15 filings are only required for entities contacted by BEA and for U.S. affiliates satisfying a size threshold of greater than \$40 million. The particular form and level of detail required vary based on size and on whether the affiliate is majority or minority foreign owned (with size thresholds set at \$40 million, \$120 million, and \$300 million). Greater detail is collected on majority-owned U.S. affiliates, those with foreign ownership of more than 50%, in both benchmark and non-benchmark years to emphasize those affiliates unambiguously under foreign control.¹⁹

Reporting for both the benchmark and annual surveys is on a fully consolidated enterprise basis within the United States. While most data on U.S. affiliates is collected at the consolidated enterprise level, these surveys collect limited state and industry level information. For the largest majority-owned U.S. affiliates (greater than \$300 million), both sales and employment are collected by industry for up to 10 industries based on industry of highest sales. Employment and property values are collected for all 50 U.S. states. For medium-sized majority-owned U.S. affiliates (less than \$300 million but greater than

¹⁷In particular, they cover U.S. business enterprises in which a foreign person owns, directly or indirectly, 10 percent or more of the voting securities of an incorporated U.S. business enterprise or an equivalent interest of an unincorporated U.S. business enterprise.

¹⁸There are two additional BEA surveys on inward direct investment: (1) the Survey of New Foreign Direct Investment in the United States (Form BE-13), which captures new investment transactions on a rolling basis when a FDI relationship is created or when an existing U.S. affiliate of a foreign parent establishes a new U.S. legal entity, expands its U.S. operations, or acquires a U.S. business enterprise, and (2) the Quarterly Survey of Foreign Direct Investment in the United States (Form BE-605), which collects quarterly data on positions and transactions between U.S. affiliates and their foreign parents (and foreign affiliates of those foreign parents). See [U.S. Bureau of Economic Analysis \(n.d.e\)](#) for more details.

¹⁹A majority-owned U.S. affiliate is defined as a U.S. affiliate in which the combined direct and indirect voting interest of all foreign parents of the U.S. affiliate exceeds 50 percent.

\$120 million)²⁰ and for large or medium minority-owned U.S. affiliates, sales by industry is collected for up to four industries. Employment and property values are collected by location for up to either 5 or 15 states depending on the affiliate’s size. For the smallest U.S. affiliates, only the single industry of largest sales and single state of greatest employment are collected.

Companies operating in the U.S. can have both a foreign parent, making them a U.S. affiliate, and a foreign affiliate, making them a U.S. parent, in which case they may appear in both the outward and the inward AMNE survey data. We refer to cases where a firm is linked to both the outward and inward surveys as “overlaps” and present an algorithm to mutually bin those firms as U.S.-owned or foreign-owned in Section 5.

3. Linking Methodology

We identify multinational firms, both U.S.- and foreign-owned, in the CBPBR by linking EIN, business name, and address information in the BEA direct investment surveys. The CBPBR encompasses the private-sector employer universe, i.e. establishments with paid employees.²¹ Therefore, prior to implementing our matching algorithm, we exclude firms with zero employment in the BEA surveys. On average, 86% of firms in the BE-10/11 surveys report non-zero employment; and 51% of firms in the BE-12/15 surveys report non-zero employment. Appendix Table A-1 reports the share of firms that report non-zero and zero employment in the respective surveys from 1997 through 2017. We see that beginning in 2014, the share of parent firms reporting non-zero employment decreased noticeably—96% of parents reported non-zero employment prior to 2014, and this share drops to around 45% starting in 2014.²²

We conduct three parallel matching routines to identify all possible matches between a firm in the BEA surveys and the CBPBR in any given year—EIN matching, business name matching, business address matching.²³ Once all possible matches are identified, unique selections are made using a ranking method that utilizes additional information as follows: whether the matched firm is a multi-unit, shares similar

²⁰The lower threshold is \$60 million in benchmark years.

²¹The Census Bureau also tracks the non-employer universe using income tax filings. See [Davis, Haltiwanger, Jarmin, Krizan, Miranda, Nucci and Sandusky \(2009\)](#) and [Goetz and Kroff \(2021\)](#) for details on construction of the non-employer universe.

²²Improvements in coverage in the 2014 benchmark survey led to a notable increase in the number of reporting enterprises. Most of the increase in the number of companies to the survey frame was attributed to outreach efforts. The number of U.S. parents doubled, while total U.S. parent employment increased by about 18 percent ([U.S. Bureau of Economic Analysis, 2018](#)).

²³Prior linking methodologies, which relied on deterministic matching primarily using EINs, are described in [Zeile \(2013\)](#) for outward links and in [Howenstine and Zeile \(1992, 1994\)](#) for inward links.

employment as reported in the BEA surveys, shares the same two-digit sector as reported in the BEA surveys, or shares the same state as reported in the BEA surveys, and whether the match was made in the same year of the survey. The ranking criteria is described in detail in Appendix Section [A.1](#).

3.1. EIN Matching

We employ an iterative matching algorithm, following [Kamal and Ouyang \(2020\)](#), that proceeds in three main steps. First, we match EINs in the BEA surveys to EINs in the CBPBR utilizing a window of years—the current year (t), successive year ($t + 1$), and preceding year ($t - 1$). Next, we match the EINs in the BEA surveys from the previous step that did not link to a firm identifier in the CBPBR to EINs used to file income taxes.²⁴ These EINs do not contain payroll or employment information but might provide a link to a firm identifier. Finally, we match the remaining unmatched EINs in the BEA surveys to EINs in all available historic years of the CBPBR spanning 1976 through ($t - 2$). We employ window and historic matching to maximize the likelihood of finding the EIN and therefore a match to a firm identifier. We retain matches in years other than survey year t because a clerical analysis of these firms reveal that they may be part of reorganizations. We further found that, although the firm identifier for the newly reorganized firm may exist in the CBPBR, the link to the old firm may be missing. Efforts to re-establish these missing links are a potential area of improvement.

3.2. Business Name Matching

We employ both deterministic and probabilistic matching routines following [Kamal and Ouyang \(2020\)](#).

3.2.1. Deterministic Name Matching

We conduct an iterative word match routine that is repeated on three versions of the business name—raw original text from the surveys, clean name (upcase, add spaces between “&” and “-”), and standardized name. Names are standardized using a combination of custom programs and the DQ.STANDARDIZE function in SAS ([Taylor and Branum-Martin, 2014](#)). First, we directly match the names against the CBPBR. Second, the name string is split into five words (removing words such as “INC”, “CO”, “CORP”, and the like) and then recombined into a string and matched against the CBPBR. Third, we remove the character “&” from the name. Fourth, any numeric characters are further removed from the name. The fifth step is identical to the second step except that we use a maximum of three words only.

²⁴The CBPBR only contains payroll tax EINs. We utilize income tax EINs available in the raw BR.

3.2.2. Probabilistic Name Matching

Once all five steps are completed as described above, the remaining unmatched names from the surveys are subject to two probabilistic name matching procedures.

First, we modify the raw names in the two files—BEA surveys and CBPBR—to correct for common misspellings as described in Section 3.2.1. We match to the CBPBR using SAS DQMATCH and a sensitivity of 95.²⁵ A higher value results in stricter matches, and 95 is the highest possible threshold. Matches with at least two words are retained, starting with the maximum number of possible words matched.

Second, we implement a machine learning (ML) algorithm on the remaining unmatched names that is divided into four parts: computer assisted translation, locality sensitive hashing, word pair scoring, and ensemble prediction. Computer assisted translation reduces the absolute number of matches by upper casing all characters, correcting all spacing, keeping only valid characters, correcting suffix misspellings, standardizing suffixes, and running the SAS DQ standardize algorithm. Locality sensitive hash pairing reduces the number of possible matches by grouping names together that might reasonably match. The individual hash algorithms include standardized word, soundex, DQMATCH 95, caverphone, doublemetaphone, and NYSIIS. Word pair scoring generates scores to be used as features in the machine learning algorithm with 27 different score algorithms. The ensemble prediction is based on supervised stacking or stacked generalization. The base classification learners are logistic regression, gini decision tree, and conditional inference tree. Only the highest probability match is retained.

3.3. Business Address Matching

We begin by standardizing the business name in the CBPBR and the BEA surveys. Next, we generate a match to the CBPBR with business name using DQMATCH 60. Then we restrict the BR to establishments that share the same DQMATCH code (in terms of business name), city, ZIP Code (3-digit), and state as reported in the BEA surveys. Finally, we select firms in the CBPBR that share string similarity in terms of raw business and raw street names.²⁶

²⁵DQMATCH is a fuzzy matching tool that recognizes strings that match inexactly but actually represent the same firm name in the context of our study. The DQMATCH function creates match codes for strings based on their characters, position, and sensitivity. Names sharing same match codes are identified as matches. The DQMATCH function uses a default sensitivity of 85.

²⁶The string comparator used is COMPGED, a built-in SAS function (SAS®, 2022).

3.4. Clerical Matching

We implement clerical matching for a select set of years. We manually assign firm identifiers to a set of U.S. multinational parents, in 2007 and 2012, that did not match to the CBPBR using EINs and have at least 100 employees as reported on the BE-10.²⁷ These *usid-firmid* links are applied in 2004–2012. We believe that firms are most likely to be present in the intervening years. We also utilize two sets of prior matched files. First, a set of clerical *usid-firmid* links is obtained for 2008–2010 from linking the Business RD and Innovation Survey (BRDIS) to the BE-10/11 and BE-12/15 previously conducted by the Census Bureau’s Economic Directorate. These links are applied in 2008–2010 only. Second, a set of clerical *usid-firmid* links is obtained for 2007 from linking the Economic Census to the BE-12/15 also previously conducted by the Census Bureau’s Economic Directorate. These links are applied in 2007 only. Any link in the clerical match files described above supersedes those from the general matching algorithm due to the care taken in hand matching these cases.²⁸

The matching routine results in two sets of multinational crosswalk files: (i) *parent* crosswalk: links BE-10/11 to the BR (BE10-BR and BE11-BR); and (ii) *affiliate* crosswalk: links BE-12/15 to the BR (BE12-BR and BE15-BR). The file contents are described in Appendix Section A.2.

4. Matching Results

We now describe the results from implementing the matching routine described in Section 3. We report the employment-weighted match rates separately by the matching algorithm and year of the BR in which the *firmid* was obtained. We also report the ratio of employment in the Longitudinal Business Database and employment reported in the BEA surveys. The match statistics for the inward surveys include U.S. affiliates of both minority and majority foreign-owned multinational firms.

4.1. Match Rates by Matching Algorithm

This section describes the match rates from 1997 through 2017 between the BEA surveys and the CBPBR. Figures 1(a) and 1(b) plot the annual match rates, weighted by employment reported in the BEA surveys, between BE-10/11 and CBPBR (*parent* crosswalk) and BE-12/15 and CBPBR (*affiliate*

²⁷The clerical matching was conducted when the outward surveys in this project were only available starting in 2007 through 2012. Since clerical review is labor-intensive, we were unable to extend the review to additional years.

²⁸A comparison of matches generated from the automated matching algorithms to those from clerical review reveals a 96% agreement.

crosswalk), respectively. The figures separately show the share of matches using both EIN and business name, EIN only, name only, and clerical matches.

The average employment-weighted match rate between BE-10/11 and CBPBR is 98% over the 21-year period (Figure 1(a)). In years where we do not conduct clerical review, 68% of the matches are obtained using both EIN and business name; 23% using EIN only; and about 6% using only business name. In years where we undertake clerical review, the bulk (42%) of the matches are obtained using a clerical review; 40% are obtained using both EIN and business name; 15% using EIN only; and about 2% using only business name. Clerical reviews utilize both EINs and business names. We report the match rates by count of firms in Appendix Table A-2. We find that beginning in 2014, when the survey universe was expanded, through 2017 the average unmatched rate is about 20%.

The average employment-weighted match rates between BE-12/15 and CBPBR is 97% (Figure 1(b)). In years where we do not conduct clerical review, about 76% of the matches are obtained using both EIN and business name; about 17% using EIN only; and about 3% using only business name. In years where we undertake clerical review, the majority (52%) of the matches are obtained using a clerical review; 39% are obtained using both EIN and business name; 7% using EIN only; and about 1% using only business name. Clerical reviews utilize both EINs and business names. We report the match rates by count of firms in Appendix Table A-3. We find that the average unmatched rate is about 16%. The majority of the unmatched U.S. affiliates report operating in “Real Estate (including Equity REITS)” or NAICS 5310. Over 80% of firms in the “Real Estate” sector employ fewer than five employees (U.S. Census Bureau, 2019a).

4.2. Match Rates by Match Year

Figure 2(a) and 2(b) plot the annual match rates, weighted by employment reported in the BEA surveys, separated by the year of the match. We implement window matching, and therefore we may obtain a *firmid* in a year that is different from the BEA survey year. On average, 85% of matches are obtained in the same year as the survey (t); about 3% are obtained in a year after the survey ($t + 1$); about 2% obtained in a year prior to the survey ($t - 1$); and 10% are obtained in a year that is at least 2 years prior to the survey year but no earlier than 1976 (*historic*).

An implication of window matching is that not all firms identified in the crosswalks can be linked to other Census Bureau data sets in year t .²⁹ Moreover, the matching algorithm is designed to maximize

²⁹For example, if a BEA entity in the 2007 outward survey is matched to a firmid in the BR in 2004, then this BEA entity will not link to any other Census Bureau data sets (such as the LBD or EC) in 2007.

matches for a given survey year t such that linking the annual crosswalk files over time may not be sufficient in order to create reliable longitudinal links.³⁰

4.3. Matched Employment Ratios

We compare the employment associated with the firm in the LBD to the employment reported in BEA benchmark surveys. Successful matches should exhibit ratios close to 1.³¹

In Panel A of Table 1, we report the employment ratios for U.S. parents by six size classes. The size classes are defined using employment reported in the USDIA (BE-10) benchmark survey. Panel B shows the share of total domestic U.S. parent employment in each size class. We find that in all benchmark years the employment ratio is close to 1 (ranging between 0.98 and 1.29) in the largest two size classes (1,000+). Panel B shows that these two size classes together account for almost all of parent employment. In size class 10,000+, which accounts for almost 80% of all U.S. parent employment, the ratio ranges between 0.98 and 1.06.

In Panel B of Table 1, we see a broadly similar pattern in the employment ratios for U.S. affiliates across size classes. The size classes are defined using employment reported in the FDIUS (BE-12) benchmark survey. In the largest size class (10,000+) that accounts for a little over half of total employment at U.S. affiliates of foreign parents on average, the ratio ranges between 0.79 and 1.11 across the five benchmark years. In the second largest size class (1,000 to 10,000) the ratio ranges between 1.52 and 2.26 and this size class accounts for about a third of total employment.

Overall, the agreement in total employment reported in the BEA surveys and the Longitudinal Business Database among firms that account for the bulk of employment in the BEA surveys provides additional confidence in the quality of matches obtained from our matching algorithm.

³⁰Chow et al. (2021) describes current efforts and ongoing challenges in creating longitudinally consistent firm identifiers.

³¹We note that even successful matches may differ in their recorded employment due to differences in how employment is measured in the BEA surveys and the LBD. The BEA surveys collect the number of employees on payroll at the end of a fiscal year, including part-time but excluding temporary and contract employees not included in payroll records. If that number is unusually high or low due to temporary factors, or if it fluctuates widely during the year due to seasonal factors, reporters are asked for a number reflecting normal operations or an average, respectively. The LBD measures the number of employees at the establishment in the payroll period including March 12 (Chow et al., 2021).

5. Identifying “Overlaps”

Companies operating in the United States can have both a foreign parent and a foreign affiliate. These “overlap” cases primarily arise due to the complex organizational structures of multinational firms that own business units spanning a wide range of geographic and business functions. For example, using public filings, we find that Toyota Motor Corporation (TMC), an automotive company headquartered in Japan, owned 209 Japanese subsidiaries and 335 overseas subsidiaries as of 2021 ([Toyota Motor Corporation, 2021](#)).³² The annual filings with the U.S. Securities and Exchange Commission show that TMC had 100% ownership and voting interest in Toyota Motor North America, Inc. (TMNA), headquartered in the United States. TMNA is the operating subsidiary that oversees all operations of TMC in Canada, Mexico, and the United States. In this example, TMNA is an affiliate of the parent firm TMC; and TMNA is also the parent firm for North American subsidiaries in Canada and Mexico. This example illustrates the difficulty in designating a mutually-exclusive MNE status (U.S.- or foreign-owned) to firms. We describe two main difficulties that arise in the data and our related approaches to determine the final ownership type.

First, because international statistical guidelines define direct investors as domestic businesses that own at least 10 percent of a foreign business enterprise, it is possible for U.S. companies with foreign affiliates reporting as U.S. parents on the outward surveys to have qualifying foreign owners and so also report on the inward surveys as U.S. affiliates.³³ In these cases, we use the concept of equity control to classify each MNE as either foreign- or U.S.-owned. For example, we classify a firm as U.S.-owned if the U.S. affiliate reporter is only minority foreign-owned or has a U.S. ultimate beneficial owner (UBO).³⁴

Second, there may be rare cases where a domestic subsidiary of a U.S. business is indirectly owned by its U.S. parent company through a foreign affiliate. In this case, the domestic subsidiary is classified as a foreign-owned U.S. business (an affiliate in the inward data) while the U.S. parent is classified as a U.S.-owned business in the BEA data. In these cases, the U.S. parent company in the outward survey data and its indirectly owned domestic subsidiary in the inward survey data may link to the same entity in the CBPBR based on common matching variables such as EIN or business names.³⁵ Because the two businesses are not the same entity, and a closer analysis of these cases revealed that the BEA reporters

³²This example is sourced from public-use data sources and should not be construed as indication of presence or absence in the BEA direct investment surveys.

³³We identified these cases (i.e. those who file the BE-10/11 as well as the BE-12/15) using the `be_15id` field in the outward surveys.

³⁴The ultimate beneficial owner (UBO) is defined on the survey form as “the person or entity, proceeding up the ownership chain beginning with and including the foreign parent, in which no other entity has more than 50% direct voting interest.”

³⁵These BEA reporters are identified as having the same *firmid* in the *parent* and *affiliate* crosswalk.

on the inward survey tend to have little or no employment, we categorize these firms as U.S.-owned MNEs if the employment reported on the inward surveys is less than 10% of the U.S. parent employment reported on the outward surveys.³⁶

In summary, we develop and implement an algorithm based on the above discussion to assign a mutually exclusive MNE status to “overlap” cases as follows. First, for cases where the inward and outward records are identified as linked in the BEA data, we base the classification on the country of ultimate beneficial owner and type of ownership (sourced from the BE-12/15 surveys). If the country of ultimate beneficial ownership is the United States or the linked U.S. affiliate is only minority foreign-owned, the MNE is classified as U.S.-owned.³⁷ Second, for overlap cases that are not identified as being linked in the BEA data, we similarly consider the country of ultimate beneficial owner and type of ownership but also consider the ratio of employment reported in the BE-12/15 to employment reported in the BE-10/11 by the linked parent.³⁸ If this ratio is less than 10%, even if the affiliate is majority foreign-owned and does not have a U.S. UBO, the MNE is classified as U.S.-owned.³⁹

Table 3 reports the share of firms and their associated employment identified as “overlaps” in 1997, 2002, 2007, 2012, and 2017 based on Economic Census links. On average, 5% of linked BR firms are “overlaps” in a year, accounting for an average of 15% of total private sector employment among linked firms. The next two columns report the share of overlap firms that are assigned as U.S.-owned and their associated employment; the last two columns report the share of those firms that are assigned as foreign-owned and their associated employment. The results show that our algorithm results in assigning the majority (88% on average) of “overlap” cases as foreign-owned in a given year. However, on an employment-weighted basis, our algorithm assigns a little over half of employment at “overlap” firms as U.S.-owned.

³⁶The 10% threshold is based on extensive clerical review of “overlap” cases in 2007 and 2012 and guidance from BEA foreign investment survey experts.

³⁷This is the same as the classification used to define U.S.-headquartered MNEs in BEA’s annual publications of worldwide activities of U.S. MNEs (U.S. Bureau of Economic Analysis, 2017b, Part 3).

³⁸The ratio is computed as employment reported in the BE-12/15 divided by the employment associated with the *firmid* in the BR.

³⁹Antrás, Fadeev, Fort and Tintlenot (2022) adopt a slightly different approach. They use ownership and voting share information from the BE-12/15 surveys, but instead of implementing employment ratios, they use ownership information reported by firms in the Census Bureau’s Company Organization Survey (COS) (U.S. Census Bureau, 2022). We do not rely on the COS because not all BEA reporters report on the COS and therefore we would not be able to assign an ownership classification for all “overlap” cases.

6. Multinational Firms in the United States

Utilizing the newly constructed set of comprehensive crosswalks between the multinational surveys conducted by BEA and the Census Bureau's Business Register, we describe the activities of firms and their establishments operating in the United States by their multinational status in 5 Economic Census years spanning a 20-year period: 1997, 2002, 2007, 2012, 2017.

We classify firms in the Economic Census as either a U.S.-owned MNE, a foreign-owned MNE, or a non-MNE using the classification algorithm described in Section 5. U.S.-owned MNEs are Economic Census firms linked to a U.S. parent. Foreign-owned MNEs are Economic Census firms linked to a majority-owned U.S. affiliate. Overlap cases, where a firm links to both a U.S. parent and a majority-owned U.S. affiliate, are classified as either a U.S.-owned or a foreign-owned multinational as described in Section 5. Foreign-owned multinationals are restricted to the subset of majority foreign-owned U.S. affiliates only. We focus on this subset to capture companies that are directly under foreign control.⁴⁰ In referring to U.S.-owned and foreign-owned multinationals in this context, we are only referring to the domestic U.S. activity of those multinationals. Non-MNEs are defined by exclusion—firms in the Economic Census that were not linked to a U.S. parent or to majority-owned U.S. affiliate.

6.1. Share of Economic Activity by Multinational Status

Table 4 presents the share of firms, establishments, and selected economic activity (employment, payroll, sales, merchandise exports, and merchandise imports) represented by multinational and non-multinational firms. MNEs are rare: on average, they account for less than 1% and 10% of all firms and establishments, respectively. The uncommon prevalence of MNEs is consistent with theories featuring high fixed costs associated with multinational production (Dunning, 1981; Helpman, Melitz and Yeaple, 2004). As shown in Table 4 and Figure 3, relative to the small number of multinational firms in the U.S. economy, MNEs account for disproportionately large shares of economic activity on average: 22% of total employment, 30% of payroll, 40% sales on average, 65% of goods exports, and 60% of goods imports. Evidence of the highly skewed distribution of economic activities towards multinational firms in the economy using the newly available crosswalks confirms previous findings (Yeaple, 2013; Antrás and Yeaple, 2014).⁴¹

⁴⁰In 2017, majority-owned affiliates accounted for greater than 90% of all U.S. affiliates (U.S. Bureau of Economic Analysis, 2017a).

⁴¹These prior studies relied on public-use statistics from BEA, OECD, and Census Bureau.

U.S.-owned MNEs tend to be substantially larger than foreign-owned MNEs. U.S.-owned MNEs account for three-quarters of employment among MNEs. They also account for the majority of payroll, sales, and exports among MNEs. U.S.- and foreign-owned MNEs are more comparable in their import shares. The shares of economic activities are very stable over the 21-year period, with the exception of exports. The U.S.-owned MNEs' share of exports has been decreasing over time (52% in 1997 and 41% in 2017) while the foreign-owned MNEs' share has been increasing over the same period (14% in 1997 and 25% in 2017).

Although MNEs account for very small shares of all firms, U.S.-owned MNEs tend to be concentrated among the largest firms in the economy. Table 5 shows the share of firms by multinational status and seven firm-size classes. In the first panel, we can see that the majority of U.S.-owned MNEs employ 1,000 workers or more. We can also see that, over time, U.S.-owned MNEs' share of firms employing 2,500+ workers decreased from almost 40% in 1997 to 20% in 2017. Foreign-owned MNE operations within the U.S. tend to be housed at smaller-sized firms.

6.2. Scope of Economic Activity by Multinational Status

We document the scope of activity by multinational status in Table 6. Within each firm type, this table reports the share of firms with multiple establishments (column 1), establishments in multiple sectors (column 2), and establishments in multiple states (column 3). The vast majority of U.S.-owned MNEs operate multiple establishments although the share is decreasing over time: 90% in 1997 and 65% in 2017.⁴² Over a third of foreign-owned MNEs are multi-unit firms. In contrast, less than 5% of non-MNEs are multi-units in any of the Census years. MNEs are also more likely to operate in multiple sectors than non-MNEs. "Sector" is defined as a single or combination of two-digit NAICS sectors.⁴³ On average, 63% of U.S.-owned MNEs, 27% of foreign-owned MNEs, and 1% of non-MNEs operate in more than one sector. MNEs are also more likely to have operations in multiple states than non-MNEs. The majority of U.S.-owned MNEs have operations in multiple states although the share is decreasing over time: 84% in 1997 and 56% in 2017. About a third of foreign-owned MNEs span multiple states. Only 1% of non-MNEs operate in multiple states.

Table 7, columns 1 through 5, report the annual average number of establishments, sectors, four-digit NAICS industries, states, and counties by firms' multinational status. U.S.-owned MNEs are larger on all of these dimensions compared to foreign-owned MNEs and non-MNEs. The average non-MNE is a

⁴²This decline may in part be driven by increased coverage of smaller MNEs starting in 2014.

⁴³"Mining" (21-23); "Manufacturing" (31-33); "Wholesale" (42); "Retail" (44-45); "Transportation" (48-49); "Information" (51); "Finance and Insurance" (52); "Real Estate" (53); "Professional Services" (54); "Management" (55); "Administrative Services" (56); and "Other Services" (61-62, 71-72, 81). See Section 6.5 for more details.

single-unit firm, whereas the average MNE is a multi-unit firm spanning multiple sectors and states. The average U.S.-owned MNE operates 128 establishments and the average foreign-owned MNE operates 19 establishments. U.S.-owned MNEs are also twice as industrially diverse as foreign-owned MNEs, operating across three broad sectors, on average, and in about five different detailed four-digit industries. U.S.-owned MNEs also display greater geographic diversity. U.S.-owned MNEs operate in 11 states and 20 counties, on average; foreign-owned MNEs operate in about 4 states and 5 counties.

The last four columns in Table 7 show the number of countries and products associated with firms' merchandise trade.⁴⁴ These statistics are based on the universe of goods trading firms. Columns 6 and 7 report the number of destination and source countries, respectively. The last two columns show the number of HS6 products that are exported and imported, respectively. We can see that, on average, U.S.-owned MNEs export 25 HS6 products to 53 countries and import 22 HS6 products from 30 countries; foreign-owned MNEs export 17 HS6 products to 36 countries and import 16 HS6 products from 19 countries; and non-MNEs export 5 HS6 products to 11 countries and import 6 HS6 products from 6 countries.

Overall, these statistics confirm that multinationals, and in particular U.S.-owned MNEs, tend to organize their U.S. activities across multiple industries and geographies and engage intensively in merchandise trade.

6.3. Scale of Economic Activity by Multinational Status

Table 8 shows the annual average employment, payroll (in million USD), and sales (in million USD) by firms' multinational status in the first three columns, respectively.⁴⁵ In terms of average employment, U.S.-owned MNEs are a striking 8 times larger than foreign-owned MNEs and 364 times larger than non-MNEs. Differences in average payroll exhibit similar patterns: U.S. MNEs are about 7 times larger than foreign-owned MNEs and 533 times larger than non-MNEs. This may, in part, reflect greater utilization of skilled workers employed at MNEs compared with non-MNEs. U.S.-owned MNEs also have a little more than five times higher average sales than foreign-owned MNEs.

⁴⁴See Bruner and Grimm (2019) for the role of multinationals in U.S. services trade.

⁴⁵Although these statistics may also be calculated from published AMNE statistics (U.S. Bureau of Economic Analysis, 2017b), there are three differences of note: (i) AMNE statistics include "overlaps"—companies that are both U.S. parent companies of overseas affiliates and are themselves owned by a foreign parent company—in both the U.S. parent and U.S. affiliate of foreign parent statistics; (ii) AMNE statistics are based on end of calendar year employment and payroll; and (iii) AMNE statistics include records excluded from this analysis (i.e., records that were dropped or records that were not linked).

Although U.S.-owned MNEs tend to be larger than foreign-owned MNEs, we find that between 1997 and 2017, average employment at U.S.-owned MNEs decreased (7,749 vs. 4,731), although average payroll was higher (278 vs. 332), and average pay per worker was also higher with or without adjustment for industry averages. In Appendix Table A-9, we also report the share of employment and sales by broad sector and multinational status for the five Economic Census years. We find that the manufacturing employment shares declined at all three firm types between 1997 and 2017. The decrease was accompanied by increases in employment at services-providing sectors, especially at MNEs. These patterns, overall, are consistent with broader shifts in the U.S. economy away from goods-producing to services-providing activities precipitated by the changing nature of production arrangements where firms may increasingly outsource processing and manufacturing activities but specialize domestically in higher value added knowledge-intensive activities (Ding, Fort, Redding and Schott, 2022; Fort, Pierce and Schott, 2018; Kamal, 2018).

A clear hierarchy in the average scale of activity (employment, payroll, sales) with U.S.-owned MNEs being the largest, followed by foreign-owned MNEs and non-MNEs is consistent with the findings in Section 6.1. In order to further facilitate a comparison between the three firm types at the most disaggregated economic unit, we construct simple measures of labor productivity—pay per worker and sales per worker—at the *establishment* level under columns 4 and 5 in Table 8. These statistics reveal that the average establishment of a foreign-owned MNE exhibits higher labor productivity than establishments of the other two firm types.⁴⁶ This average difference persists and, in fact, becomes much larger after controlling for industry heterogeneity as reported in the last two columns.

6.4. Industrial Distribution by Multinational Status

Figure 4 shows the average annual shares of (a) establishments, (b) employment, (c) sales, and (d) payroll, respectively, by firm type within 12 broad sectors. The sectors are defined as a single or group of 2-digit NAICS as follows: “Mining” (21-23); “Manufacturing” (31-33); “Wholesale” (42); “Retail” (44-45); “Transportation” (48-49); “Information” (51); “Finance and Insurance” (52); “Real Estate” (53); “Professional Services” (54); “Management” (55); “Administrative Services” (56); and “Other Services” (61-62, 71-72, 81). Industrial activity is measured at the establishment level. We assign an establishment the multinational status associated with its parent firm. Therefore, we aggregate from six-digit NAICS of all establishments under common firm ownership to measure the industrial distribution

⁴⁶This is consistent with findings from linking the 2012 inward BEA survey to the Bureau of Labor Statistics’ (BLS) Business Register. Based on the 2012 BEA-BLS links, pay per worker was \$56,400 for all foreign-owned establishments (including minority foreign-owned and overlap), and \$44,900 for all other establishments (Friesenhahn, Fayer and Watson, 2019). In Table 8, we find similar results for 2012: pay per worker was \$57,300 for foreign-owned MNEs, \$52,900 for U.S.-owned MNEs, and \$34,800 for non-MNEs.

of a multinational firm. This level of detail is not available using only the BEA surveys which collect main four-digit NAICS for the consolidated enterprise and limited additional detail.⁴⁷

Similar to the overall domestic shares presented in Table 4, we can see in Figure 4(a) that MNEs account for small shares of establishments in any given sector, with the exception of “Information” and “Management.” MNEs account for about a third of establishments in “Information” and “Management,” with U.S.-owned MNEs’ accounting for the larger share (25% and 20%, respectively) among MNEs.

In contrast, MNEs account for large shares of employment within several broad sectors, as shown in Figure 4(b). Within manufacturing, U.S.- and foreign-owned MNEs represent 30% and 11% of employment, respectively. Within non-manufacturing sectors, MNEs employ 50%, 47%, and 38% of workers in “Information,” “Management,” and “Finance and Insurance” respectively; they account for about a third of employment in “Wholesale,” “Retail,” and “Transportation.” Among MNEs, U.S.-owned MNEs account for three-quarters or more of employment in these sectors. Similar patterns hold in the share of sales and payroll in Figures 4(c) and 4(d), respectively.

We report the annual shares of establishments, employment, payroll, and sales over the five Economic Census years in Appendix Tables A-6 and A-7. We find that these shares are fairly stable over time with a notable exception in the share of sales in the manufacturing sector. Specifically, the share of sales has been declining at U.S.-owned MNEs while there has been a corresponding increase at foreign-owned MNEs in the manufacturing sector between 1997 and 2017. The sales share at U.S.-owned MNEs declined from almost 50% in 1997 to about 40% in 2017; and increased from 11% in 1997 to 23% in 2017 at foreign-owned MNEs.

We explore the average labor productivity within broad sectors by firms’ multinational status measured as pay per worker and sales per worker in Figures 5(a) and 5(b), respectively. We find that MNEs exhibit higher average pay per worker compared to non-MNEs, and there is very little difference between U.S.- and foreign-owned MNEs. An exception is in “Professional Services,” where foreign-owned MNEs exhibit higher average pay per worker than U.S.-owned MNEs.

There is much less variation in average sales per worker among the 3 firm types within almost all 12 broad sectors. An exception is in “Wholesale” where non-MNEs exhibit more than 3 times lower average sales per worker than MNEs; and U.S.-owned MNEs exhibit higher average sales per worker than foreign-owned MNEs.

⁴⁷Howenstine and Zeile (1994) discuss in more detail the advantages of using establishment- versus consolidated enterprise-level data in the context of linking the BEA inward surveys to the BR.

6.5. Geographic Distribution by Multinational Status

Figure 6 displays the average shares of (a) number of establishments, (b) employment, (c) sales, and (d) payroll accounted by the three firm types within nine Census divisions, which correspond to broad geographic regions.⁴⁸ We find that MNEs exhibit similar shares in these variables across the nine divisions.

Figure 7 displays the average pay per worker by multinational status and Census division. We can see in Figure 7(a) that MNEs exhibit higher average pay per worker than non-MNEs in all regions; however, there does not appear to be much difference between U.S.- and foreign-owned MNEs in a particular region. There may be concerns that industrial composition in a region is driving these statistics. Therefore, we recreate the average pay per worker by adjusting for industry means as shown in Figure 7(b).⁴⁹ By the adjusted measure, the gap between non-MNEs and MNEs persists. However, now we can see that that foreign-owned MNEs have higher industry-adjusted average pay per worker in the “Mountain” and “Pacific” regions. These results suggest that it is important to control for industrial heterogeneity when comparing multinational characteristics across space.

7. Concluding Remarks

This paper documents the methodology and results from comprehensively linking the multinational surveys conducted by the Bureau of Economic Analysis to the Census Bureau's Business Register from 1997 through 2017. These new linkages enable comprehensive identification of U.S.-owned and foreign-owned multinational firms operating in the United States.

Identification of the universe of multinational firms in the United States is part of a broader research agenda to develop aggregated public-use business dynamics statistics of globally engaged firms—BDS-GEF. Under this research agenda, firms' global engagement is defined along three main dimensions: trade in goods, trade in services, foreign direct investment. The Center for Economic Studies at the U.S. Census Bureau jointly with BEA is actively developing the data infrastructure to identify services traders in addition to multinationals in the CBPBR (Kamal and Ouyang, 2022).⁵⁰ Handley, Kamal and

⁴⁸In the Appendix, we report shares of establishments and employment (Table A-10) and payroll and sales (Table A-11) by state.

⁴⁹We begin by computing pay per worker at the establishment level and then subtracting the average pay per worker in the industry in which the establishment operates. Then we take an average of the establishment-level industry-adjusted pay per worker by region and firms' multinational status.

⁵⁰The data infrastructure entails links between BEA's surveys on services trade to the Census Bureau's BR. The confidential multinational and services trade crosswalks are available to qualified researchers on approved projects through the

Ouyang (2021) describe the first experimental, public-use product extending the Business Dynamics Statistics program at the U.S. Census Bureau—BDS-Goods Traders. These statistics describe the business dynamics of goods-trading firms in the U.S. economy. The BDS-Goods Traders is the first in a set of public-use statistics developed under BDS-GEF. The BDS-GEF aims to augment the view of U.S. business dynamics along key dimensions of firms' participation in global markets.

The newly available crosswalks identifying multinationals in the Business Register will not only enable the quantification of MNEs' contribution to employment growth and firm dynamics in the U.S. economy, but they will also address a rich set of research questions that require detailed information on both domestic activities (such as production, innovation) and foreign activities (such as merchandise and services trade, affiliate sales) of MNEs compared to other firms in the economy. For example, what is the organization of MNEs' global operations and how has it changed over time? How do MNEs' production activities shape industrial and spatial competition?

The Census Bureau and BEA are actively working on extending the crosswalk time series on an annual basis and developing the public-use BDS-Multinationals statistics.

Federal Statistical Research Data Centers (FSRDC). [U.S. Census Bureau \(2021a\)](#) provides information on the application process.

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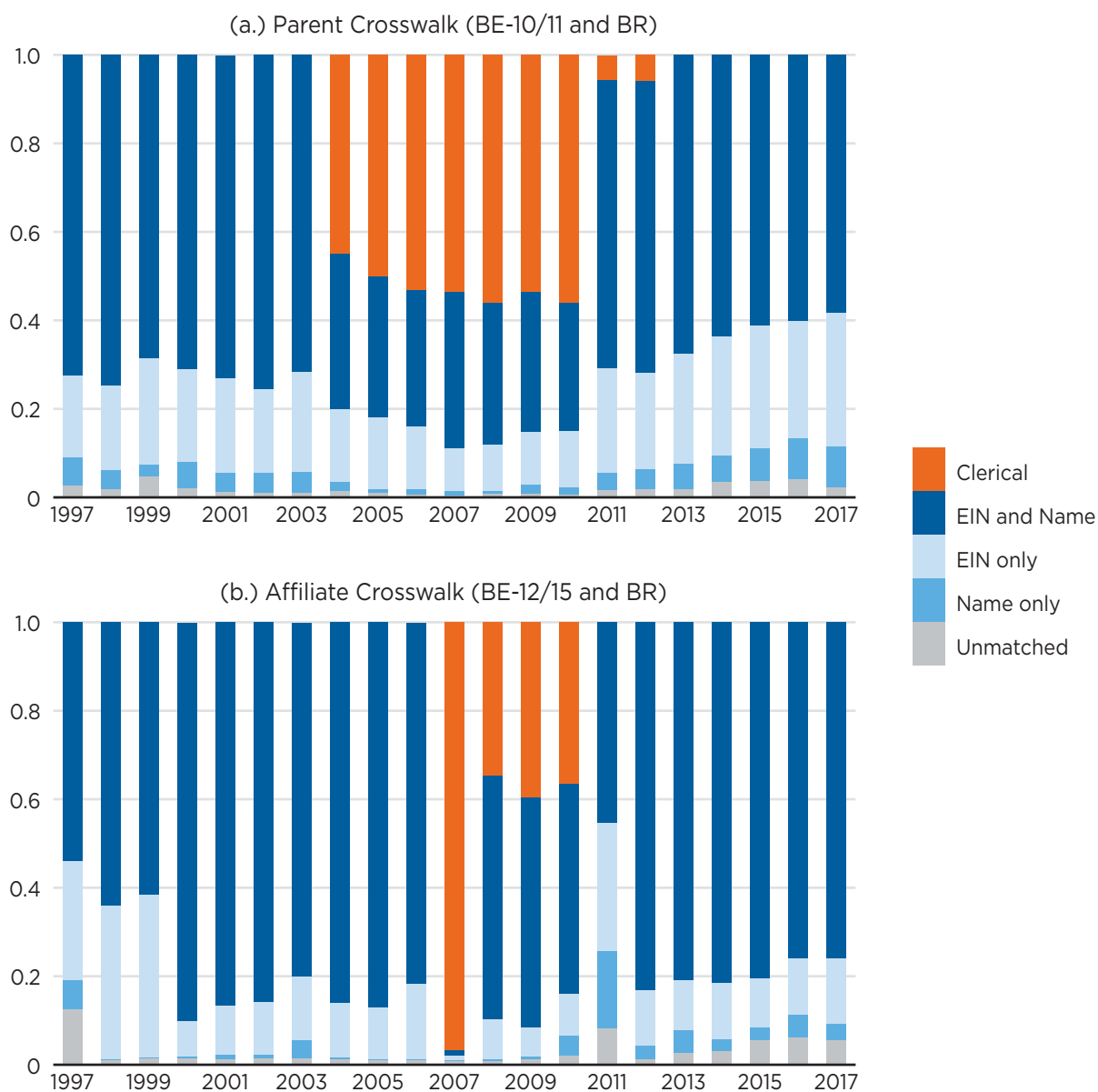
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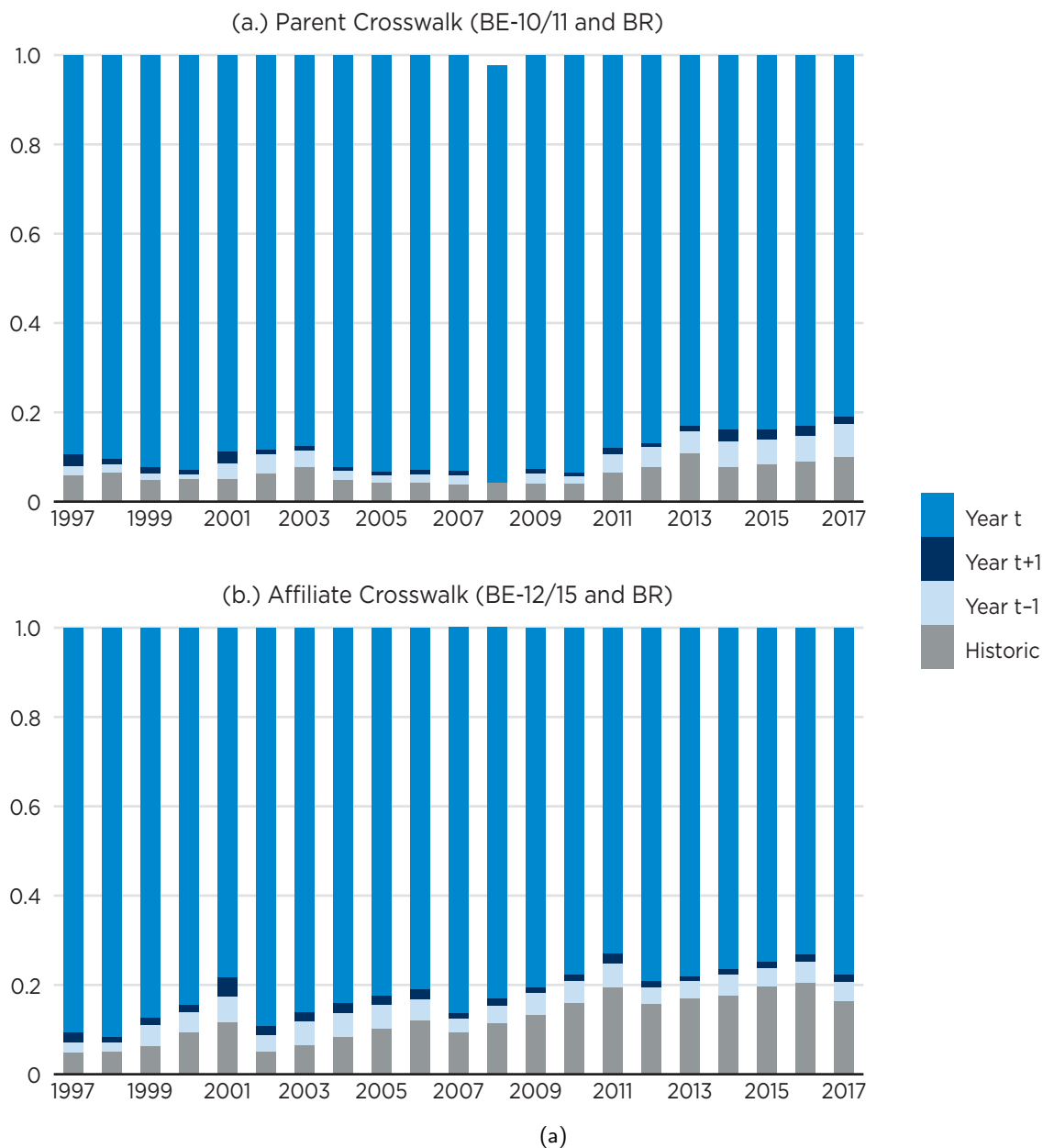
Figure 1. Employment-weighted Match Rates by Match Type, 1997-2017



Notes: This figure displays the annual employment-weighted match rate between (a) BE-10/11 and BR and (b) BE-12/15 and BR using employment reported in BEA surveys. “EIN and Name” denotes cases that were matched using both EIN and business name; “EIN only” denotes cases that were matched using EIN only; “Name only” denotes cases that were matched using business name only; “Clerical” denotes cases that were matched using clerical review; “Unmatched” denotes cases that were not matched.

Source: Authors’ calculations using BE10-BR and BE11-BR.

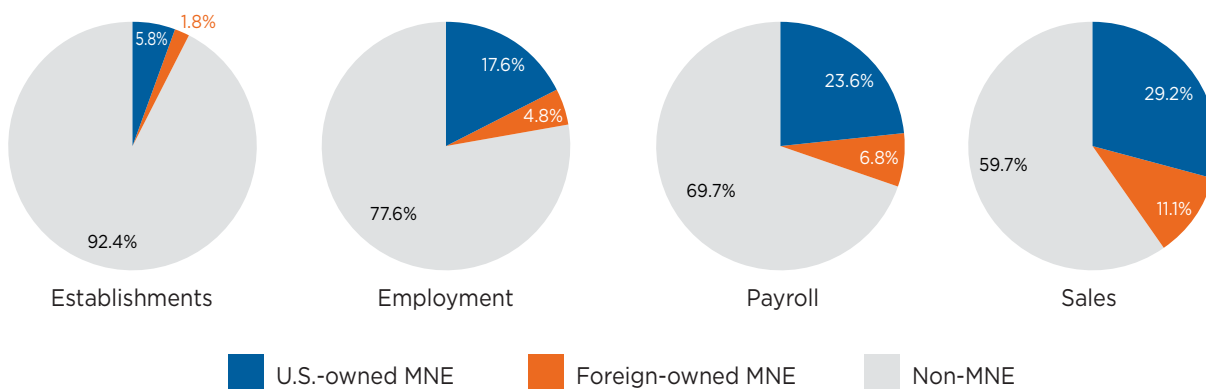
Figure 2. Employment-weighted Match Rates by Match Year, 1997-2017



Notes: This figure displays the annual employment-weighted match rate by year of match between BE-10/11 and BR using employment reported in BEA surveys. “Year t ” indicates a match in the year of the survey; “Year $t + 1$ ” indicates a match in the year after the survey; “Year $t - 1$ ” indicates a match in the year prior to the survey; “Historic” indicates a match in any year between 1976 and year $t - 2$ of the survey. Statistics for years $t + 1$ and $t - 1$ have been suppressed in 2008.

Source: Authors’ calculations using BE10-BR and BE11-BR.

Figure 3. Average Share of Economic Activity by Multinational Status



Notes: This figure displays the annual share of number of establishments, employment, sales, and payroll averaged over five Economic Census years (1997, 2002, 2007, 2012, 2017).

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

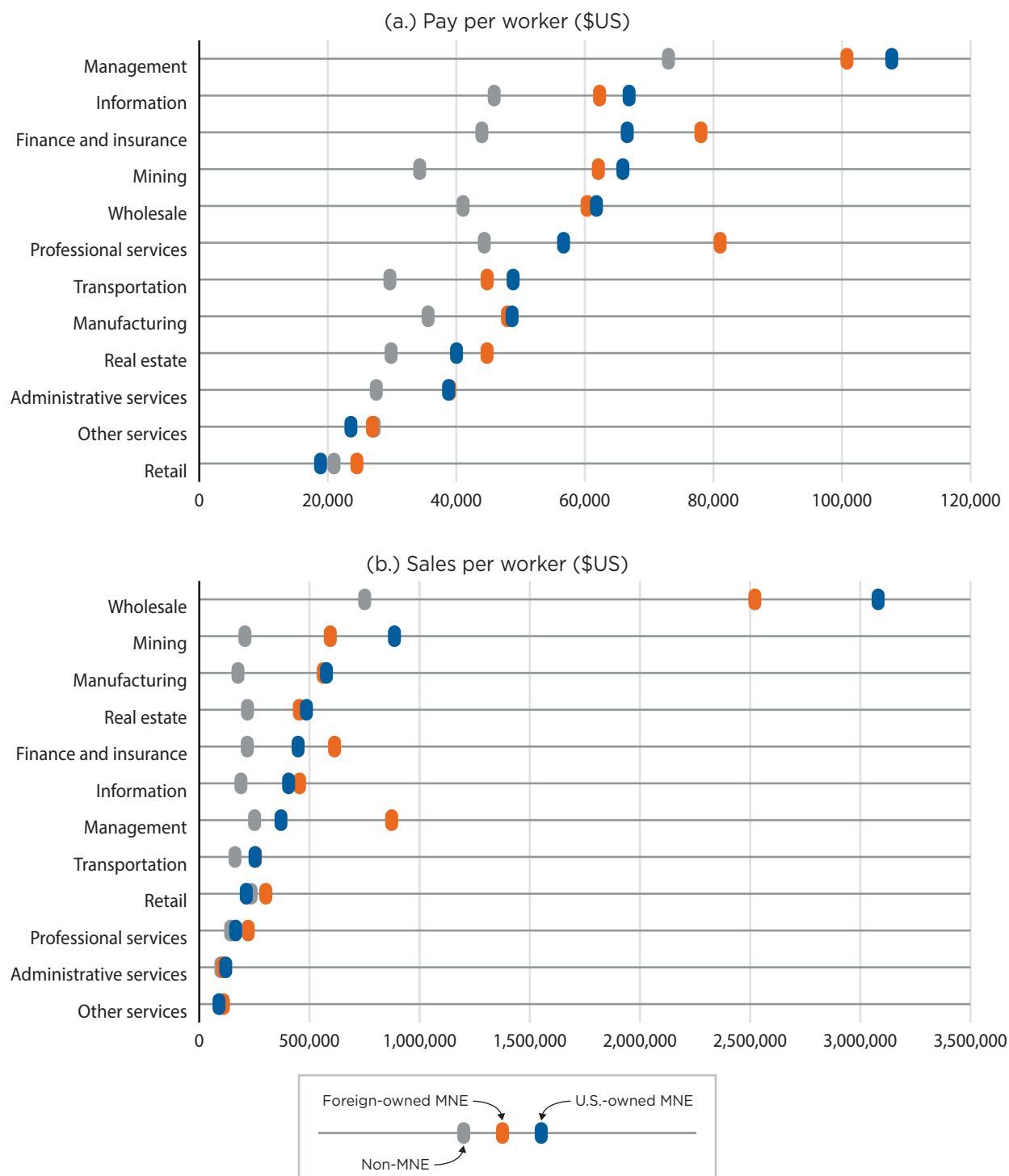
Figure 4. Average Share of Economic Activity by Sector and Multinational Status



Notes: This figure displays the annual share of (a) number of establishments, (b) employment, (c) sales, and (d) payroll averaged over five Economic Census years (1997, 2002, 2007, 2012, 2017) within broad sectors by firms' multinational status. Broad sectors are one or more 2-digit NAICS as follows: "Mining" (21-23), "Manufacturing" (31-33), "Wholesale" (42), "Retail" (44-45), "Transportation" (48-49), "Information" (51), "Finance & Insurance" (52), "Real Estate" (53), "Professional Services" (54), "Management" (55), "Administrative Services" (56), "Other Services" (61-62, 71-72, 81)

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

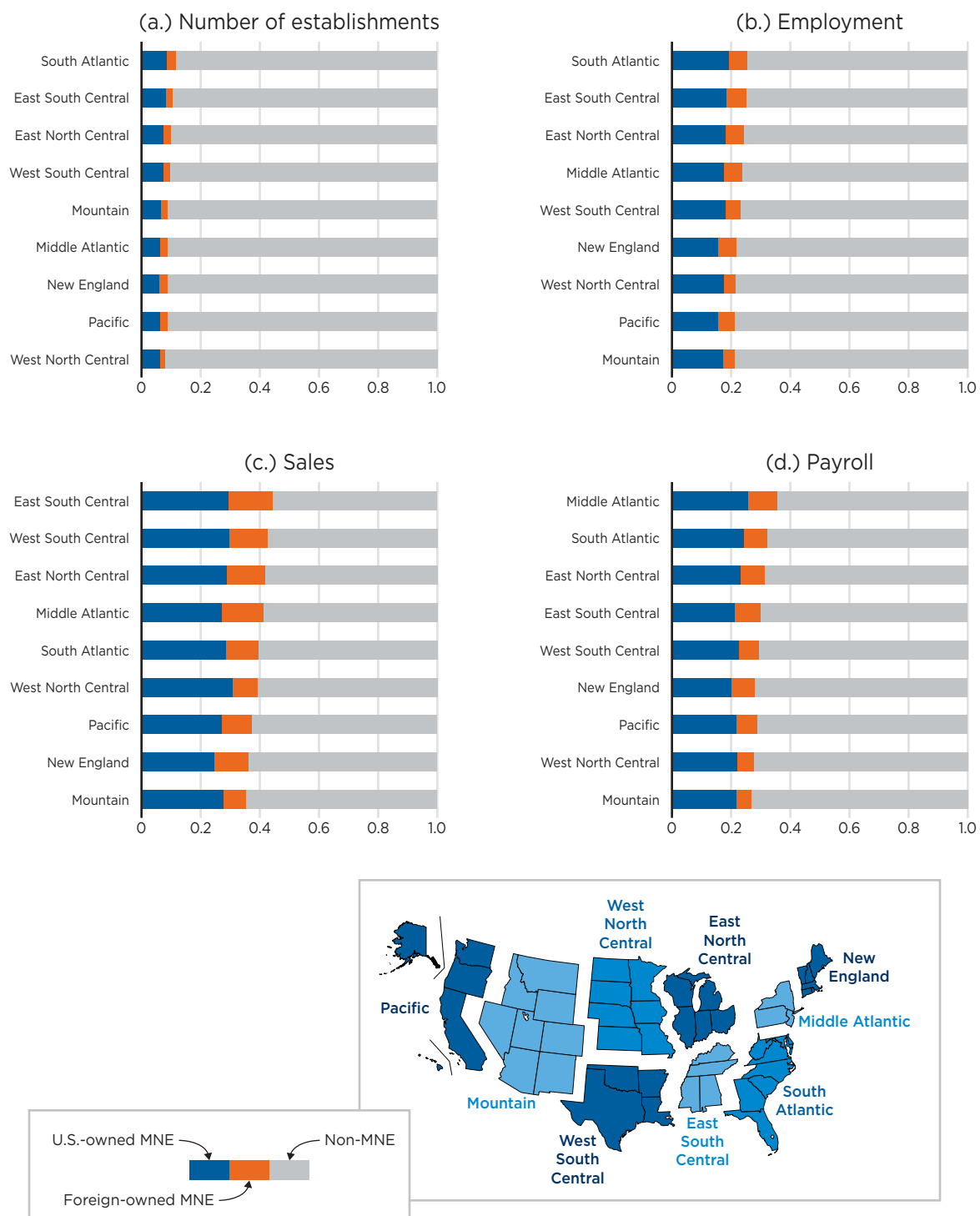
Figure 5. Average Productivity by Sector and Multinational Status



Notes: This figure displays the annual (a) pay per worker (in 1,000 USD) and (b) sales per worker (in 1,000 USD) averaged over five Economic Census years (1997, 2002, 2007, 2012, 2017) within broad sectors by firms' multinational status. Broad sectors are one or more 2-digit NAICS as follows: "Mining" (21-23), "Manufacturing" (31-33), "Wholesale" (42), "Retail" (44-45), "Transportation" (48-49), "Information" (51), "Finance & Insurance" (52), "Real Estate" (53), "Professional Services" (54), "Management" (55), "Administrative Services" (56), "Other Services" (61-62, 71-72, 81)

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

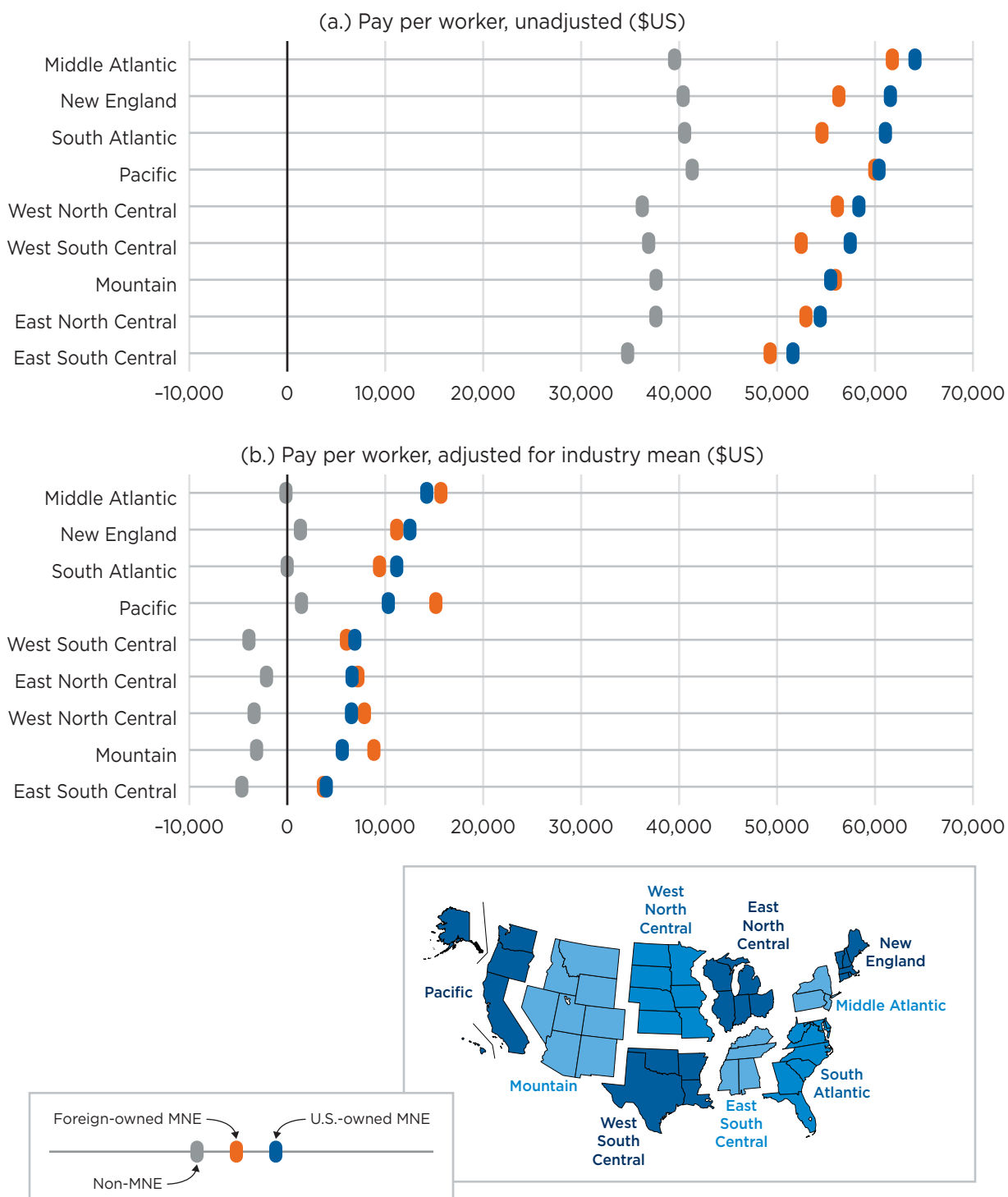
Figure 6. Average Share of Economic Activity by Region and Multinational Status



Notes: This figure displays the 2017 share of (a) number of establishments, (b) employment, (c) sales, and (d) payroll within 9 Census divisions by firms' multinational status.

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

Figure 7. Average Pay per Worker by Region and Multinational Status



Notes: This figure displays the 2017 average pay per worker (in 1,000 USD) within 9 Census divisions by firms' multinational status.

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

Table 1. Employment Ratio, Parent Crosswalk

Panel A: Employment ratios				
Size Class	1999	2004	2009	2014
<10	7.62	>100	D	97.48
10-99	15.73	6.61	D	35.15
100-499	2.35	4.43	3.74	4.98
500-999	1.49	1.25	1.59	1.32
1,000-10,000	1.25	1.29	1.21	1.28
10,000+	1.05	1.06	1.06	0.98

Panel B: Employment shares				
Size Class	1999	2004	2009	2014
<10	0.00	0.00	D	0.00
10-99	0.00	0.00	D	0.00
100-499	0.01	0.01	0.01	0.02
500-999	0.01	0.01	0.01	0.02
1,000-10,000	0.19	0.18	0.19	0.20
10,000+	0.78	0.80	0.78	0.77

Notes: Panel A shows the ratio between employment in the LBD and BEA surveys by five size classes. Size class is defined using employment reported in the BEA surveys. Panel B shows the share of employment reported in the BEA surveys by size class. "D" denotes suppressed cells.

Source: Authors' calculations using BE11-BR.

Table 2. Employment Ratio, Affiliate Crosswalk

Panel A: Employment ratios					
Size Class	1997	2002	2007	2012	2017
<10	>100	>100	>100	>100	>100
10-99	16.55	46.46	18.53	31.42	96.31
100-499	4.55	5.40	4.95	5.32	5.64
500-999	2.26	2.96	3.64	3.36	2.36
1,000-10,000	1.52	2.26	1.85	1.58	2.00
10,000+	0.97	0.79	1.11	0.92	0.95

Panel B: Employment shares					
Size Class	1997	2002	2007	2012	2017
<10	0.00	0.00	0.00	0.00	0.00
10-99	0.03	0.02	0.02	0.02	0.02
100-499	0.09	0.06	0.06	0.05	0.05
500-999	0.07	0.06	0.06	0.06	0.05
1,000-10,000	0.40	0.33	0.35	0.32	0.32
10,000+	0.41	0.53	0.51	0.56	0.56

Notes: Panel A shows the ratio between employment in the LBD and BEA surveys by five size classes. Size class is defined using employment reported in the BEA surveys. Panel B shows the share of employment reported in the BEA surveys by size class.

Source: Authors' calculations using BE12-BR.

Table 3. Firm and Employment Share of "Overlap" Entities, by Year

Year	Total		U.S.-owned		Foreign-owned	
	Firms	Employment	Firms	Employment	Firms	Employment
1997	0.04	0.10	0.06	0.46	0.94	0.54
2002	0.05	0.16	0.13	0.54	0.88	0.46
2007	0.04	0.11	0.17	0.45	0.83	0.55
2012	0.06	0.17	0.12	0.57	0.88	0.43
2017	0.05	0.19	0.12	0.56	0.88	0.44

Notes: "Total" displays the share of firms that appear in both the BE-12 and BE-11 surveys, "overlaps", in a given year; "U.S.-owned" displays the share of overlap firms classified as U.S.-owned; and "foreign-owned" displays the share classified as foreign-owned.

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

Table 4. Economic Activity by Multinational Status, 1997-2017

Year	Firms	Establishments	Employment	Payroll	Sales	Exports	Imports
U.S.-owned MNE							
1997	0.0005	0.04	0.16	0.20	0.28	0.52	0.36
2002	0.0007	0.05	0.17	0.23	0.29	0.48	0.33
2007	0.0006	0.06	0.18	0.24	0.30	0.47	0.29
2012	0.0006	0.07	0.18	0.25	0.29	0.40	0.27
2017	0.0010	0.07	0.19	0.26	0.30	0.41	0.28
Foreign-owned MNE							
1997	0.0015	0.01	0.04	0.05	0.08	0.14	0.28
2002	0.0013	0.02	0.05	0.07	0.10	0.19	0.30
2007	0.0013	0.02	0.05	0.07	0.12	0.20	0.30
2012	0.0013	0.02	0.05	0.07	0.13	0.24	0.28
2017	0.0017	0.02	0.06	0.08	0.13	0.25	0.29
non-MNE							
1997	0.9980	0.95	0.81	0.75	0.64	0.34	0.36
2002	0.9981	0.93	0.78	0.71	0.61	0.33	0.37
2007	0.9982	0.92	0.77	0.68	0.58	0.33	0.41
2012	0.9980	0.92	0.77	0.68	0.58	0.35	0.45
2017	0.9974	0.91	0.75	0.66	0.58	0.34	0.43

Notes: This table displays the annual share of firms, establishments, employment, payroll, sales, merchandise exports, and merchandise imports by multinational status.

Source: Authors' calculations using Economic Census, LFTTD, BE10-BR, and BE12-BR.

Table 5. Firm Shares by Employment Size and Multinational Status, 1997-2017

Size Class	1997	2002	2007	2012	2017
U.S.-owned MNE					
1-19	0.02	0.05	0.04	0.05	0.14
20-49	0.02	0.05	0.04	0.05	0.09
50-99	0.03	0.07	0.06	0.07	0.09
100-249	0.10	0.14	0.12	0.12	0.14
250-999	0.24	0.23	0.24	0.25	0.22
1,000-2,499	0.19	0.16	0.16	0.16	0.12
2,500+	0.39	0.30	0.35	0.30	0.20
Foreign-owned MNE					
1-19	0.36	0.31	0.33	0.36	0.43
20-49	0.17	0.15	0.14	0.14	0.13
50-99	0.12	0.12	0.11	0.11	0.10
100-249	0.13	0.14	0.13	0.12	0.11
250-999	0.14	0.16	0.16	0.16	0.13
1,000-2,499	0.04	0.06	0.06	0.06	0.05
2,500+	0.04	0.05	0.07	0.06	0.05
non-MNE					
1-19	0.87	0.87	0.87	0.87	0.88
20-49	0.08	0.08	0.08	0.08	0.08
50-99	0.03	0.03	0.03	0.03	0.02
100-249	0.01	0.01	0.01	0.01	0.01
250-999	0.01	0.01	0.01	0.01	0.01
1,000-2,499	0.001	0.0009	0.0009	0.001	0.0009
2,500+	0.0005	0.0005	0.0005	0.0005	0.0005

Notes: This table displays the annual share of firms by multinational status and seven firm-size classes based on EC employment.

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

Table 6. Firm Shares by Multi-Unit and Multinational Status, 1997-2017

Year	Multi-Establishment	Multi-Sector	Multi-State
U.S.-owned MNE			
1997	0.90	0.70	0.84
2002	0.79	0.65	0.72
2007	0.83	0.68	0.77
2012	0.81	0.65	0.75
2017	0.65	0.46	0.56
Foreign-owned MNE			
1997	0.38	0.22	0.31
2002	0.44	0.30	0.37
2007	0.43	0.30	0.38
2012	0.42	0.29	0.36
2017	0.35	0.23	0.29
non-MNE			
1997	0.04	0.01	0.01
2002	0.04	0.01	0.01
2007	0.03	0.01	0.01
2012	0.04	0.01	0.01
2017	0.03	0.01	0.01

Notes: This table displays the annual share of firms with multiple establishments, with establishments in multiple sectors, and with establishments in multiple states by multinational status.

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

Table 7. Average Firm Scope by Multinational Status, 1997-2017

Year	Count (N)					N Traded Countries		N Traded Products	
	Establishments	Sectors	Industries	States	Counties	Exports	Imports	Exports	Imports
U.S.-owned MNE									
1997	123	3	5	13	24	53	28	27	21
2002	112	3	5	11	20	49	27	24	19
2007	156	3	5	12	22	55	31	24	23
2012	152	3	4	12	21	57	32	25	23
2017	96	2	3	8	14	52	30	23	21
Foreign-owned MNE									
1997	11	1	2	3	4	30	15	17	15
2002	20	2	2	4	6	34	18	17	15
2007	21	2	2	4	6	37	20	16	17
2012	20	2	2	4	6	40	22	17	17
2017	20	1	2	3	5	38	22	17	16
non-MNE									
1997	1	1	1	1	1	10	6	5	7
2002	1	1	1	1	1	10	6	5	7
2007	1	1	1	1	1	11	5	5	6
2012	1	1	1	1	1	12	5	5	6
2017	1	1	1	1	1	12	5	5	6

Notes: This table displays the annual average number of establishments, sectors, 4-digit industries, states, counties, exported and imported HS6 products, destination and source countries of merchandise trade by multinational status. The trade-related statistics are reported for trading firms only.

Source: Authors' calculations using Economic Census, LFTTD, BE10-BR, and BE12-BR.

Table 8. Average Productivity by Multinational Status, 1997-2017

Year	Firm Average			Establishment Average			
	Employment	Payroll	Sales	Pay/Worker	Sales/Worker	Industry Mean Adjusted	
						Pay/Worker	Sales/Worker
U.S.-owned MNE							
1997	7,749	278.1	2,522	30.5	481.3	4.0	220.0
2002	6,751	295.9	2,189	36.0	397.9	4.9	159.5
2007	7,969	440.9	3,322	48.0	479.5	7.4	191.2
2012	7,149	453.2	3,253	52.9	519.5	8.6	221.3
2017	4,731	331.8	2,179	58.8	539.7	9.6	212.1
Foreign-owned MNE							
1997	564	20.8	229.5	33.6	575.2	7.8	313.2
2002	948	45.2	395.0	42.5	539.7	9.8	282.0
2007	986	57.7	570.1	48.5	731.5	12.4	399.0
2012	972	66.0	706.0	57.3	762.9	13.4	374.0
2017	858	60.1	557.0	56.2	649.2	10.8	286.1
non-MNE							
1997	19	0.5	2.7	24.7	159.7	-0.3	-13.7
2002	19	0.6	2.9	27.9	162.7	-0.4	-13.8
2007	19	0.7	3.5	32.5	200.7	-0.7	-20.7
2012	19	0.8	4.1	34.8	218.0	-0.9	-23.2
2017	19	0.8	4.2	39.4	227.5	-1.0	-24.3

Notes: This table displays annual average firm employment, payroll (in million USD), and sales (in million USD) and annual average establishment payroll (in 1,000 USD) and sales (in 1,000 USD) per worker by multinational status. The last two columns report industry demeaned values (difference between establishment-level values and corresponding industry average).

Source: Authors' calculations using Economic Census, BE10-BR, and BE12-BR.

A. Appendix

A.1. Ranking Matches

We construct a variable—“beN1_beN2_rank”—included in the crosswalk files describing the attributes of a match (where N1=BE-10 or BE-12 and N2=BE-11 or BE-15). This field is period(.) separated and denoted R1.R2.R3.R4.R5 with R1 = rank 1, R2 = rank 2 and so on. The algorithm sorts the following in ascending order: R1, R2, R3, R4, R5. The field is read from left to right and each individual rank may contain a maximum of 2 digits. The lower the rank, the more confidence we have in our ability to have linked the BEA record to the same firm in the CBPBR.⁵¹ Each rank level is calculated independently and is designed to order traits.⁵²

1. Rank 1 (R1): Used to rank clerical matches with particular attributes. Non-clerical matches will have R1=17. This rank can take on values between 1-17 or 99.
2. Rank 2 (R2): Used to rank matches to the BR using EIN where the matches share the same zip, state, industry, and close Census/BEA employment ratio with the BEA data.⁵³ Records which do not fall in these strict definitions will have R2=3. This rank can take on values 1, 2, 3, or 99.
3. Rank 3 (R3): Used to rank EIN, name, and address matches. EIN matches are ranked higher than non-EIN matches; matches based on both name and street address are ranked higher than name matches only. This rank can take on values between 1-16 or 99.
4. Rank 4 (R4): Used to rank attributes of matches in descending order as follows: multi-unit (MU) status, industry, and state match. Multi-unit status is ranked higher than industry match, and industry match is ranked higher than state match. This rank can take on values between 1-8 or 99.
5. Rank 5 (R5): Used to rank closeness of the BEA survey year to the year in which the firmid is obtained from the BR. If the years are the same, then R5=1; if BR is 1 year after BEA then R5=2; if BR is 1 year before BEA then R5=3; if BR is X years before BEA then R5= (BEA survey year – CBPBR year + 2). This rank can take on values between 1-43 or 99. Note, 43 is the maximum value based on the latest available year, 2017. This will change with availability of additional years based on the formula above.

⁵¹A rank of 99.99.99.99.99 indicate records with zero BEA employment that are removed from matching algorithm since the BR encompasses the employer universe.

⁵²Researchers on approved projects are provided with details on all possible values of this variable in documentation located in Census Bureau's secure servers.

⁵³Census employment/BEA employment is considered close if the ratio is < 0.15 . The ratio is computed as $abs\left[\frac{(census_emp - bea_emp)}{0.5(census_emp + bea_emp)}\right]$.

Below is a description of an example where `be10.be11.rank = "09.01.01.01.01"`. This rank indicates that the *firmid* matched to the *usid* in the BEA survey has the following properties:

- R1: obtained using clerical match; is a multi-unit firm; 2-digit industry match; state match.
- R2: obtained using EIN; zip match; 2-digit industry match; state match; close employment ratio.
- R3: obtained using EIN; found using business name; found using business address.
- R4: multi-unit firm; 2-digit industry match; state match.
- R5: obtained in the same CBPBR year as the BEA survey year.

A.2. Crosswalk File Structure

The following tables list the variables included in the crosswalk files version A201701. The first letter of the version number denotes any major changes to the matching algorithm; the next four numbers denote the last year in the series; and the final two letters denote any minor changes to the matching algorithm. The version number will be updated with any updates to the data series.

Table A2-1. Multinational Crosswalk File Description: Parent Crosswalk

Variable	Description
<code>be10.be11.usid</code>	7-digit firm identifier in BE-10/11
<code>be10.be11.firmid</code>	10-digit firm identifier in BR
<code>be10.be11.rank</code>	Flags indicating matching algorithm
<code>be10.be11.firmid_year</code>	CBPBR year of match
<code>be12.be15.id</code>	6-digit identifier in BE-12/15

Notes: This table displays the variables contained in the parent crosswalk files, version A201701.

Table A2-2. Multinational Crosswalk File Description: Affiliate Crosswalk

Variable	Description
<code>be12.be15.usid</code>	6-digit firm identifier in BE-12/15
<code>be12.be15.firmid</code>	10-digit firm identifier in BR
<code>be12.be15.rank</code>	Flags indicating matching algorithm
<code>be12.be15.firmid_year</code>	CBPBR year of match

Notes: This table displays the variables contained in the affiliate crosswalk files, version A201701.

A.3. Census Bureau Data To Identify U.S. Multinational Firms

There are several sources U.S. Census Bureau data in addition to the comprehensive surveys collected by BEA that may be used to identify multinationals operating in the U.S. economy.⁵⁴ These include both survey instruments and administrative data. Table A3-1 lists the three main data sources that may be used to identify MNEs and the available years.

Table A3-1. Alternate Data Sources to Identify Multinational Firms

Data Source	Data Type	Years
Company Organization Survey	Survey	2002 - 2021
Management & Organizational Practices Survey	Survey	2015
Longitudinal Firm Trade Transactions Database (Exports)	Administrative	1992 - 2020
Longitudinal Firm Trade Transactions Database (Imports)	Administrative	1992 - 2020

The COS is conducted annually ([U.S. Census Bureau, 2022](#)). The LFTTD is available with a two-year lag ([Kamal and Ouyang, 2020](#)).

The most comparable source of foreign ownership information to the BEA multinational surveys is the Company Organization Survey (COS) also called the Report of Organization. The COS is a survey used to update the Census Bureau's Business Register and ensure complete coverage and high quality of other statistical programs but not directly used to create public-use data products ([U.S. Census Bureau, 2022](#)). The survey is conducted at the firm-industry level and collects information on foreign ownership or control ([U.S. Census Bureau, 2021c](#)). The survey can be used to determine if the company (i) is a U.S. affiliate of a foreign parent by responses to the questions whether a foreign entity owns 10% or more of the voting stock or equity rights of the company (Item 1F) and the range of percent voting stock (Item 1H); and (ii) is a U.S. parent that owns foreign affiliates by responses to the question whether the company owns 10% or more of the voting stock of a foreign business enterprise (Item 1I). This information (see Figure A3-1 for a list of the questions) is available beginning in 2002.

The Management and Organizational Practices Survey (MOPS), a supplement to the Annual Survey of Manufactures (ASM), is an establishment level survey sent to manufacturing plants ([U.S. Census Bureau, 2015b](#)). As shown in Figure A3-2, the MOPS included a question in 2015 that asked whether the establishment belongs to a firm that has production establishments in other countries (Item 46). From this question alone, it is only possible to determine whether the firm associated with the establishment is a multinational but not whether the firm is a U.S. parent or U.S. affiliate of a foreign parent firm.

The Longitudinal Firm Trade Transactions Database (LFTTD) links merchandise export and import transactions to firms in the Business Register ([Kamal and Ouyang, 2020](#)). The trade transactions contain an indicator variable that asks whether the transaction takes place between related parties. In the export transactions, parties are related if either has, directly or indirectly, 10% ownership stake (Item c, Figure A3-3). In the import transactions, parties are related if either has, directly or indirectly, 5%

⁵⁴External data sources may also provide opportunities to identify multinational firms operating in the United States. For example, [Flaaen \(2014\)](#) describes efforts to identify establishments in the Economic Census that are owned by multinational firms by linking to the LexisNexis Directory of Corporate Affiliations.

ownership stake (Item 32.C, Figure A3-4).⁵⁵ Using this indicator variable, it is only possible to determine whether the firm associated with the transactions is a multinational but not whether the firm is a U.S. parent or U.S. affiliate of a foreign parent firm.

Figure A3-1. 2021 COS

ITEM 1F: FOREIGN OWNERSHIP OR CONTROL

Does a foreign entity (company, individual, government, etc.) own directly or indirectly 10 percent or more of the voting stock or other equity rights of your company?

Yes

No

ITEM 1G: FOREIGN OWNERSHIP OR CONTROL - COMPANY INFORMATION

What is the name, address, and country of the foreign entity (company, individual, government)?

Name of foreign beneficial owner

Home office address (Number and street)

City

Country

ITEM 1H: FOREIGN OWNERSHIP OR CONTROL - PERCENT OF VOTING STOCK OWNED More

What percent of voting stock was owned directly or indirectly by a foreign entity (company, individual, government)?

10% to 24%

25% to 49%

50%

51% - 99%

100%

ITEM 1I: FOREIGN AFFILIATES

Does this company alone, or with its domestic affiliates, own 10 percent or more of the voting stock of an incorporated foreign business enterprise, or an equivalent interest in an unincorporated business enterprise, including ownership of real estate?

Yes

No

Notes: This figure displays the questions on foreign ownership or control collected on the 2021 Company Organization Survey (NC-99001).

Source: U.S. Census Bureau (2021e).

Figure A3-2. 2015 MOPS

46 Is this establishment part of a firm which has production establishments in other countries?

Yes

No

Notes: This figure displays Item 46 on the 2015 Management and Organizational Practices Survey.

Source: U.S. Census Bureau (2015a).

⁵⁵Related parties are defined as in 19 C.F.R. §152.102(g) where equity ownership is one of seven criteria ([Code of Federal Regulations, 2022](#)).

Figure A3-3. Form 7525V: Shipper's Export Declaration

U.S. DEPARTMENT OF COMMERCE – Economic and Statistics Administration – U.S. CENSUS BUREAU – BUREAU OF EXPORT ADMINISTRATION
FORM 7525-V (7-18-2003) **SHIPPER'S EXPORT DECLARATION** OMB No. 0607-0152

1a. U.S. PRINCIPAL PARTY IN INTEREST (USPPI) (Complete name and address)		2. DATE OF EXPORTATION	3. TRANSPORTATION REFERENCE NO.		
ZIP CODE					
b. USPPI'S EIN (IRS) OR ID NO.	c. PARTIES TO TRANSACTION <input type="checkbox"/> Related <input type="checkbox"/> Non-related				
4a. ULTIMATE CONSIGNEE (Complete name and address)					
b. INTERMEDIATE CONSIGNEE (Complete name and address)					
5a. FORWARDING AGENT (Complete name and address)					
5b. FORWARDING AGENT'S EIN (IRS) NO.					
6. POINT (STATE) OF ORIGIN OR FIZ NO.		7. COUNTRY OF ULTIMATE DESTINATION			
8. LOADING PIER (Vessel only)	9. METHOD OF TRANSPORTATION (Specify)	14. CARRIER IDENTIFICATION CODE	15. SHIPMENT REFERENCE NO.		
10. EXPORTING CARRIER	11. PORT OF EXPORT	16. ENTRY NUMBER	17. HAZARDOUS MATERIALS <input type="checkbox"/> Yes <input type="checkbox"/> No		
12. PORT OF UNLOADING (Vessel and air only)	13. CONTAINERIZED (Vessel only) <input type="checkbox"/> Yes <input type="checkbox"/> No	18. IN BOND CODE	19. ROUTED EXPORT TRANSACTION <input type="checkbox"/> Yes <input type="checkbox"/> No		
20. SCHEDULE B DESCRIPTION OF COMMODITIES (Use columns 22-24)					
D/E of M (21)	SCHEDULE B NUMBER (22)	QUANTITY - SCHEDULE UNIT(S) (23)	SHIPPING WEIGHT (kilograms) (24)	VIN/PRODUCT NUMBER/VEHICLE TITLE NUMBER (25)	VALUE (U.S. dollars, 000 cents) (Selling price or cost if not sold) (26)
27. LICENSE NO./LICENSE EXCEPTION SYMBOL/AUTHORIZATION		28. ECCN (When required)			
29. Duly authorized officer or employee		The USPPI authorizes the forwarder named above to act as forwarding agent for export control and customs purposes.			
30. I certify that all statements made and all information contained herein are true and correct and that I have read and understand the instructions for preparation of this document, set forth in the "Correct Way to Fill Out the Shipper's Export Declaration." I understand that civil and criminal penalties, including forfeiture and loss, may be imposed for missing, false or fraudulent statements herein, failing to provide the requested information or for violation of U.S. laws on exportation (15 U.S.C. Sec. 305; 25 U.S.C. Sec. 401; 18 U.S.C. Sec. 1001; 50 U.S.C. App. 2410).					
Signature		Confidential - Shipper's Export Declaration (or any successor document) whenever stated, shall be exempt from public disclosure unless the Secretary determines that such exemption would be contrary to the national interest (50 U.S.C. Chapter 5, Section 3025 (b)).			
Title		Export documents are subject to inspection by U.S. Customs Service and/or Office of Export Enforcement.			
Date		31. AUTHENTICATOR (When required)			
Telephone No. (include Area Code)		E-mail address			

Clear fields 1 to 19

Clear Fields 20 to 26

Clear Fields 27 to 31

Clear all fields

This form may be printed by private parties provided it conforms to the official form. For sale by the Superintendent of Documents, Government Printing Office, Washington, DC 20402, and local Customs District Directors. The "Correct Way to Fill Out the Shipper's Export Declaration" is available from the U.S. Census Bureau, Washington, DC 20233.

Notes: This figure displays the U.S. Department of Commerce Form 7525-V that U.S. exporters are required to file for merchandise exports valued at or above \$2,500.

Source: U.S. Department of Commerce (2003).

Figure A3-4. Form 7501: Entry Summary

Form Approved OMB No. 1651-0022
EXP. 10-31-2017

DEPARTMENT OF HOMELAND SECURITY
U.S. Customs and Border Protection
ENTRY SUMMARY

1. Filer Code/Entry No.		2. Entry Type		3. Summary Date	
4. Surety No.		5. Bond Type		6. Port Code	
7. Entry Date					
8. Importing Carrier			9. Mode of Transport		
10. Country of Origin			11. Import Date		
12. B/L or AWB No.			13. Manufacturer ID		
14. Exporting Country			15. Export Date		
16. I.T. No.		17. I.T. Date		18. Missing Docs	
19. Foreign Port of Lading		20. U.S. Port of Unlading			
21. Location of Goods/G.O. No.			22. Consignee No.		
23. Importer No.			24. Reference No.		
25. Ultimate Consignee Name and Address				26. Importer of Record Name and Address	
City			State		
Zip			City		
State			State		
Zip			Zip		
27. 28. Description of Merchandise					
29. A. HTSUS No.		30. A. Grossweight		31. Net Quantity in	
B. ADA/CVD No.		B. Manifest Qty.		HTSUS Units	
32. A. Entered Value		33. A. HTSUS Rate		34. Duty and I.R. Tax	
B. CHGS		B. ADA/CVD Rate		Dollars	
C. Relationship		C. IRC Rate		Cents	
D. Visa No.					
Other Fee Summary for Block 39					
35. Total Entered Value			CBP USE ONLY		TOTALS
\$			A. LIQ CODE		B. Ascertained Duty
Total Other Fees			REASON CODE		37. Duty
\$					C. Ascertained Tax
					38. Tax
					D. Ascertained Other
					39. Other
					E. Ascertained Total
					40. Total
36. DECLARATION OF IMPORTER OF RECORD (OWNER OR PURCHASER) OR AUTHORIZED AGENT					
I declare that I am the <input type="checkbox"/> Importer of record and that the actual owner, purchaser, or consignee for CBP purposes is as shown above, OR <input type="checkbox"/> owner or purchaser or agent thereof. I further declare that the merchandise <input type="checkbox"/> was obtained pursuant to a purchase or agreement to purchase and that the prices set forth in the invoices are true, OR <input type="checkbox"/> was not obtained pursuant to a purchase or agreement to purchase and the statements in the invoices as to value or price are true to the best of my knowledge and belief. I also declare that the statements in the documents herein filed fully disclose to the best of my knowledge and belief the true prices, values, quantities, rebates, drawbacks, fees, commissions, and royalties and are true and correct, and that all goods or services provided to the seller of the merchandise either free or at reduced cost are fully disclosed. I will immediately furnish to the appropriate CBP officer any information showing a different statement of facts.					
41. DECLARANT NAME		TITLE		SIGNATURE	
				DATE	
42. Broker/Filer Information (Name, address, phone number)				43. Broker/Importer File No.	
Paperwork Reduction Act Notice CBP Form 7501 (06/09)					

Notes: This figure displays the U.S. Customs and Border Protection’s Form 7501 that U.S. importers are required to file for merchandise imports valued at or above \$2,000.

Source: U.S. Customs and Border Protection (2021).

A.4. Appendix Tables

Table A-1. Share of Firms with Non-Zero and Zero Employment, 1997-2017

Year	—Parent—		—Affiliate—	
	Non-Zero	Zero	Non-Zero	Zero
1997	0.97	0.03	0.61	0.39
1998	0.98	0.02	0.59	0.41
1999	0.96	0.04	0.58	0.42
2000	0.96	0.04	0.57	0.43
2001	0.96	0.04	0.57	0.43
2002	0.96	0.04	0.57	0.43
2003	0.96	0.04	0.55	0.45
2004	0.96	0.04	0.53	0.47
2005	0.96	0.04	0.52	0.48
2006	0.96	0.04	0.52	0.48
2007	0.96	0.04	0.51	0.49
2008	0.96	0.04	0.50	0.50
2009	0.97	0.03	0.48	0.52
2010	0.96	0.04	0.46	0.54
2011	0.96	0.04	0.44	0.56
2012	0.96	0.04	0.43	0.57
2013	0.96	0.04	0.43	0.57
2014	0.45	0.55	0.43	0.57
2015	0.44	0.56	0.44	0.56
2016	0.44	0.56	0.46	0.54
2017	0.43	0.57	0.43	0.57

Notes: This table displays the annual share of firms in the BEA surveys with non-zero and zero reported employment.

Source: Authors' calculations using BE-10, BE-11, BE-12, and BE-15.

Table A-2. Match Rates by Match Type, Parent Crosswalk

Year	Unmatched	EIN & Name	EIN Only	Name Only	Clerical
1997	0.03	0.77	0.16	0.04	NA
1998	0.03	0.77	0.15	0.05	NA
1999	0.06	0.76	0.16	0.02	NA
2000	0.04	0.76	0.15	0.05	NA
2001	0.03	0.75	0.19	0.03	NA
2002	0.03	0.75	0.19	0.03	NA
2003	0.03	0.74	0.20	0.04	NA
2004	0.03	0.37	0.13	0.02	0.46
2005	0.02	0.37	0.12	0.02	0.48
2006	0.02	0.35	0.12	0.02	0.50
2007	0.01	0.34	0.09	0.01	0.54
2008	0.01	0.32	0.10	0.01	0.55
2009	0.02	0.35	0.10	0.03	0.50
2010	0.02	0.35	0.10	0.03	0.51
2011	0.03	0.70	0.17	0.04	0.05
2012	0.03	0.69	0.18	0.04	0.05
2013	0.03	0.69	0.22	0.05	NA
2014	0.22	0.56	0.19	0.02	NA
2015	0.21	0.57	0.20	0.02	NA
2016	0.21	0.55	0.22	0.03	NA
2017	0.16	0.57	0.20	0.07	NA

Notes: This table displays the annual share of firms in the BEA surveys that did not match to the BR (Unmatched) and matched to the BR using: EIN and business name (EIN & Name), only EIN (EIN Only), only business name (Name Only), and clerical review (Clerical).

Source: Authors' calculations using BE10-BR, BE11-BR, BE12-BR, and BE15-BR.

Table A-3. Match Rates by Match Type, Affiliate Crosswalk

Year	Unmatched	EIN & Name	EIN Only	Name Only	Clerical
1997	0.17	0.62	0.19	0.02	NA
1998	0.15	0.61	0.23	0.01	NA
1999	0.17	0.58	0.24	0.01	NA
2000	0.18	0.60	0.20	0.01	NA
2001	0.17	0.57	0.26	0.01	NA
2002	0.14	0.68	0.16	0.02	NA
2003	0.16	0.63	0.19	0.02	NA
2004	0.17	0.60	0.21	0.02	NA
2005	0.17	0.58	0.23	0.02	NA
2006	0.17	0.55	0.26	0.02	NA
2007	0.12	0.09	0.11	0.01	0.67
2008	0.13	0.52	0.21	0.02	0.11
2009	0.14	0.51	0.23	0.02	0.11
2010	0.15	0.48	0.24	0.02	0.11
2011	0.16	0.51	0.29	0.04	NA
2012	0.12	0.62	0.23	0.03	NA
2013	0.15	0.58	0.23	0.04	NA
2014	0.17	0.56	0.23	0.04	NA
2015	0.18	0.53	0.25	0.04	NA
2016	0.18	0.51	0.27	0.04	NA
2017	0.18	0.54	0.21	0.06	NA

Notes: This table displays the annual share of firms in the BEA surveys that did not match to the BR (Unmatched) and matched to the BR using: EIN and business name (EIN & Name), only EIN (EIN Only), only business name (Name Only), and clerical review (Clerical).

Source: Authors' calculations using BE10-BR, BE11-BR, BE12-BR, and BE15-BR.

Table A-4. Match Rates by Match Year, Parent Crosswalk

Year	Year t	Year $t + 1$	Year $t - 1$	Historic
1997	0.89	0.03	0.02	0.06
1998	0.90	0.01	0.02	0.07
1999	0.92	0.01	0.02	0.05
2000	0.93	0.01	0.01	0.05
2001	0.89	0.03	0.03	0.05
2002	0.88	0.01	0.04	0.06
2003	0.88	0.01	0.04	0.08
2004	0.92	0.01	0.02	0.05
2005	0.93	0.01	0.02	0.04
2006	0.93	0.01	0.02	0.04
2007	0.93	0.01	0.02	0.04
2008	0.93	D	D	0.04
2009	0.93	0.01	0.02	0.04
2010	0.93	0.01	0.02	0.04
2011	0.88	0.01	0.04	0.07
2012	0.87	0.01	0.05	0.08
2013	0.83	0.01	0.05	0.11
2014	0.84	0.03	0.06	0.08
2015	0.84	0.02	0.05	0.08
2016	0.83	0.02	0.06	0.09
2017	0.81	0.02	0.07	0.10

Notes: This table displays the share of firms in the BEA surveys that matched to the BR in the year of the survey (Year t), a year after the survey (Year $t + 1$), a year prior to the survey (Year $t - 1$), and any year between 1976 and year $t - 2$ (Historic). "D" denotes suppressed cells.

Source: Authors' calculations using BE10-BR, BE11-BR, BE12-BR, and BE15-BR.

Table A-5. Match Rates by Match Year, Affiliate Crosswalk

Year	Year t	Year $t + 1$	Year $t - 1$	Historic
1997	0.91	0.02	0.02	0.05
1998	0.92	0.01	0.02	0.05
1999	0.87	0.02	0.05	0.06
2000	0.85	0.02	0.05	0.09
2001	0.78	0.04	0.06	0.12
2002	0.89	0.02	0.04	0.05
2003	0.86	0.02	0.05	0.06
2004	0.84	0.02	0.06	0.08
2005	0.82	0.02	0.05	0.10
2006	0.81	0.02	0.05	0.12
2007	0.86	0.01	0.03	0.09
2008	0.83	0.02	0.04	0.11
2009	0.81	0.01	0.05	0.13
2010	0.78	0.01	0.05	0.16
2011	0.73	0.02	0.05	0.19
2012	0.79	0.01	0.04	0.16
2013	0.78	0.01	0.04	0.17
2014	0.76	0.01	0.05	0.18
2015	0.75	0.01	0.04	0.20
2016	0.73	0.02	0.05	0.20
2017	0.78	0.02	0.04	0.16

Notes: This table displays the share of firms in the BEA surveys that matched to the BR in the year of the survey (Year t), a year after the survey (Year $t + 1$), a year prior to the survey (Year $t - 1$), and any year between 1976 and year $t - 2$ (Historic).

Source: Authors' calculations using BE10-BR, BE11-BR, BE12-BR, and BE15-BR.

Table A-6. Share of Establishments and Employment by Sector and Multinational Status, 1997-2017

Sector Group	Establishments					Employment				
	1997	2002	2007	2012	2017	1997	2002	2007	2012	2017
U.S.-owned MNE										
Mining	0.01	0.01	0.01	0.01	0.01	0.08	0.07	0.06	0.08	0.07
Manufacturing	0.05	0.05	0.05	0.05	0.05	0.32	0.32	0.30	0.28	0.29
Wholesale	0.06	0.06	0.06	0.07	0.07	0.16	0.19	0.19	0.19	0.21
Retail	0.07	0.09	0.08	0.10	0.12	0.18	0.25	0.25	0.27	0.31
Transportation	0.05	0.07	0.08	0.08	0.10	0.14	0.20	0.29	0.30	0.35
Information	0.21	0.22	0.33	0.27	0.23	0.41	0.40	0.47	0.43	0.42
Finance	0.08	0.09	0.20	0.22	0.21	0.21	0.24	0.37	0.39	0.36
Real Estate	0.03	0.04	0.04	0.07	0.07	0.09	0.09	0.11	0.12	0.11
Professional	0.02	0.03	0.04	0.04	0.06	0.13	0.17	0.19	0.19	0.20
Management	0.07	0.21	0.23	0.25	0.25	0.15	0.42	0.41	0.39	0.37
Administrative	0.04	0.05	0.05	0.06	0.06	0.12	0.12	0.14	0.13	0.17
Other Services	0.02	0.02	0.02	0.03	0.03	0.05	0.05	0.05	0.05	0.06
Foreign-owned MNE										
Mining	0.002	0.004	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.03
Manufacturing	0.02	0.03	0.03	0.03	0.03	0.08	0.10	0.11	0.12	0.15
Wholesale	0.03	0.03	0.04	0.05	0.06	0.06	0.08	0.09	0.09	0.11
Retail	0.01	0.02	0.03	0.02	0.04	0.03	0.04	0.04	0.03	0.05
Transportation	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.08	0.07	0.08
Information	0.01	0.09	0.02	0.04	0.09	0.03	0.11	0.06	0.07	0.10
Finance	0.02	0.04	0.03	0.05	0.03	0.05	0.07	0.06	0.08	0.06
Real Estate	0.02	0.02	0.01	0.01	0.02	0.03	0.03	0.02	0.02	0.03
Professional	0.003	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.05	0.06
Management	0.07	0.10	0.10	0.10	0.14	0.08	0.12	0.12	0.12	0.12
Administrative	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.06	0.07	0.04
Other Services	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.03
non-MNE										
Mining	0.99	0.99	0.99	0.98	0.98	0.90	0.90	0.90	0.88	0.90
Manufacturing	0.93	0.93	0.92	0.92	0.91	0.61	0.58	0.59	0.59	0.56
Wholesale	0.92	0.90	0.90	0.88	0.87	0.78	0.73	0.72	0.72	0.68
Retail	0.92	0.89	0.88	0.89	0.84	0.79	0.72	0.70	0.70	0.65
Transportation	0.93	0.91	0.89	0.89	0.87	0.82	0.76	0.64	0.63	0.57
Information	0.77	0.69	0.64	0.69	0.68	0.56	0.49	0.47	0.51	0.49
Finance	0.90	0.87	0.77	0.74	0.77	0.74	0.69	0.57	0.53	0.58
Real Estate	0.95	0.94	0.95	0.92	0.91	0.89	0.87	0.87	0.86	0.86
Professional	0.98	0.96	0.95	0.95	0.93	0.86	0.80	0.77	0.76	0.73
Management	0.86	0.69	0.67	0.66	0.62	0.77	0.45	0.47	0.49	0.51
Administrative	0.95	0.94	0.93	0.92	0.91	0.85	0.85	0.80	0.80	0.78
Other Services	0.97	0.97	0.97	0.97	0.96	0.94	0.93	0.94	0.93	0.91

Notes: This table displays the share of establishments and employment by broad sector and multinational status. For definition of multinational status and sector see Sections 5 and 6.5, respectively.

Source: Authors' calculations using Economic Census, BE11-BR, and BE12-BR.

Table A-7. Share of Payroll and Sales by Sector and Multinational Status, 1997-2017

Sector Group	Payroll					Sales				
	1997	2002	2007	2012	2017	1997	2002	2007	2012	2017
U.S.-owned MNE										
Mining	0.12	0.10	0.09	0.12	0.10	0.19	0.14	0.14	0.16	0.13
Manufacturing	0.39	0.37	0.36	0.35	0.34	0.48	0.46	0.46	0.42	0.39
Wholesale	0.20	0.24	0.24	0.26	0.27	0.30	0.34	0.31	0.29	0.34
Retail	0.15	0.22	0.23	0.25	0.28	0.16	0.23	0.24	0.26	0.30
Transportation	0.18	0.24	0.33	0.34	0.42	0.19	0.20	0.29	0.31	0.37
Information	0.48	0.46	0.53	0.53	0.54	0.55	0.52	0.61	0.53	0.58
Finance	0.24	0.29	0.42	0.43	0.41	0.29	0.32	0.42	0.39	0.37
Real Estate	0.10	0.10	0.12	0.16	0.15	0.14	0.15	0.16	0.18	0.18
Professional	0.15	0.21	0.24	0.26	0.26	0.17	0.19	0.24	0.25	0.25
Management	0.27	0.50	0.51	0.48	0.48	0.14	0.36	0.28	0.15	0.16
Administrative	0.14	0.13	0.17	0.16	0.23	0.17	0.14	0.18	0.16	0.20
Other Services	0.04	0.05	0.04	0.04	0.07	0.05	0.06	0.05	0.05	0.08
Foreign-owned MNE										
Mining	0.02	0.03	0.04	0.05	0.04	0.02	0.05	0.06	0.08	0.07
Manufacturing	0.08	0.12	0.13	0.14	0.16	0.11	0.15	0.19	0.22	0.23
Wholesale	0.08	0.10	0.12	0.12	0.15	0.14	0.17	0.19	0.22	0.23
Retail	0.03	0.04	0.05	0.03	0.05	0.03	0.04	0.05	0.03	0.04
Transportation	0.04	0.05	0.07	0.06	0.07	0.05	0.05	0.07	0.07	0.07
Information	0.04	0.13	0.08	0.07	0.10	0.06	0.14	0.08	0.08	0.13
Finance	0.08	0.11	0.10	0.12	0.10	0.10	0.12	0.12	0.12	0.09
Real Estate	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05
Professional	0.02	0.05	0.06	0.07	0.08	0.02	0.04	0.05	0.07	0.08
Management	0.10	0.13	0.14	0.13	0.13	0.14	0.22	0.15	0.15	0.08
Administrative	0.03	0.04	0.08	0.08	0.05	0.03	0.04	0.07	0.06	0.04
Other Services	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.03
non-MNE										
Mining	0.86	0.87	0.87	0.83	0.86	0.79	0.81	0.80	0.76	0.81
Manufacturing	0.52	0.51	0.51	0.51	0.50	0.42	0.38	0.35	0.36	0.38
Wholesale	0.71	0.66	0.64	0.62	0.58	0.56	0.50	0.50	0.49	0.43
Retail	0.83	0.74	0.72	0.72	0.67	0.82	0.73	0.71	0.71	0.66
Transportation	0.79	0.71	0.60	0.60	0.52	0.76	0.75	0.64	0.62	0.56
Information	0.48	0.41	0.39	0.40	0.36	0.40	0.34	0.31	0.38	0.30
Finance	0.67	0.60	0.47	0.46	0.49	0.61	0.57	0.46	0.49	0.54
Real Estate	0.86	0.86	0.85	0.81	0.81	0.82	0.81	0.79	0.77	0.77
Professional	0.83	0.75	0.70	0.67	0.66	0.81	0.77	0.71	0.68	0.67
Management	0.63	0.37	0.35	0.39	0.39	0.72	0.42	0.56	0.70	0.76
Administrative	0.83	0.84	0.75	0.76	0.72	0.80	0.82	0.75	0.79	0.76
Other Services	0.95	0.94	0.95	0.94	0.91	0.94	0.93	0.93	0.93	0.90

Notes: This table displays the share of annual payroll and sales by broad sector and multinational status. For definition of multinational status and sector see Sections 5 and 6.5, respectively.

Source: Authors' calculations using Economic Census, BE11-BR, and BE12-BR.

Table A-8. Average Productivity by Sector and Multinational Status, 1997-2017

Sector Group	Average Pay per Worker					Average Sales per Worker				
	1997	2002	2007	2012	2017	1997	2002	2007	2012	2017
U.S.-owned MNE										
Mining	49	53	67	75	85	885	659	1,078	964	844
Manufacturing	36	41	49	56	61	372	408	634	793	679
Wholesale	49	51	62	68	77	2,572	2,019	2,909	3,650	4,255
Retail	14	17	20	21	22	154	178	248	243	243
Transportation	37	42	49	54	62	332	183	241	241	278
Information	49	54	64	80	88	336	300	353	465	574
Finance	47	58	68	72	89	479	518	446	360	439
Real Estate	24	29	36	48	63	325	452	606	435	453
Professional	45	43	56	68	71	138	134	157	202	194
Management	115	82	113	119	109	1,099	540	130	48	37
Administrative	28	31	40	44	51	111	81	130	139	141
Other Services	16	18	21	26	37	64	65	85	104	128
Foreign-owned MNE										
Mining	47	48	62	75	79	388	424	601	722	838
Manufacturing	36	41	48	54	61	347	388	654	732	692
Wholesale	51	55	62	63	70	2,153	2,232	2,868	2,746	2,608
Retail	20	22	26	28	27	194	214	434	348	321
Transportation	33	40	43	50	58	227	191	210	298	338
Information	42	52	78	68	73	581	279	500	399	517
Finance	54	63	83	77	114	622	542	698	511	696
Real Estate	31	36	47	53	56	236	291	620	516	769
Professional	62	70	85	94	93	193	192	234	249	241
Management	84	81	120	114	105	1,592	1,208	811	670	85
Administrative	30	34	42	42	47	74	107	112	87	153
Other Services	18	22	27	35	33	65	83	125	144	131
non-MNE										
Mining	25	28	37	38	44	160	165	235	240	235
Manufacturing	25	33	34	39	48	117	143	178	204	237
Wholesale	33	35	41	45	50	616	566	773	926	873
Retail	16	19	21	23	26	166	193	242	279	296
Transportation	23	25	30	33	37	122	124	158	181	226
Information	37	39	46	51	56	140	161	187	224	233
Finance	34	38	44	49	55	204	193	215	216	261
Real Estate	21	25	30	33	39	170	187	214	235	288
Professional	36	39	46	48	54	111	122	146	159	174
Management	60	58	80	84	83	517	223	228	156	133
Administrative	22	24	28	30	34	73	82	99	106	128
Other Services	22	25	28	29	32	76	85	98	102	115

Notes: This table displays average annual pay per worker (in 1,000 USD) and sales per worker (in 1,000 USD) within sectors by firms' multinational status. For definition of multinational status and sector see Sections 5 and 6.5, respectively.

Source: Authors' calculations using Economic Census, BE11-BR, and BE12-BR.

Table A-9. MNE Share of Employment and Sales by Sector, 1997-2017

Sector Group	Employment					Sales				
	1997	2002	2007	2012	2017	1997	2002	2007	2012	2017
U.S.-owned MNE										
Mining	0.03	0.03	0.03	0.03	0.02	0.05	0.04	0.04	0.04	0.03
Manufacturing	0.35	0.25	0.19	0.16	0.14	0.37	0.30	0.28	0.26	0.20
Wholesale	0.06	0.06	0.06	0.06	0.05	0.24	0.25	0.23	0.25	0.27
Retail	0.17	0.19	0.19	0.20	0.21	0.08	0.11	0.11	0.12	0.13
Transportation	0.03	0.04	0.06	0.06	0.07	0.01	0.01	0.02	0.02	0.03
Information	0.08	0.08	0.08	0.07	0.06	0.07	0.07	0.07	0.07	0.08
Finance	0.08	0.08	0.12	0.12	0.10	0.13	0.14	0.17	0.16	0.15
Real Estate	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Professional	0.05	0.06	0.07	0.08	0.08	0.02	0.03	0.03	0.04	0.04
Management	0.001	0.06	0.05	0.06	0.06	0.001	0.01	0.003	0.001	0.001
Administrative	0.06	0.05	0.07	0.06	0.09	0.01	0.01	0.01	0.01	0.02
Other Services	0.09	0.09	0.08	0.09	0.11	0.02	0.02	0.02	0.02	0.03
Foreign-owned MNE										
Mining	0.03	0.04	0.05	0.04	0.04	0.02	0.04	0.05	0.04	0.04
Manufacturing	0.37	0.29	0.26	0.25	0.24	0.29	0.28	0.31	0.30	0.27
Wholesale	0.10	0.09	0.10	0.09	0.10	0.41	0.36	0.37	0.42	0.43
Retail	0.11	0.1	0.12	0.08	0.10	0.05	0.05	0.05	0.03	0.04
Transportation	0.03	0.03	0.06	0.05	0.05	0.01	0.01	0.01	0.01	0.01
Information	0.03	0.08	0.04	0.04	0.05	0.03	0.06	0.02	0.02	0.04
Finance	0.09	0.09	0.07	0.08	0.06	0.16	0.15	0.13	0.10	0.09
Real Estate	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.005	0.01
Professional	0.02	0.05	0.06	0.08	0.08	0.01	0.02	0.02	0.02	0.03
Management	0.003	0.06	0.06	0.06	0.06	0.004	0.01	0.004	0.003	0.002
Administrative	0.07	0.05	0.11	0.11	0.07	0.01	0.01	0.01	0.01	0.01
Other Services	0.13	0.11	0.08	0.10	0.14	0.02	0.02	0.01	0.02	0.03
non-MNE										
Mining	0.07	0.09	0.09	0.07	0.08	0.10	0.11	0.13	0.10	0.11
Manufacturing	0.13	0.10	0.09	0.08	0.07	0.14	0.12	0.11	0.11	0.10
Wholesale	0.06	0.05	0.05	0.05	0.05	0.20	0.18	0.19	0.21	0.18
Retail	0.14	0.12	0.12	0.12	0.11	0.18	0.17	0.16	0.16	0.15
Transportation	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
Information	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02
Finance	0.05	0.05	0.04	0.04	0.04	0.12	0.12	0.10	0.10	0.11
Real Estate	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Professional	0.06	0.07	0.07	0.07	0.07	0.04	0.05	0.05	0.05	0.06
Management	0.001	0.01	0.01	0.02	0.02	0.002	0.003	0.003	0.003	0.003
Administrative	0.08	0.09	0.09	0.09	0.10	0.02	0.03	0.03	0.03	0.03
Other Services	0.33	0.34	0.36	0.40	0.40	0.13	0.15	0.16	0.17	0.18

Notes: This table displays the share of employment and sales within a firm type by sector. For definition of multinational status and sector see Sections 5 and 6.5, respectively.

Source: Authors' calculations using Economic Census, BE11-BR, and BE12-BR.

Table A-10. Share of Establishments and Employment by State and Multinational Status, 2017

State	Establishments			Employment		
	U.S.	Foreign	non-MNE	U.S.	Foreign	non-MNE
Alabama	0.08	0.03	0.90	0.16	0.07	0.76
Alaska	0.06	0.02	0.92	0.11	0.06	0.83
Arizona	0.08	0.03	0.89	0.21	0.05	0.74
Arkansas	0.08	0.02	0.91	0.21	0.05	0.74
California	0.06	0.02	0.92	0.19	0.05	0.76
Colorado	0.07	0.02	0.91	0.21	0.05	0.74
Connecticut	0.08	0.03	0.89	0.20	0.07	0.73
Delaware	0.10	0.04	0.86	0.22	0.07	0.71
District of Columbia	0.11	0.05	0.84	0.17	0.06	0.78
Florida	0.07	0.02	0.91	0.23	0.06	0.71
Georgia	0.08	0.03	0.89	0.20	0.07	0.73
Hawaii	0.07	0.03	0.89	0.13	0.08	0.79
Idaho	0.06	0.01	0.93	0.15	0.03	0.82
Illinois	0.07	0.03	0.90	0.19	0.07	0.74
Indiana	0.08	0.03	0.89	0.19	0.07	0.74
Iowa	0.06	0.02	0.92	0.19	0.04	0.78
Kansas	0.07	0.02	0.91	0.19	0.05	0.76
Kentucky	0.08	0.02	0.89	0.20	0.07	0.73
Louisiana	0.07	0.03	0.90	0.15	0.05	0.80
Maine	0.05	0.02	0.93	0.13	0.06	0.82
Maryland	0.08	0.03	0.89	0.18	0.05	0.77
Massachusetts	0.07	0.03	0.90	0.18	0.06	0.75
Michigan	0.07	0.02	0.91	0.16	0.07	0.77
Minnesota	0.06	0.02	0.92	0.22	0.04	0.74
Mississippi	0.07	0.02	0.90	0.17	0.05	0.78
Missouri	0.07	0.02	0.91	0.20	0.05	0.75
Montana	0.05	0.01	0.94	0.10	0.02	0.88
Nebraska	0.06	0.02	0.93	0.18	0.04	0.77
Nevada	0.08	0.03	0.90	0.25	0.04	0.71
New Hampshire	0.07	0.03	0.90	0.19	0.07	0.74
New Jersey	0.07	0.03	0.90	0.18	0.07	0.74
New Mexico	0.08	0.02	0.90	0.16	0.04	0.80
New York	0.05	0.02	0.93	0.16	0.06	0.78
North Carolina	0.08	0.03	0.89	0.20	0.07	0.73
North Dakota	0.06	0.02	0.92	0.13	0.03	0.83
Ohio	0.08	0.03	0.89	0.19	0.06	0.75
Oklahoma	0.06	0.02	0.92	0.15	0.04	0.81
Oregon	0.06	0.02	0.92	0.16	0.04	0.80
Pennsylvania	0.07	0.03	0.90	0.18	0.06	0.76
Rhode Island	0.06	0.03	0.91	0.14	0.06	0.81
South Carolina	0.08	0.03	0.89	0.17	0.08	0.75
South Dakota	0.05	0.01	0.94	0.12	0.03	0.85
Tennessee	0.09	0.03	0.88	0.21	0.07	0.72
Texas	0.08	0.03	0.89	0.21	0.06	0.73
Utah	0.06	0.02	0.92	0.17	0.05	0.79
Vermont	0.04	0.02	0.93	0.10	0.06	0.84
Virginia	0.09	0.03	0.88	0.20	0.06	0.74
Washington	0.06	0.02	0.91	0.20	0.05	0.75
West Virginia	0.08	0.02	0.90	0.15	0.05	0.80
Wisconsin	0.06	0.02	0.92	0.17	0.04	0.79
Wyoming	0.06	0.02	0.92	0.13	0.04	0.82

Notes: This table displays the 2017 share of establishments and employment in states by firms' multinational status. For definition of multinational status see Section 5.

Source: Authors' calculations using Economic Census, BE11-BR, and BE12-BR.

Table A-11. Share of Payroll and Sales by State and Multinational Status, 2017

State	Payroll			Sales		
	U.S.	Foreign	non-MNE	U.S.	Foreign	non-MNE
Alabama	0.19	0.10	0.71	0.25	0.19	0.56
Alaska	0.11	0.09	0.8	0.25	0.14	0.61
Arizona	0.28	0.06	0.67	0.35	0.08	0.57
Arkansas	0.26	0.06	0.68	0.31	0.09	0.6
California	0.29	0.07	0.65	0.30	0.12	0.58
Colorado	0.26	0.07	0.67	0.29	0.12	0.59
Connecticut	0.30	0.09	0.61	0.36	0.15	0.48
Delaware	0.25	0.12	0.62	0.39	0.16	0.45
District of Columbia	0.25	0.05	0.71	0.15	0.03	0.81
Florida	0.29	0.07	0.64	0.30	0.09	0.61
Georgia	0.28	0.08	0.64	0.32	0.13	0.55
Hawaii	0.14	0.08	0.78	0.20	0.07	0.73
Idaho	0.22	0.03	0.75	0.26	0.05	0.69
Illinois	0.27	0.09	0.64	0.33	0.15	0.52
Indiana	0.23	0.10	0.67	0.28	0.16	0.56
Iowa	0.24	0.05	0.71	0.31	0.09	0.60
Kansas	0.23	0.07	0.70	0.33	0.11	0.56
Kentucky	0.23	0.10	0.68	0.30	0.19	0.51
Louisiana	0.18	0.07	0.75	0.31	0.16	0.54
Maine	0.15	0.07	0.79	0.20	0.13	0.66
Maryland	0.22	0.06	0.72	0.27	0.08	0.65
Massachusetts	0.27	0.08	0.65	0.30	0.11	0.59
Michigan	0.20	0.10	0.70	0.27	0.16	0.57
Minnesota	0.30	0.06	0.64	0.36	0.08	0.57
Mississippi	0.18	0.06	0.76	0.28	0.09	0.63
Missouri	0.25	0.07	0.69	0.34	0.08	0.58
Montana	0.13	0.02	0.85	0.25	0.03	0.72
Nebraska	0.23	0.05	0.72	0.32	0.11	0.57
Nevada	0.29	0.05	0.66	0.32	0.07	0.61
New Hampshire	0.21	0.08	0.71	0.23	0.14	0.64
New Jersey	0.27	0.12	0.61	0.28	0.19	0.53
New Mexico	0.19	0.04	0.77	0.25	0.07	0.68
New York	0.26	0.10	0.64	0.25	0.14	0.62
North Carolina	0.27	0.09	0.64	0.30	0.13	0.57
North Dakota	0.17	0.04	0.79	0.32	0.06	0.62
Ohio	0.23	0.07	0.69	0.31	0.11	0.58
Oklahoma	0.19	0.05	0.76	0.25	0.08	0.67
Oregon	0.24	0.05	0.72	0.24	0.08	0.68
Pennsylvania	0.24	0.08	0.68	0.28	0.10	0.62
Rhode Island	0.17	0.07	0.76	0.21	0.08	0.71
South Carolina	0.21	0.11	0.68	0.31	0.15	0.53
South Dakota	0.13	0.04	0.83	0.18	0.05	0.77
Tennessee	0.25	0.09	0.66	0.34	0.13	0.53
Texas	0.28	0.09	0.63	0.32	0.19	0.49
Utah	0.20	0.06	0.74	0.27	0.08	0.66
Vermont	0.12	0.07	0.81	0.17	0.08	0.75
Virginia	0.25	0.07	0.68	0.27	0.10	0.63
Washington	0.32	0.06	0.62	0.37	0.09	0.54
West Virginia	0.16	0.07	0.77	0.26	0.12	0.63
Wisconsin	0.21	0.06	0.73	0.25	0.07	0.68
Wyoming	0.17	0.07	0.75	0.23	0.10	0.68

Notes: This table displays the share of 2017 payroll and sales within states by firms' multinational status. For definition of multinational status see Section 5.

Source: Authors' calculations using Economic Census, BE11-BR, and BE12-BR.

Table A-12. Average Pay per Worker by State and Multinational Status, 2017

State	Pay per Worker			Ind-Adj Pay per Worker		
	U.S.	Foreign	non-MNE	U.S.	Foreign	non-MNE
Alabama	50.9	50.2	35.2	3.5	2.6	-4.4
Alaska	65.3	77.2	44.8	11.5	30.4	4.8
Arizona	52.7	47.3	38.9	4.1	4.7	-2.0
Arkansas	66.0	49.3	34.4	10.8	4.2	-5.2
California	64.7	60.6	45.1	15.4	15.5	3.0
Colorado	61.4	59.5	41.9	11.2	13.7	0.2
Connecticut	70.2	66.1	43.7	20.2	20.4	3.7
Delaware	59.5	51.9	40.4	5.4	2.3	-1.6
District of Columbia	96.9	72.0	61.6	39.5	26.9	19.3
Florida	55.1	52.0	36.7	7.4	9.0	-4.7
Georgia	56.6	54.0	38.7	8.5	8.6	-2.0
Hawaii	55.5	47.5	39.0	9.3	7.9	0.4
Idaho	53.8	56.3	34.7	3.4	6.1	-5.4
Illinois	60.5	57.3	40.2	11.3	12.3	-0.4
Indiana	51.0	45.7	35.7	3.2	2.1	-3.8
Iowa	55.9	54.1	35.2	2.7	5.7	-4.0
Kansas	59.1	53.8	35.6	7.7	5.8	-5.1
Kentucky	49.8	50.0	34.5	2.1	4.6	-5.2
Louisiana	53.2	53.1	37.0	4.9	5.5	-3.8
Maine	53.3	51.4	35.4	6.2	7.0	-2.8
Maryland	64.2	60.8	43.0	14.7	13.3	2.2
Massachusetts	67.8	64.1	45.3	18.8	17.8	5.8
Michigan	53.4	56.7	38.1	6.8	9.1	-1.6
Minnesota	61.2	58.5	39.4	9.8	11.7	-0.3
Mississippi	49.1	46.5	32.4	2.4	2.3	-6.2
Missouri	54.8	51.0	35.2	5.1	5.6	-4.4
Montana	56.8	62.6	33.8	5.5	12.3	-5.4
Nebraska	59.0	54.7	35.2	7.5	7.1	-4.5
Nevada	54.5	48.9	41.0	7.3	7.2	-0.4
New Hampshire	59.8	54.5	41.5	11.9	10.6	2.1
New Jersey	66.7	61.2	40.5	15.5	15.2	0.2
New Mexico	48.8	48.6	34.4	1.6	3.9	-5.4
New York	67.7	70.5	40.1	18.2	23.4	0.9
North Carolina	55.3	53.1	36.4	6.1	7.5	-3.1
North Dakota	62.3	61.2	38.9	9.0	11.1	-0.6
Ohio	52.9	50.7	37.2	5.5	7.0	-3.0
Oklahoma	53.5	50.5	35.8	4.4	3.5	-5.5
Oregon	56.1	57.3	37.2	5.6	10.5	-2.1
Pennsylvania	57.8	53.6	38.0	9.0	8.5	-1.5
Rhode Island	60.5	51.4	39.3	11.3	6.5	0.5
South Carolina	54.1	45.1	35.1	5.4	4.2	-3.8
South Dakota	56.2	59.8	34.3	4.2	8.1	-4.8
Tennessee	56.7	50.5	36.9	7.9	5.3	-2.8
Texas	57.1	56.9	40.4	7.4	11.0	-1.1
Utah	56.0	60.6	37.9	6.9	12.3	-4.5
Vermont	57.9	50.3	37.3	6.7	4.8	-1.4
Virginia	62.0	50.9	40.8	12.1	9.2	0.2
Washington	60.5	57.2	40.7	9.7	11.5	1.1
West Virginia	45.8	51.4	32.3	1.5	3.9	-6.7
Wisconsin	54.4	54.4	36.9	6.3	5.5	-1.9
Wyoming	60.0	63.8	38.6	5.0	10.6	-2.2

Notes: This table displays average annual payroll per worker (in 1,000 US) within states by firms' multinational status. Industry-adjusted values calculated as the average difference between establishment reported values and corresponding industry average. For definition of multinational status see Section 5.

Source: Authors' calculations using Economic Census, BE11-BR, and BE12-BR.