

Diverging Trends in National and Local Concentration*

Online Appendix

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1 Data Description

1.1 NETS

The National Establishment Time Series (NETS) is made available through Walls & Associates, which relies on data compiled by Dun & Bradstreet (D&B). D&B provides each business establishment, corresponding to a distinct business activity by an enterprise at a specific location, a unique 9-digit Data Universal Numbering System (DUNS) number, which remains with that establishment even in the case of broader corporate-level changes, name changes, and so on.¹ Each year, D&B compiles data for its Duns Marketing Information file on business characteristics of every establishment, including its sales, employment, location, primary industry, and the DUNS number of the establishment to which it reports (i.e. its parent company).² As described by Neumark, Zhang, and Wall (2006), as well as Barnatchez, Crane, and Decker (2017), D&B makes an exhaustive effort to ensure that the file accurately covers the entire universe of business establishments, relying on many sources of information including direct phone calls, Yellow Pages, newspapers, and multiple government agencies. Furthermore, D&B and the establishments from which they gather information both have incentives to ensure information is accurate.

While D&B compiles annual cross-sections of establishment characteristics, Walls & Associates aggregates these files into a longitudinal database that makes it possible to track the birth and death of establishments. Neumark et al. (2006) note that this process requires imputation of sales and employment to many establishment-year pairings.

We use the NETS database to gather data on employment, sales, and the primary industry (8-digit SIC code) for each establishment for each year from 1990 through 2014, as well as the DUNS number of the establishment’s headquarters in each year (HQ or enterprise number). In each year, an enterprise is then defined as a collection of all the establishments with a given HQ number. We additionally collect the establishment’s county, ZIP code, and legal status, as well as the most recent HQ number of the establishment.³ The data is provided in wide form, with one observation per establishment and separate variables for establishment characteristics in each year, but we reshape the data into long form with one observation per establishment-year. We then drop any observations that have missing employment, sales, industry, or HQ numbers, and consider an establishment to “exist” in a given year if it has an observation associated with it (i.e. it has non-missing employment, sales, industry, and

¹If an establishment goes out of business, its DUNS number will not be re-used.

²This file contains data on many other establishment characteristics that we do not consider in this paper.

³The NETS database additionally has a variable for the business name, allowing us to identify the firms associated with specific HQ numbers.

HQ numbers). We can then see the first year in which each establishment exists (its entry year) and the last year (its exit year).⁴

Among these remaining establishment-year pairs, we identify the industry corresponding to the headquarters for each enterprise, and drop any establishments belonging to an enterprise whose headquarters has an SIC 8 industry code corresponding to the Public Administration division. We then drop any establishments which have an SIC 8 code either equal to 73899999 (Business Activities at Non-Commercial Sites), falling under Public Administration (even if their enterprise headquarters do not), the Educational Services 2-digit SIC sector (SIC 2 82), or the SIC 3-digit code 601, Central Reserve Depository. Additionally, we drop any establishments whose HQ number corresponds to the United States Postal Services (USPS), whose legal status identifies them as a non-profit organization, or which are in counties located outside of the 50 U.S. states and the District of Columbia. Among remaining establishments, we keep only those whose primary industry falls into one of the following five divisions: Manufacturing; Wholesale Trade; Retail Trade; Finance, Insurance, and Real Estate (FIRE); and Services. In the remaining dataset, we have roughly 41 million unique establishments spread across approximately 312 million establishment-year pairs.

1.1.1 Data Quality

A number of researchers have attempted to compare the scope and accuracy of the NETS database to official sources such as the County Business Patterns (CBP), the Quarterly Census of Employment and Wages (QCEW), the Longitudinal Business Database (LBD), and Census Nonemployer Statistics (CES). Neumark et al. (2006); Neumark, Wall, and Zhang (2011); and Barnatchez et al. (2017) find that NETS reports substantially higher aggregate employment than these sources. This discrepancy seems to arise primarily from the inclusion of nonemployer establishments, which consist only of business owners and have no paid employees, in the NETS data; such establishments are generally not counted in government employment data. Since nonemployer establishments tend to have very small employment numbers, NETS vastly overstates the number of establishments in the 1-4 employee bin compared to Census counts of establishments with employment in this range, as noted by Neumark et al. (2006) and Barnatchez et al. (2017). Using an extract of the NETS data covering Georgia, Choi, Robertson, and Rupasingha (2013) find that, compared to the QCEW, NETS has nearly 75% more establishments in the state in 2000 and roughly three times as many in 2009.

⁴Establishments that exist in 1990 are assigned 1990 as their entry year, as we have no data on them prior to this year. Likewise, establishments which exist in 2014 have that as their exit year.

In the main text, we include these nonemployer establishments because they do report positive sales (and employment). Following the advice of Barnatchez et al. (2017), however, we show later in this appendix that the results hold when modifying the data to attempt to remove such establishments. While Neumark et al. (2006) argue that subtracting one from establishments' employment counts to remove business owners makes the NETS universe comparable to that of official sources and eliminates most nonemployer establishments, Barnatchez et al. (2017) instead propose subtracting one from employment counts at the headquarters of each enterprise, because enterprise owners will generally only be counted at their headquarters. Along those lines, we present an alternative specification in which, for each year, we exclude sales and employment from all enterprises that report only one employee.

However, there is some evidence that dropping single-employee enterprises may not remove the entire set of nonemployers. While over one-quarter of establishment-year pairs in our dataset have only one employee, nearly as many report two employees. Furthermore, because the CBP and LBD report establishment counts in employment bins, we can only compare the number of establishments with *between* 1 and 4 employees in NETS and these other sources. In fact, Barnatchez et al. (2017) find that NETS still overcounts the number of establishments in this range even after dropping single-employee enterprises. Consequently, we explore a second specification in which we exclude sales and employment from all enterprise-year pairs reporting fewer than five employees.⁵ Additionally, we explore a third specification where we exclude sales and employment from enterprise-year pairs reporting fewer than ten employees. Surely there are many employer establishments with fewer than five and ten employees, so these specifications should be interpreted as conservative attempts to remove the influence of nonemployer establishments in the database. This notion is supported by the fact that, in every year, enterprises with one employee contain relatively immaterial shares of less than 5% and 3% of aggregate employment and sales, respectively, but enterprises with fewer than five employees contain rather substantial shares, between 11% and 23% of aggregate employment and between 10% and 16% of aggregate sales.⁶

There are two other potential issues regarding the NETS database to be addressed. First, Neumark et al. (2006) observe that NETS can be slow to report the birth and death of establishments, often operating on a two-to-three year lag in such cases. Second, the NETS data reported for each year are collected primarily in the prior year, and unlike official govern-

⁵Since the vast majority of enterprises only have one establishment, results removing establishments based on establishment size rather than enterprise size should be roughly equivalent.

⁶Likewise, enterprises with fewer than ten employees contain, in every year, between 19% and 31% of aggregate employment and between 18% and 22% of aggregate sales.

ment sources NETS data are collected throughout the year, with establishments potentially reporting data at different months in different years.⁷ Because our dataset encompasses a 25-year period, such lags and inconsistencies in data collection timing should not affect the long-term trends we observe in the main text.

1.2 SIC 8 Codes

Our benchmark definition of an industry is an 8-digit Standard Industrial Classification (SIC) code. The first four digits of each SIC 8 code (SIC 4 codes) are created and determined by U.S. government agencies and assigned to business establishments. D&B supplements these codes with an additional four digits, providing a much finer level of detail regarding establishments’ primary activities; there are over 18,000 unique 8-digit SIC codes compared to only about 1,000 unique SIC codes at the 4-digit level and 84 at the 2-digit level. Each SIC code is also assigned to one of 11 divisions, five of which we consider in this paper.⁸

To better illustrate this “hierarchy” of SIC codes, consider the case of Walmart. As mentioned in the main text, the large majority of Walmart’s establishments in 2014 have SIC 8 53119901, Discount Department Stores, as their primary industry. This SIC 8 is a subset of SIC 4 5311, Department Stores, which also contains three other industries including SIC 8 53119902, Non-discount Department Stores. This SIC 4 code is further contained within the General Merchandise sector, SIC 2 53, which encompasses other industries corresponding to, for instance, Warehouse Club Stores and Miscellaneous General Merchandise. Finally, the Retail Trade division contains these industries and others as diverse as Grocery Stores, Optical Goods Stores, Eating Places, and Hardware Stores.

Individual SIC 8 codes vary widely in their sizes as measured by employment, sales, and the number of establishments. For instance, among the 15,305 SIC 8 codes considered in the main text, over one-quarter of these have reported 2014 employment of fewer than 100 employees across all establishments with that primary industry.⁹ On the other hand, there

⁷Some researchers roll back NETS data one year, but Barnatchez et al. (2017) find more favorable comparisons with government sources leaving years unchanged.

⁸In addition to the primary 8-digit SIC code of each establishment, the NETS database reports the establishment’s primary North American Industry Classification System (NAICS) code. While government agencies developed the SIC system in the early 1900s, the Office of Management and Budget developed the NAICS system in 1992 to better reflect changes in the structure of the economy. Although the NAICS system contains a higher share of codes in more service-oriented industries, the most detailed NAICS code level only contains roughly 1,100 industries, a level of aggregation much more comparable to the 4-digit than the 8-digit SIC code. Consequently, we use SIC 8 codes as they offer by far the most granular available definition of an industry.

⁹Approximately 90% of these industries are in the Manufacturing division.

are 206 industries with greater than 100,000 reported employees, with the Discount Department Stores industry having over 1.8 million. Overall, industries in Retail Trade, FIRE, and Services have much higher employment on average than industries in Manufacturing and Wholesale Trade.

To get a better sense of this heterogeneity across industries, Table (1) shows total employment and the number of SIC 8 industries within each of our SIC 2 sectors in 2014, as well as the division into which each SIC 2 code falls. Even at the sector level, there is substantial heterogeneity in these variables. Over 12 million and 10 million employees work in the Health Services and Business Services sectors, respectively, while many sectors in the Manufacturing division have only a few hundred thousand employees. Sectors in Retail Trade, FIRE, and Services tend to have higher employment than sectors in Manufacturing and Wholesale Trade, while the latter two divisions encompass over three-quarters of all SIC 8 codes.

SIC 2 Code	SIC 2 Description	Division	Employment in 2014 (Thousands)	Number of SIC 8 codes in 2014	Mean SIC 8 employment in 2014 (Thousands)
20	Food and Kindred Products	Manufacturing	1637	805	2
21	Tobacco Products	Manufacturing	25	11	2
22	Textile Mill Products	Manufacturing	343	587	1
23	Apparel, Finished Products from Fabrics and Similar Materials	Manufacturing	386	385	1
24	Lumber and Wood Products, Except Furniture	Manufacturing	699	371	2
25	Furniture and Fixtures	Manufacturing	429	262	2
26	Paper and Allied Products	Manufacturing	680	328	2
27	Printing, Publishing and Allied Industries	Manufacturing	1472	299	5
28	Chemicals and Allied Products	Manufacturing	1345	643	2
29	Petroleum Refining and Related Industries	Manufacturing	189	75	3
30	Rubber and Miscellaneous Plastic Products	Manufacturing	895	334	3
31	Leather and Leather Products	Manufacturing	101	162	1
32	Stone, Clay, Glass, and Concrete Products	Manufacturing	576	516	1
33	Primary Metal Industries	Manufacturing	610	345	2
34	Fabricated Metal Products	Manufacturing	1488	736	2
35	Industrial and Commercial Machinery and Computer Equipment	Manufacturing	2144	1123	2
36	Electronic and Other Electrical Equipment and Components	Manufacturing	1967	694	3
37	Transportation Equipment	Manufacturing	1802	373	5

38	Measuring, Photographic, Medical, and Optical Goods, and Clocks	Manufacturing	1401	784	2
39	Miscellaneous Manufacturing Industries	Manufacturing	570	627	1
50	Wholesale Trade - Durable Goods	Wholesale Trade	4527	1104	4
51	Wholesale Trade - Nondurable Goods	Wholesale Trade	2966	653	5
52	Building Materials, Hardware, Garden Supplies and Mobile Homes	Retail Trade	1400	77	18
53	General Merchandise Stores	Retail Trade	3346	11	304
54	Food Stores	Retail Trade	3935	61	65
55	Automotive Dealers and Gasoline Service Stations	Retail Trade	2783	68	41
56	Apparel and Accessory Stores	Retail Trade	1462	78	19
57	Home Furniture, Furnishings and Equipment Stores	Retail Trade	1279	125	10
58	Eating and Drinking Places	Retail Trade	10446	81	129
59	Miscellaneous Retail	Retail Trade	4446	358	12
60	Depository Credit Institutions	FIRE	1974	37	53
61	Nondepository Credit Institutions	FIRE	749	65	12
62	Security and Commodity Brokers, Dealers, Exchanges and Services	FIRE	901	56	16
63	Insurance Carriers	FIRE	1191	77	15
64	Insurance Agents, Brokers and Service	FIRE	1373	27	51
65	Real Estate	FIRE	4217	63	67
67	Holding and Other Investment Offices	FIRE	1679	48	35
70	Hotels, Rooming Houses, Camps, and Other Lodging Places	Services	2736	49	56
72	Personal Services	Services	2501	168	15
73	Business Services	Services	10524	487	22
75	Automotive Repair, Services and Parking	Services	1822	106	17
76	Miscellaneous Repair Services	Services	928	227	4
78	Motion Pictures	Services	535	67	8
79	Amusement and Recreation Services	Services	2357	306	8
80	Health Services	Services	12200	203	60
81	Legal Services	Services	1869	25	75
83	Social Services	Services	2755	109	25
84	Museums, Art Galleries and Botanical and Zoological Gardens	Services	125	15	8
86	Membership Organizations	Services	3025	125	24
87	Engineering, Accounting, Research, and Management Services	Services	7927	198	40
89	Services, Not Elsewhere Classified	Services	734	46	16

Table 1: Employment and Number of SIC 8 Codes in Each SIC 2 Sector in 2014

1.2.1 Percent of Sector-Level Employment in Industries with Diverging Trends

Table (2) provides more detail for Figure (7) in the main text and further highlights this degree of heterogeneity by displaying the exact percentages of employment in each sector and division across industries with diverging trends. In the column headings, α_n and α_z refer to the coefficients obtained from regressing the weighted average change in the HHI in each industry on the year with a constant at the national and ZIP code levels, respectively. The first three columns to the right of the sector and division descriptions show the percentage of employment in industries that have a positive national trend and positive, negative, and flat ZIP code trends, respectively. The last column displays the percentage of employment in industries with positive national trends located in industries that also have negative local trends. In all five divisions, over half of employment in industries with positive national trends is also located in industries that have declining concentration over time at the ZIP code level.

Division	SIC2	Description	Pct. Emp $\alpha_n > 0, \alpha_z > 0$	Pct. Emp $\alpha_n > 0, \alpha_z < 0$	Pct. Emp $\alpha_n > 0, \alpha_z = 0$	Pct. Emp $\alpha_z < 0 \alpha_n > 0$
D		Manufacturing	27.45	33.81	2.78	52.79
D	20	Food and Kindred Prod.	36.94	29.6	3.66	42.16
D	21	Tobacco Prod.	17.18	0	3.79	0
D	22	Textile Mill Prod.	43.68	29.26	5.14	37.47
D	23	Apparel, Finished Prod. from Fabrics	52.12	23.91	1.8	30.72
D	24	Lumber and Wood Prod., Exc. Furn.	26.51	33.49	1.28	54.65
D	25	Furniture and Fixtures	52.83	18.19	2.63	24.70
D	26	Paper and Allied Prod.	22.74	50.72	5.67	64.1
D	27	Printing and Publishing	45.8	31.69	.46	40.65
D	28	Chemicals and Allied Prod.	16.9	30.32	2.78	60.64
D	29	Petroleum Refining	72.23	11.37	.85	13.46
D	30	Rubber and Misc. Plastic Prod.	22.11	49.7	2.95	66.48
D	31	Leather and Leather Prod.	52.53	26.01	4.4	31.36
D	32	Stone Clay, Glass, and Concrete Prod.	18.33	39.32	4.07	63.7
D	33	Primary Metal Ind.	22.23	34.83	3.79	57.24
D	34	Fabricated Metal Prod.	23.39	32.32	2.57	55.46
D	35	Ind. and Comm. Machinery and Comp. Equip.	24.94	31.52	2.61	53.36
D	36	Electronic and Electric Equip.	14.41	39.46	2.26	70.31
D	37	Transport. Equip.	13.73	33.97	2.94	67.09

D	38	Instruments and Related Products	21.72	43.76	3.72	63.24
D	39	Misc. Manufact. Ind.	27.57	25.11	2.71	45.33
F		Wholesale Trade	34.17	39.01	.18	53.17
F	50	Wholesale- Durable Goods	31.65	39.71	.19	55.5
F	51	Wholesale- Nondurable Goods	38.18	37.89	.16	49.7
G		Retail Trade	14.57	52.71	.01	78.33
G	52	Bldg. Materials and Garden. Supp.	47.91	31.25	.06	39.45
G	53	Gen. Merch. Stores	1.83	96.38	0	98.14
G	54	Food Stores	21.69	70.27	0	76.41
G	55	Auto. Dealers and Service Stations	7.27	77.5	.01	91.41
G	56	Apparel and Access. Stores	6.42	77.24	0	92.33
G	57	Furn. and Homefurn. Stores	20.92	55.51	.02	72.6
G	58	Eating and Drinking Places	4.66	26.43	.01	85
G	59	Misc. Retail	30.94	42.54	0	57.89
H		Finance, Insurance, and Real Estate	14.26	46.17	.04	76.35
H	60	Depository Inst.	12.23	75.44	.01	86.04
H	61	Nondepository Inst.	11.27	38.33	.06	77.19
H	62	Security and Commod. Brokers	15.37	13.58	.03	46.86
H	63	Insurance Carr.	42.88	17.58	.23	28.97
H	64	Ins. Agents, Brokers, and Service	7.01	12.78	0	64.6
H	65	Real Estate	6.77	69.86	.01	91.16
H	67	Holding and Oth. Invest. Offices	19.81	27.48	.04	58.06
I		Services	9.26	40.44	.04	81.31
I	70	Hotels and Lodging Places	13.51	40.79	0	75.12
I	72	Personal Serv.	5.11	53.34	.15	91.03
I	73	Business Serv.	20.91	34.87	.01	62.5
I	75	Auto Repair, Serv., and Park.	8.29	43.55	.01	84
I	76	Misc. Repair Serv.	18.42	40.68	.04	68.78
I	78	Motion Pict.	37.54	47.23	.05	55.68
I	79	Amusement and Rec. Serv.	5.12	36.38	.06	87.52
I	80	Health Services	6.31	38.48	.08	85.74
I	81	Legal Services	.11	26.45	0	99.59
I	83	Social Services	.66	70.49	0	99.07
I	84	Museums, Art Gall., Zoos	2.95	3.99	.18	56.1
I	86	Membership Org.	.67	54.62	0	98.78
I	87	Engineering and Mgmt. Services	4.77	35.14	0	88.04
I	88	Private Households	0	53.19	39.43	57.43
I	89	Misc. Serv.	1.09	17.75	0	94.22

Table 2: Percent of Sector Employment in Industries with Diverging Trends

2 Robustness

The results in this section show that all the findings in the main text are robust to, in order, specifications removing small enterprises from the NETS database, using alternative measures of concentration, measuring concentration in terms of employment rather than sales, using a balanced panel of industry-geography pairs, and using only establishments that report non-imputed employment. Finally, we expand on some of the results highlighted in the main text.

2.1 Removing Nonemployer Enterprises

As discussed above, this section contains three modifications to the NETS database in order to reduce the occurrence of nonemployer establishments in the data. The first modification, removing enterprise-year pairs with only one employee, likely leaves a large number of nonemployment establishments remaining, while dropping enterprise-year pairs with fewer than five and fewer than ten employees likely overstates the prevalence of such nonemployer establishments.

2.1.1 Removing Enterprises with Only 1 Employee

Figure 1: Removing Enterprises with One Employee: Diverging economy-wide national and local concentration trends

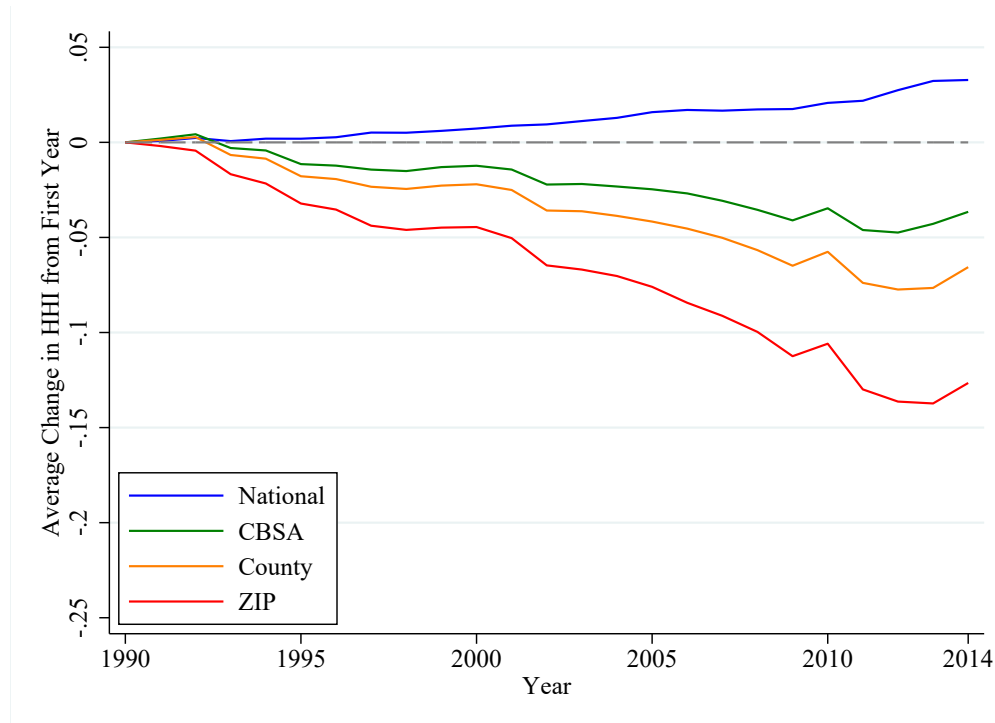


Figure 2: Removing Enterprises with One Employee: Diverging division-level national and local concentration trends

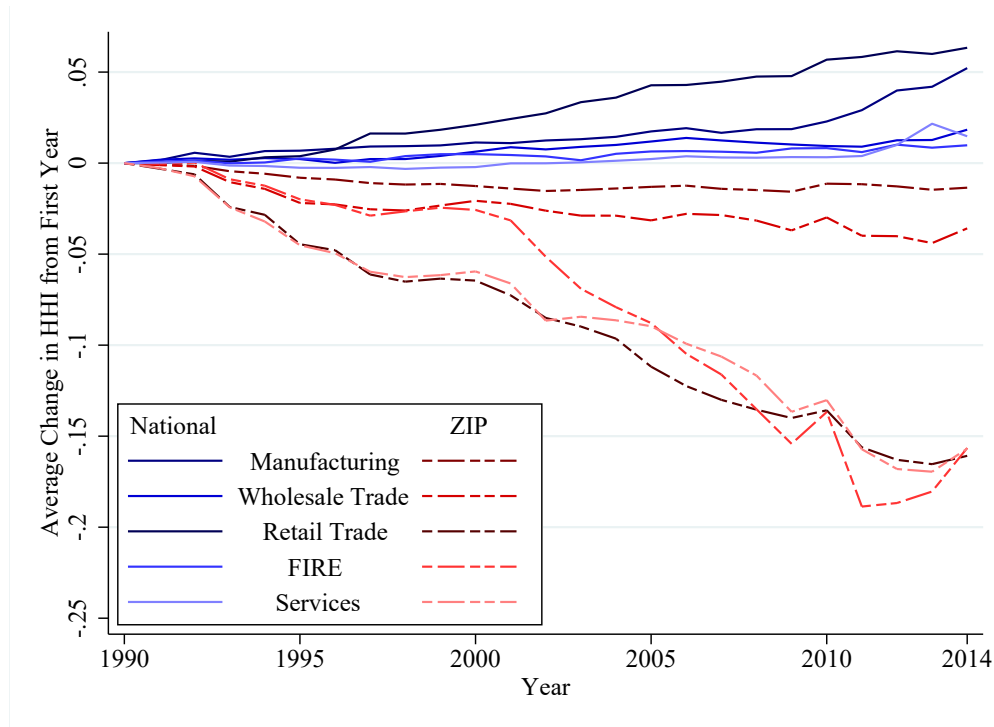


Figure 3: Removing Enterprises with One Employee: Diverging economy-wide trends in sales concentration

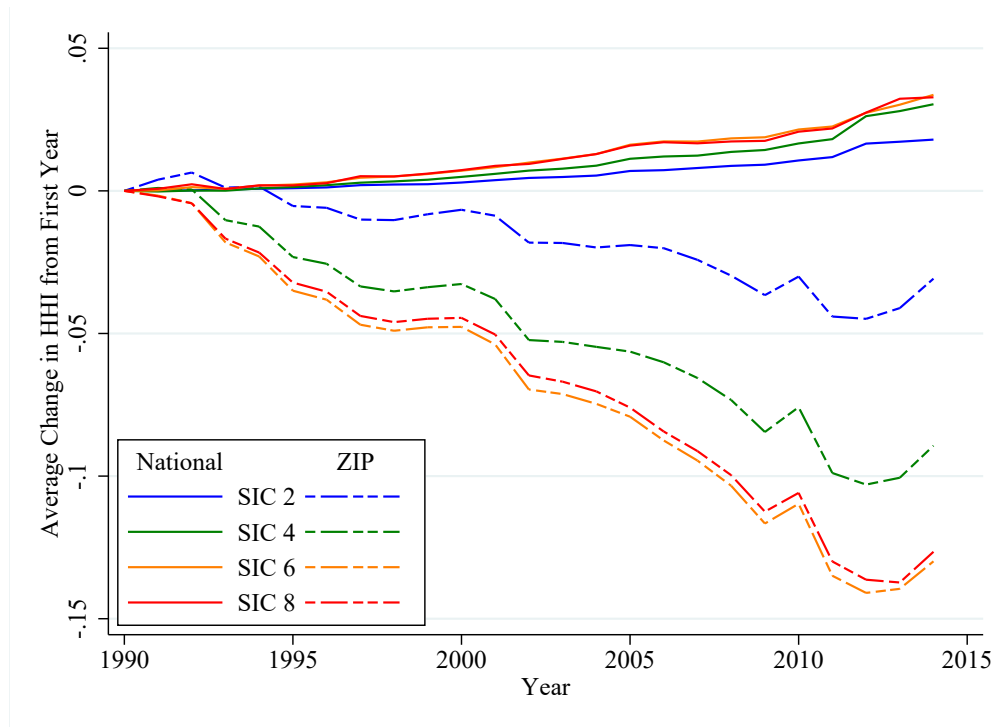


Figure 4: Removing Enterprises with One Employee: Diverging economy-wide trends in employment concentration

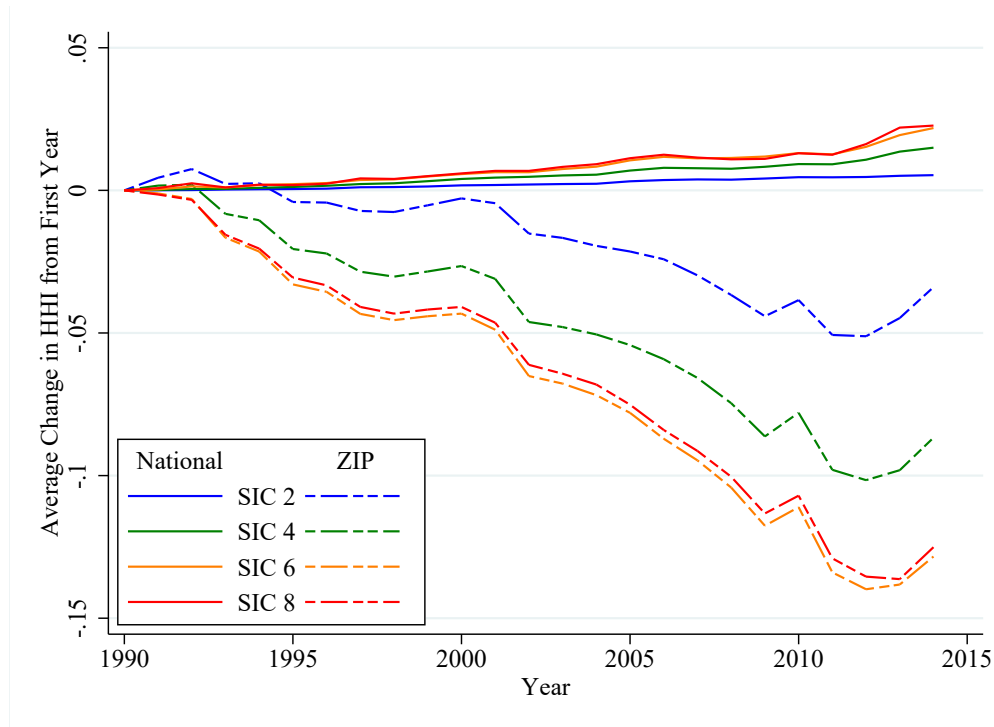


Figure 5: Removing Enterprises with One Employee: Diverging economy-wide national and local concentration trends with a balanced panel

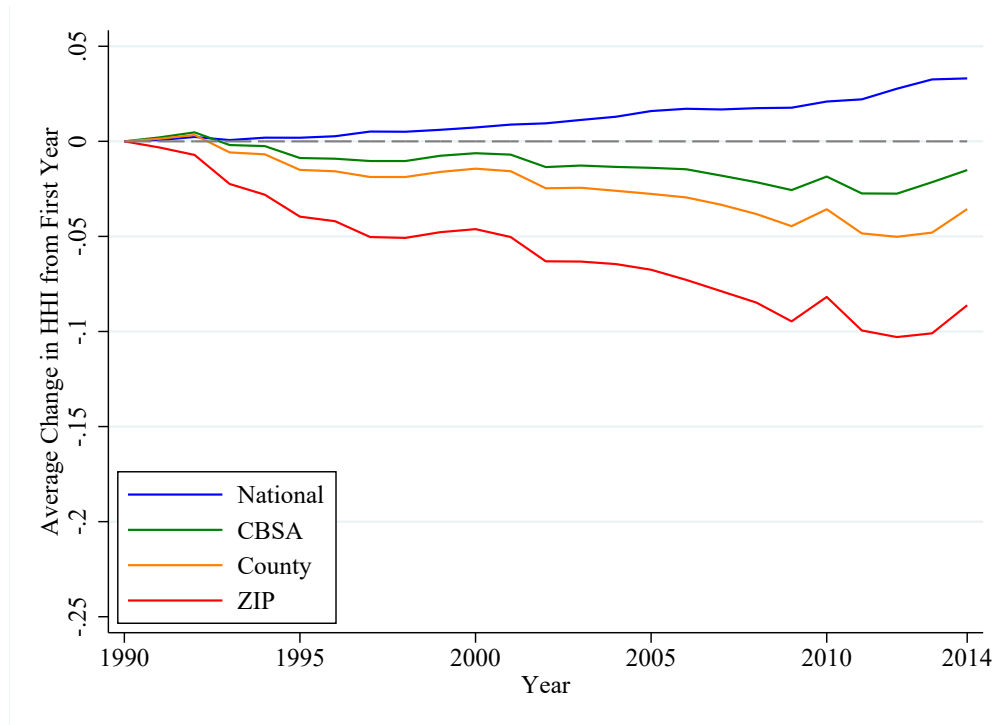


Figure 6: Removing Enterprises with One Employee: Diverging division-level national and local concentration trends with a balanced panel

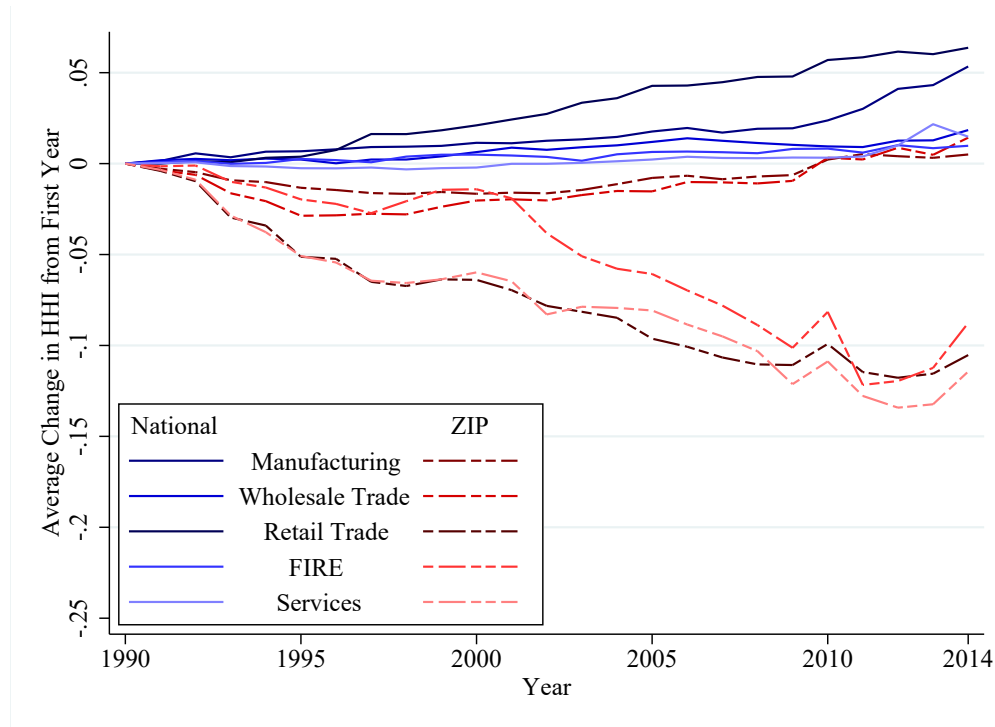


Figure 7: Removing Enterprises with One Employee: Pervasive diverging trends across 2-digit sectors

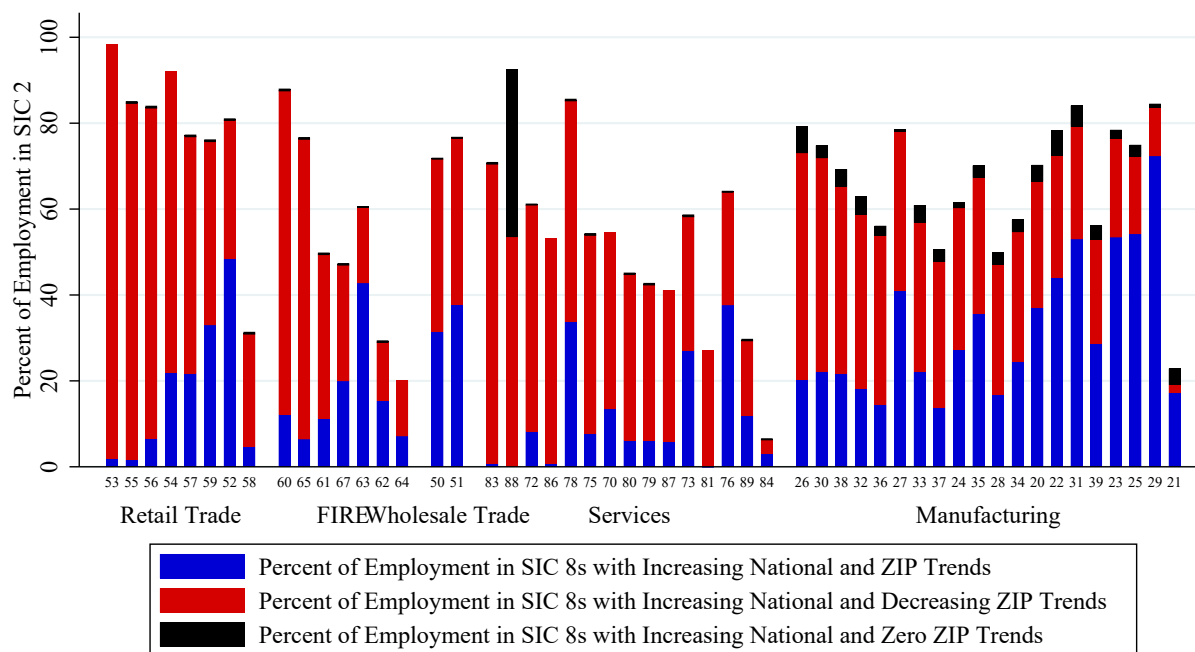


Figure 8: Removing Enterprises with One Employee: The role of top enterprises in national and local concentration trends in diverging industries

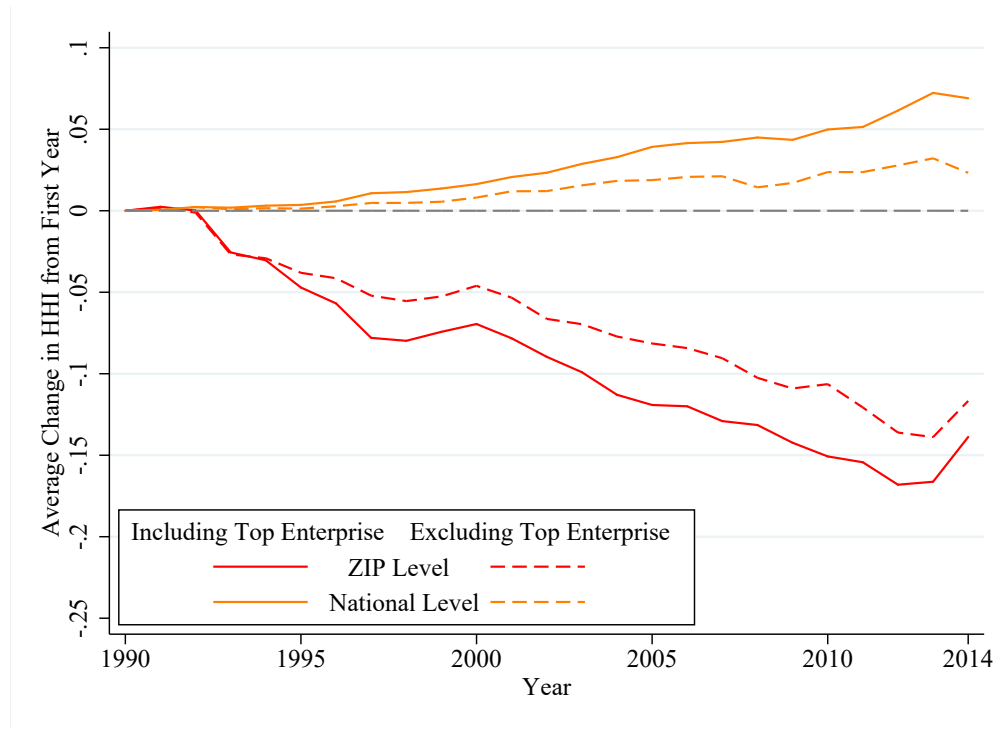


Figure 9: Removing Enterprises with One Employee: The role of top enterprises in national and local concentration trends in concentrating industries

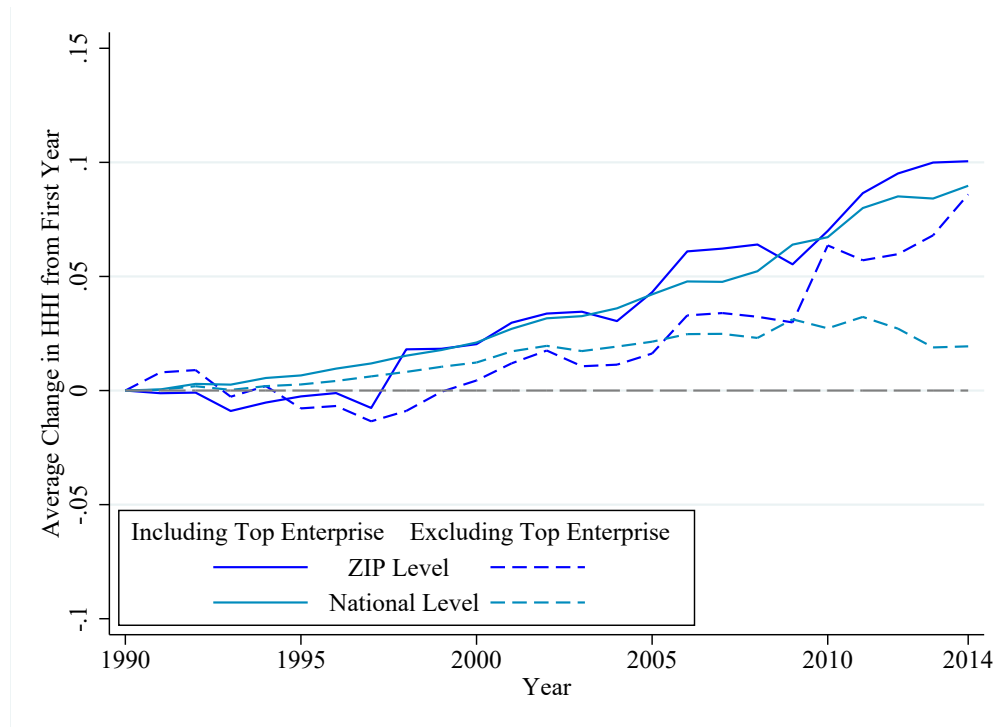


Figure 10: Removing Enterprises with One Employee: Effect on concentration when the second and third largest enterprises enter a market in diverging industries

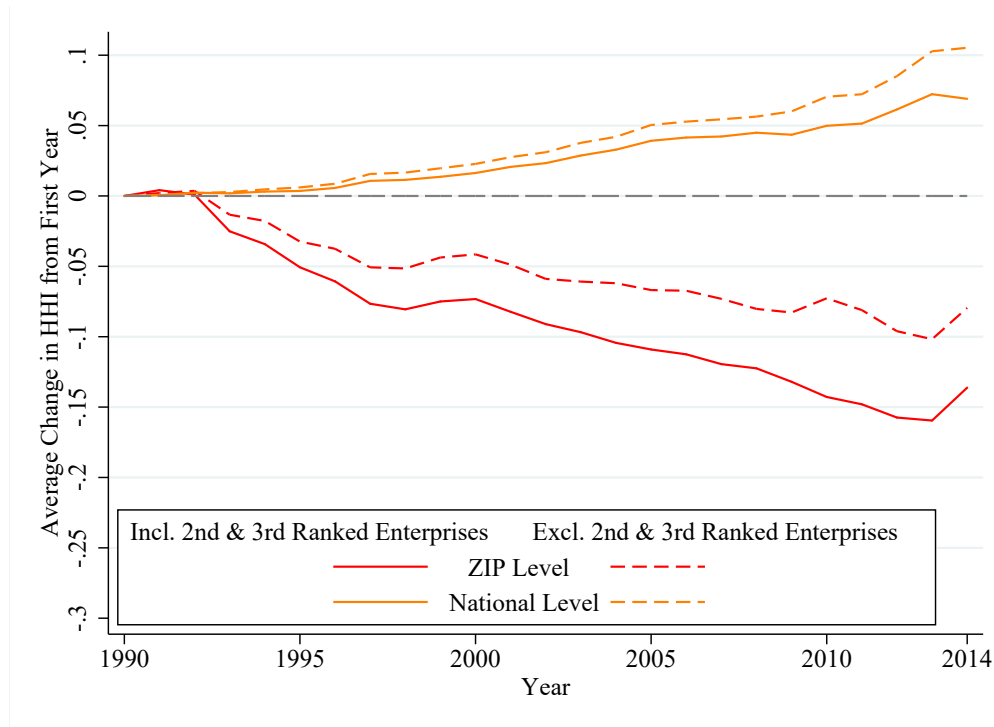


Figure 11: Removing Enterprises with One Employee: The role of the second and third largest enterprises in concentrating industries

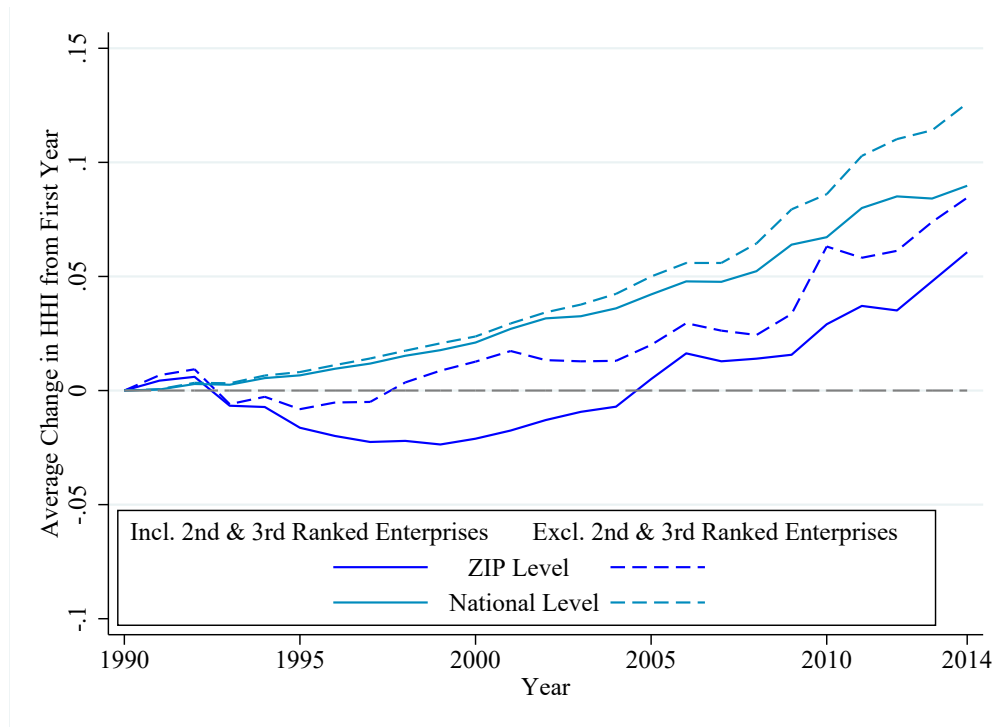


Figure 12: Removing Enterprises with One Employee: Expansion of top enterprises into ZIP codes

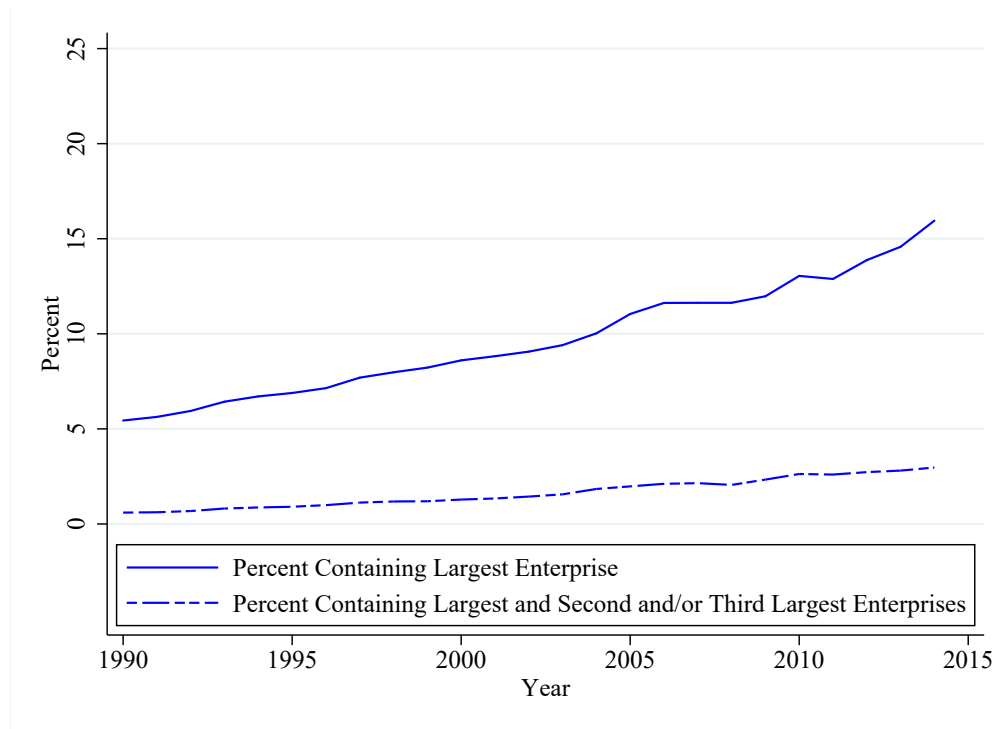


Figure 13: Removing Enterprises with One Employee: Effect on concentration when a top enterprise enters a local market in diverging industries

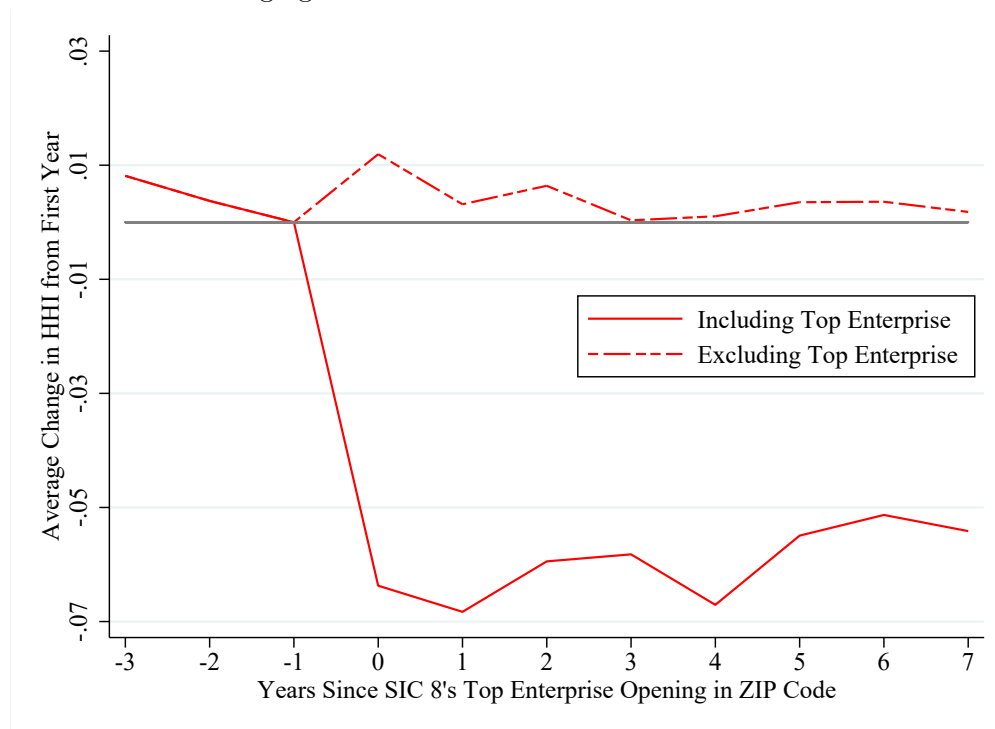


Figure 14: Removing Enterprises with One Employee: Effect on concentration when a top enterprise enters a local market in concentrating industries

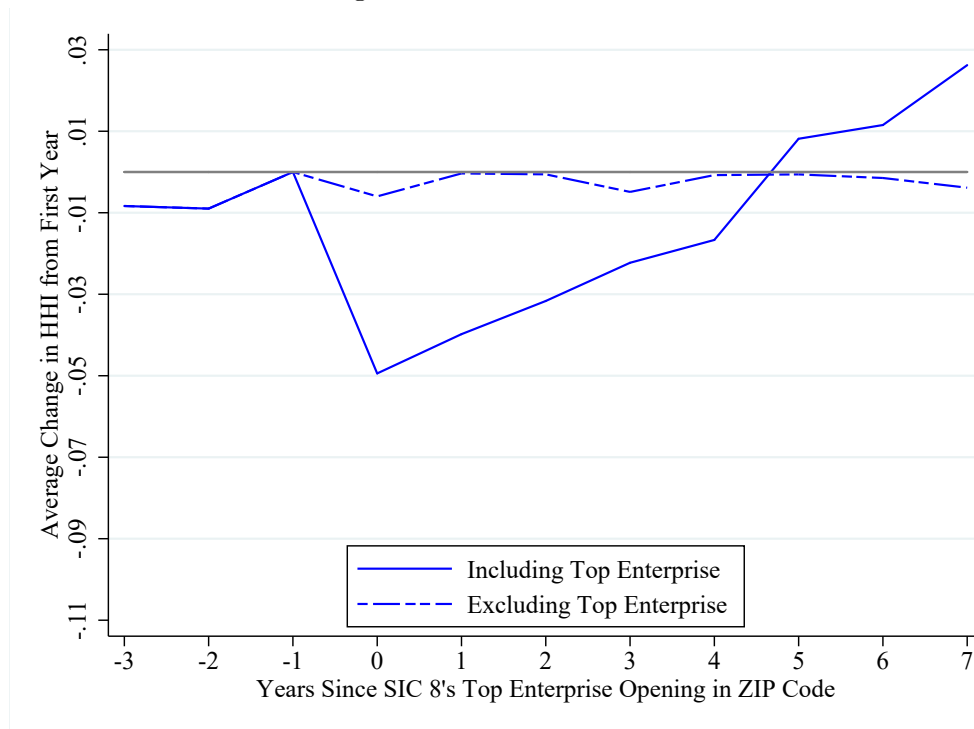


Figure 15: Removing Enterprises with One Employee: Effect on concentration when Walmart enters a local market



Figure 16: Removing Enterprises with One Employee: Effect on number of establishments when Walmart enters a local market

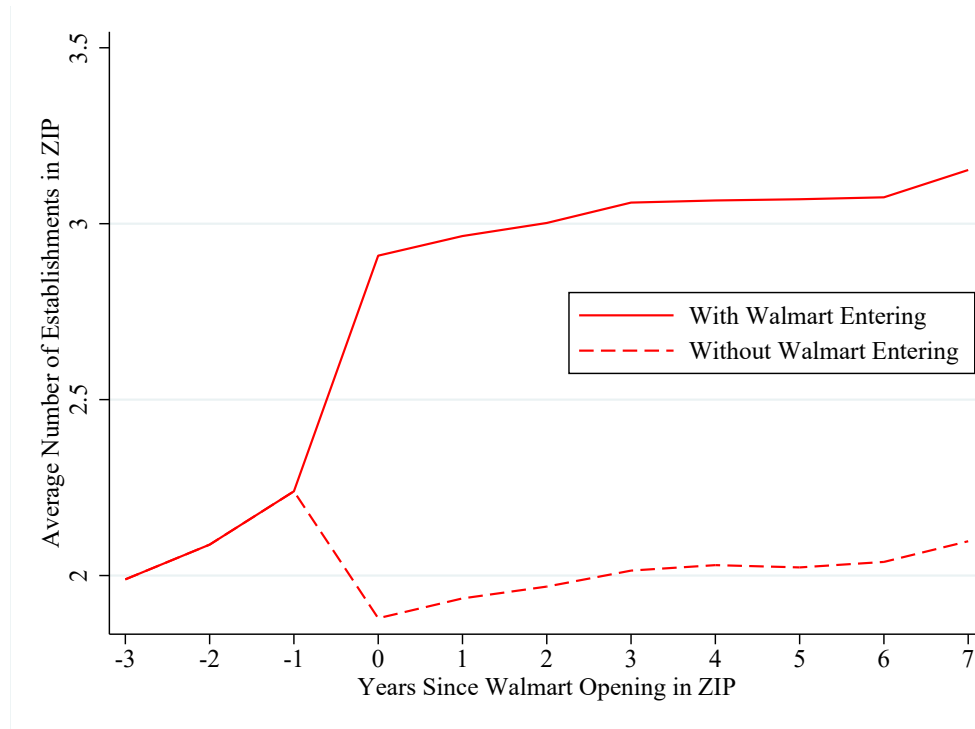


Figure 17: Removing Enterprises with One Employee: Effect on concentration when Cemex enters a local market

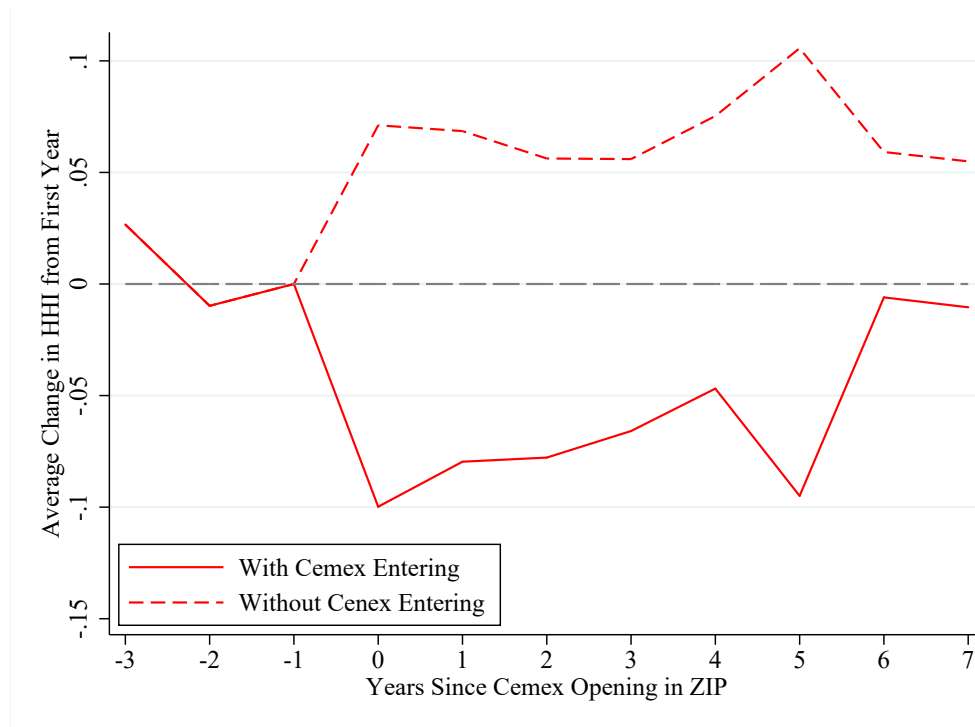
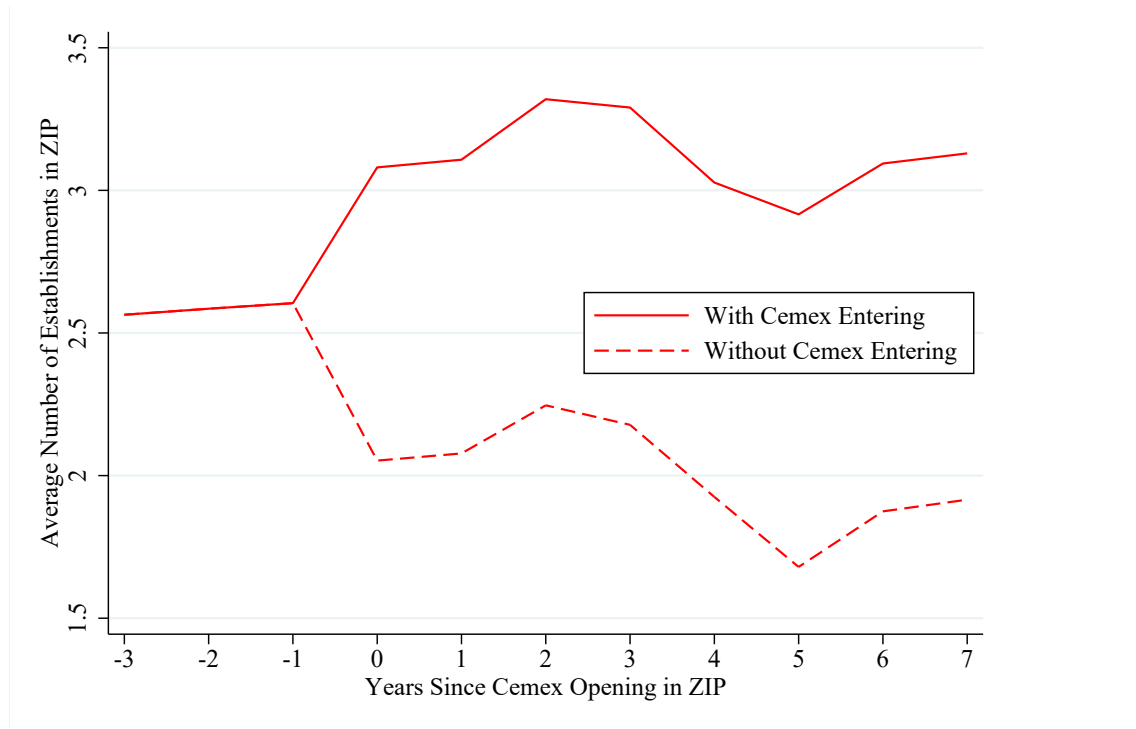


Figure 18: Removing Enterprises with One Employee: Effect on number of establishments when Cemex enters a local market



2.1.2 Removing Enterprises with Fewer than 5 Employees

Figure 19: Removing Enterprises with Fewer than 5 Employees: Diverging economy-wide national and local concentration trends

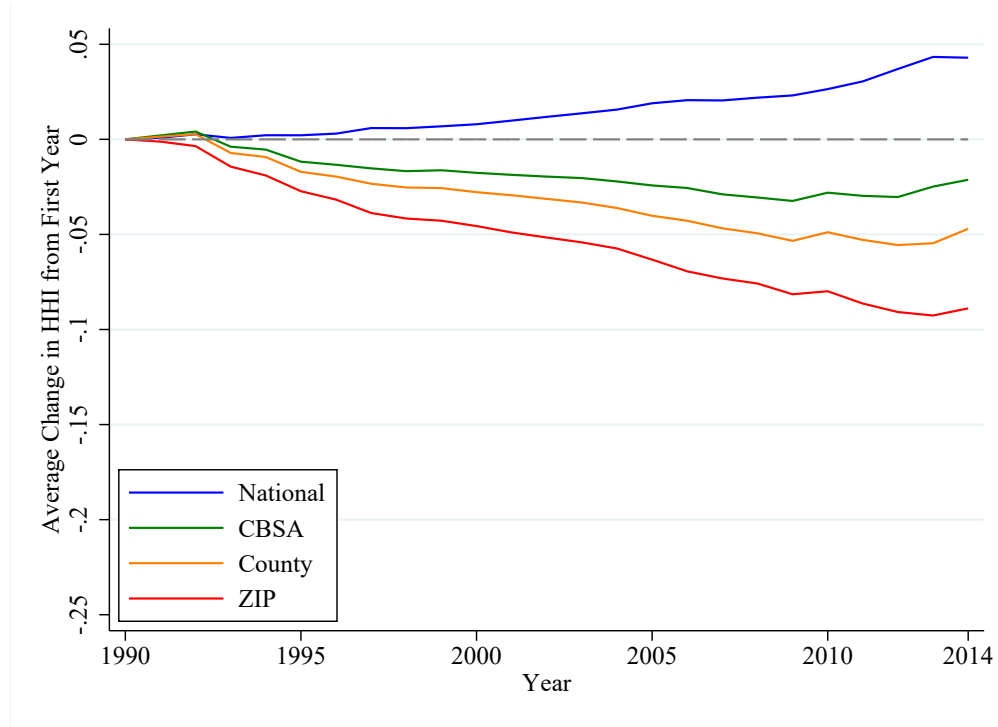


Figure 20: Removing Enterprises with Fewer than 5 Employees: Diverging division-level national and local concentration trends

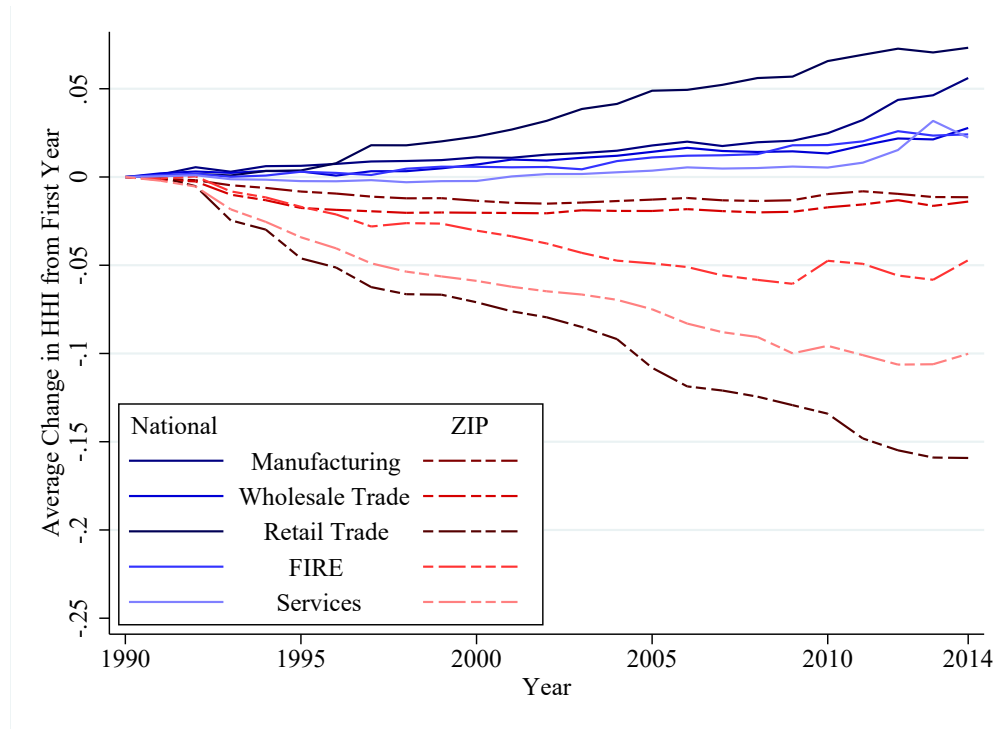


Figure 21: Removing Enterprises with Fewer than 5 Employees: Diverging economy-wide trends in sales concentration

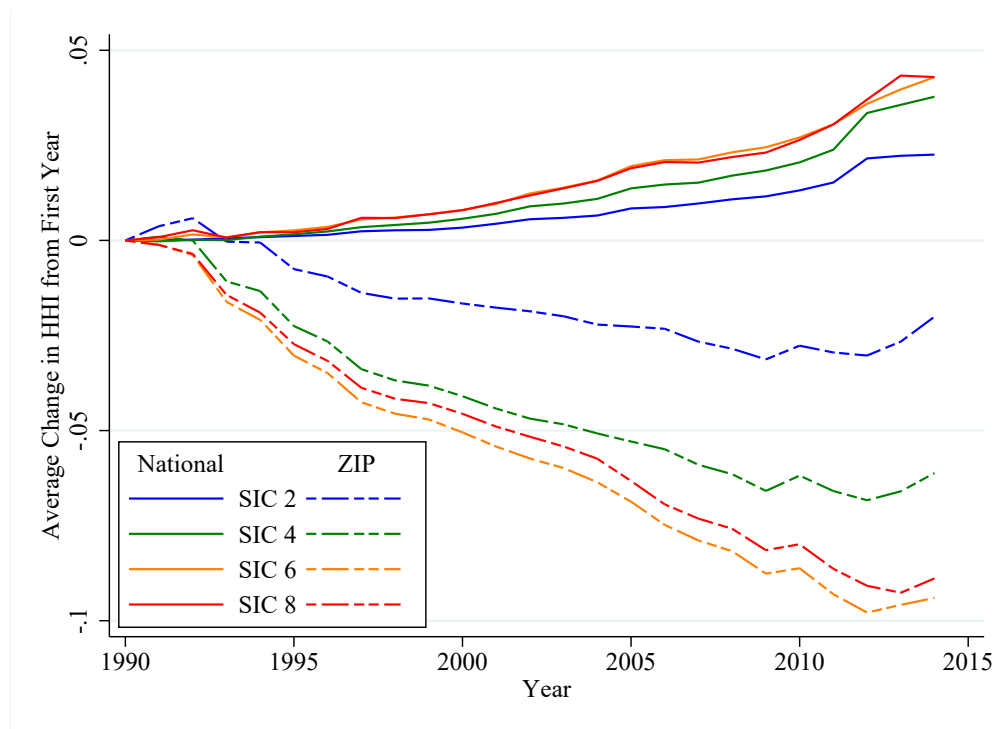


Figure 22: Removing Enterprises with Fewer than 5 Employees: Diverging economy-wide trends in employment concentration

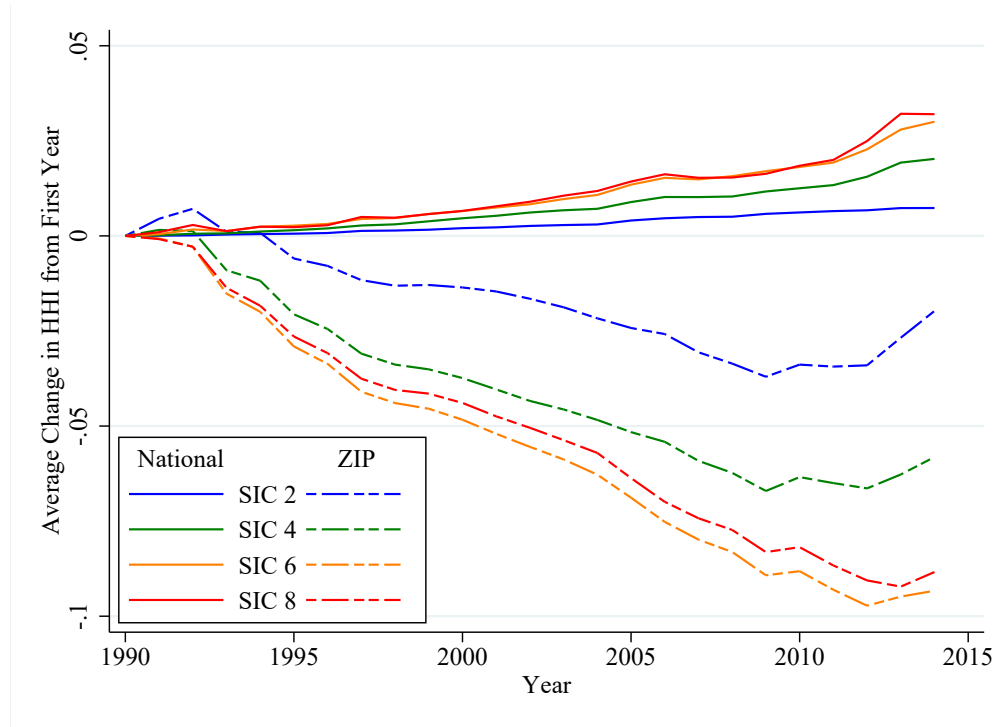


Figure 23: Removing Enterprises with Fewer than 5 Employees: Diverging economy-wide national and local concentration trends with a balanced panel

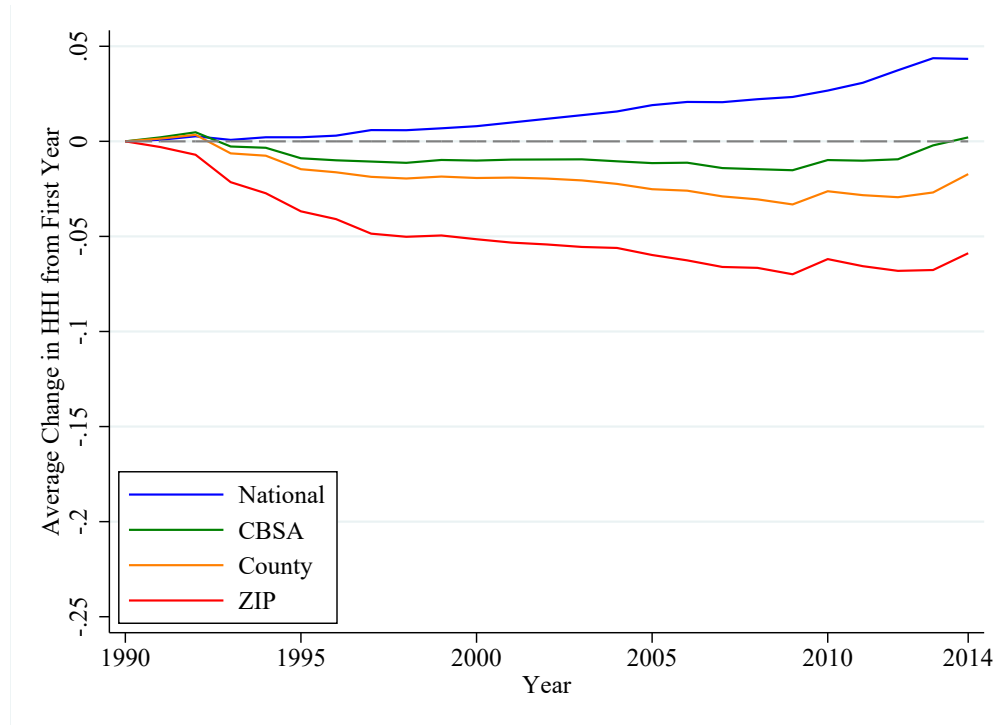


Figure 24: Removing Enterprises with Fewer than 5 Employees: Diverging division-level national and local concentration trends with a balanced panel

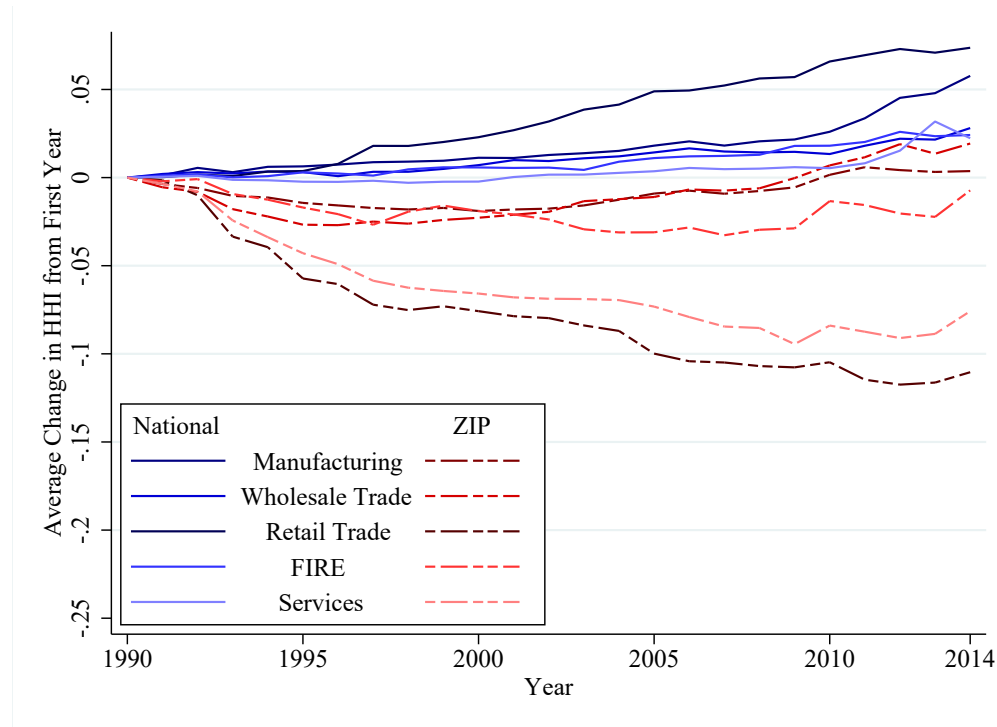


Figure 25: Removing Enterprises with Fewer than 5 Employees: Pervasive diverging trends across 2-digit sectors

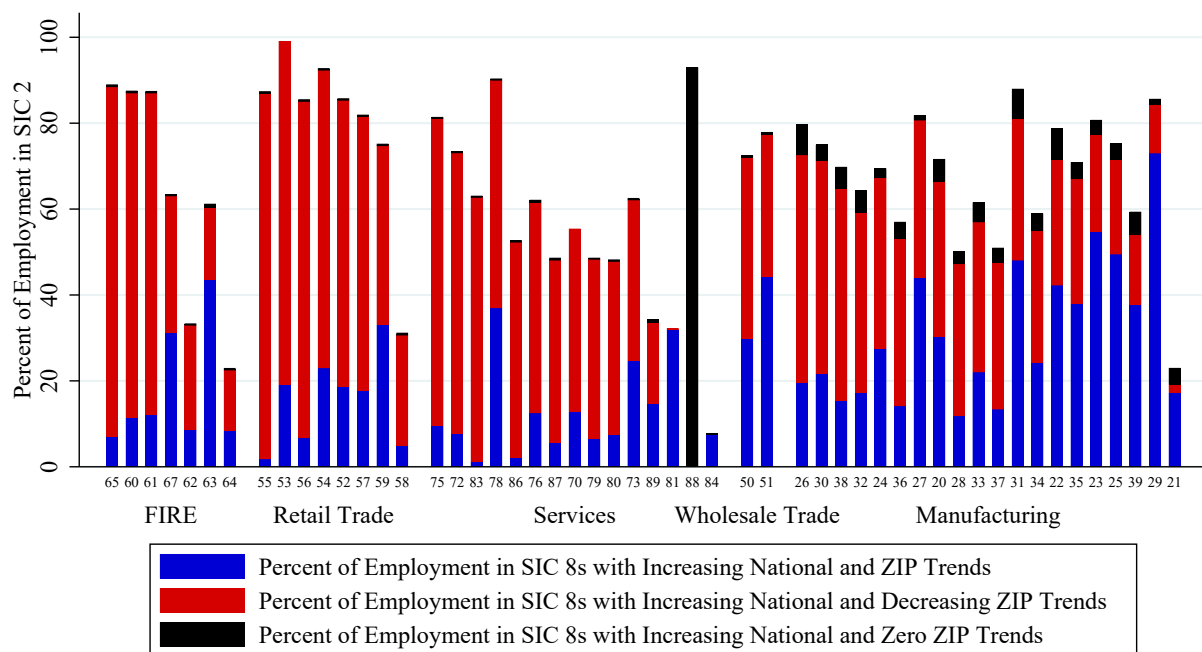


Figure 26: Removing Enterprises with Fewer than 5 Employees: The role of top enterprises in national and local concentration trends in diverging industries

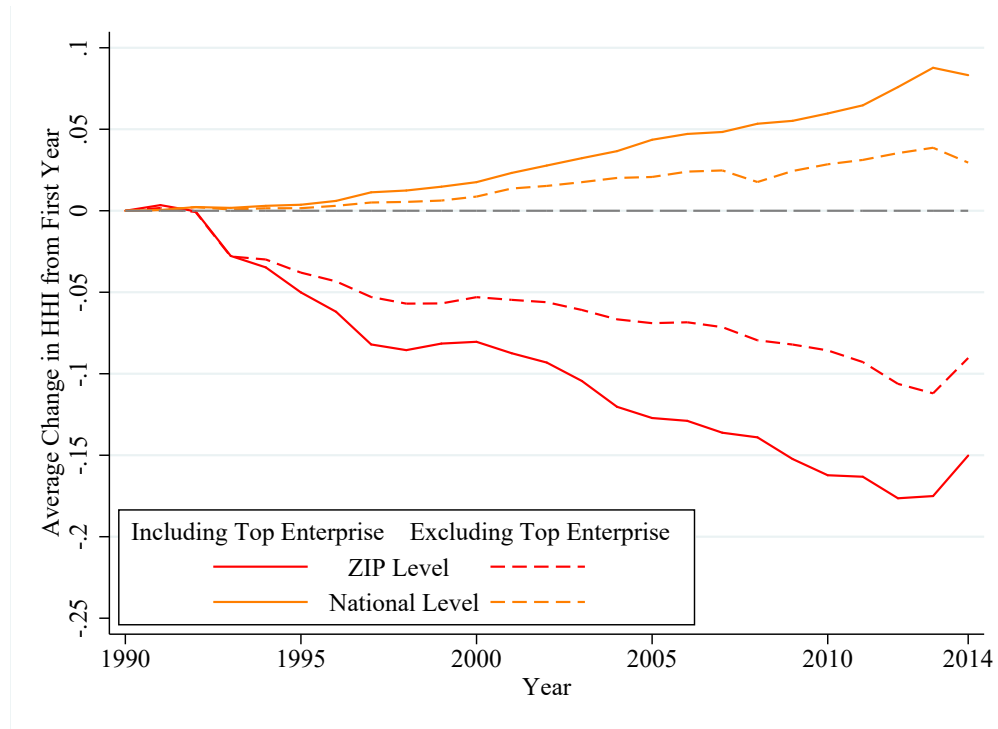


Figure 27: Removing Enterprises with Fewer than 5 Employees: The role of top enterprises in national and local concentration trends in concentrating industries

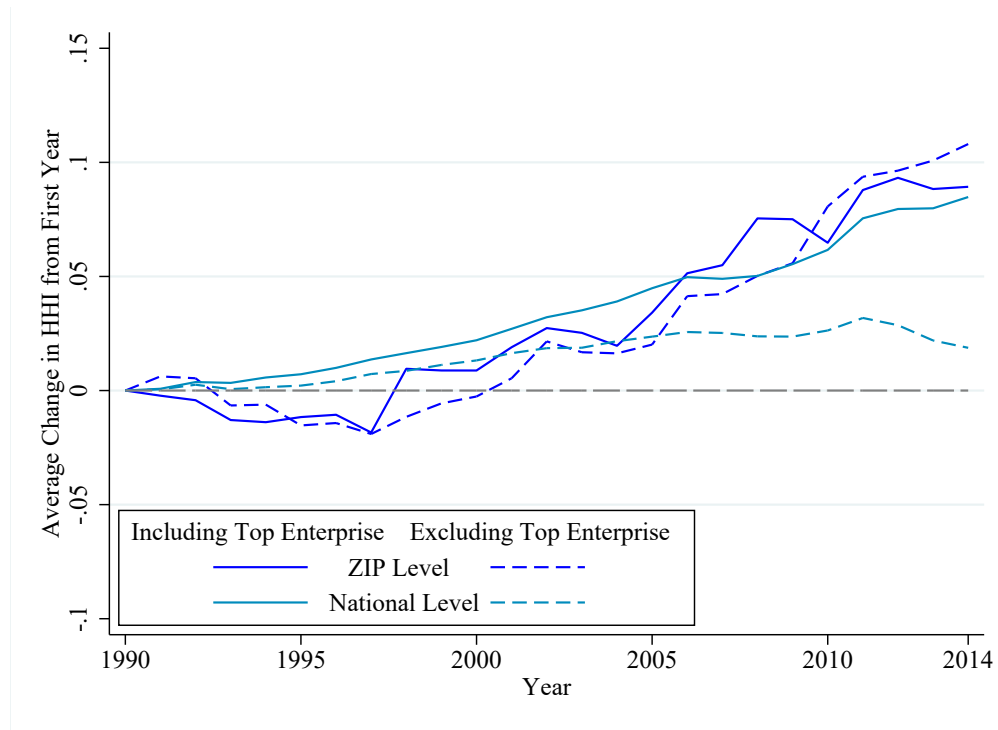


Figure 28: Removing Enterprises with Fewer than 5 Employees: The role of the second and third largest enterprises in diverging industries

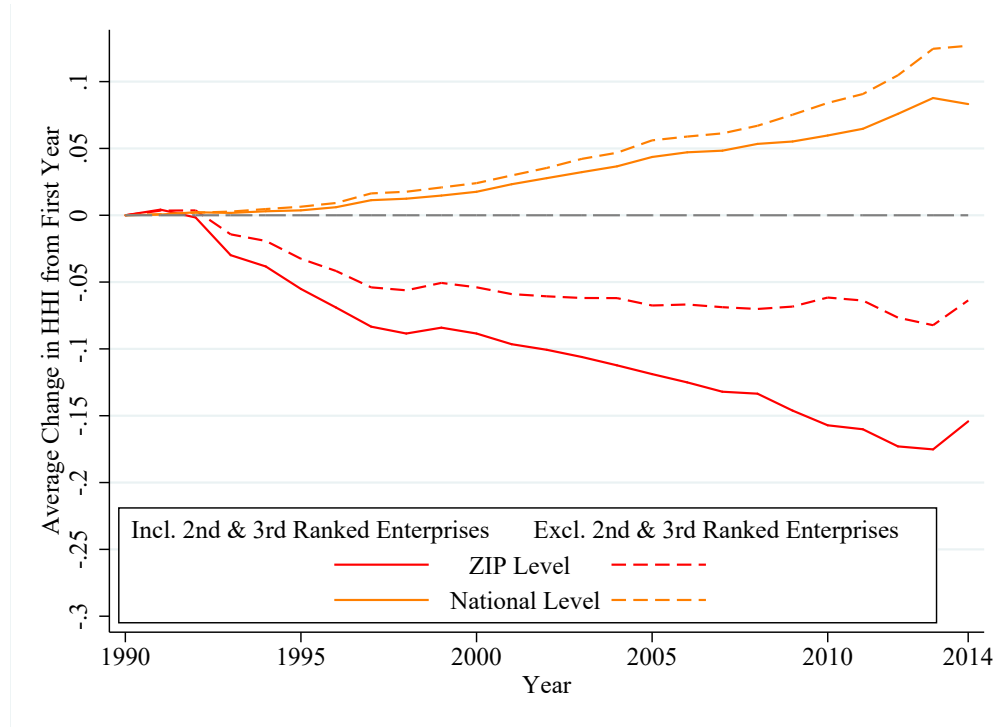


Figure 29: Removing Enterprises with Fewer than 5 Employees: The role of the second and third largest enterprises in concentrating industries

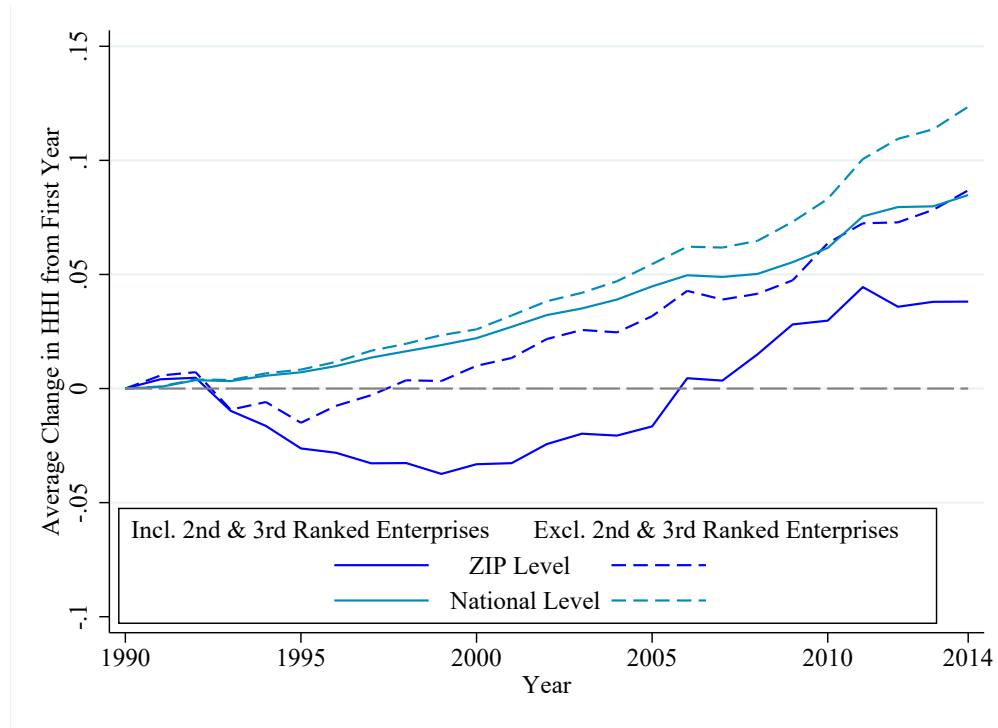


Figure 30: Removing Enterprises with Fewer than 5 Employees: Expansion of top enterprises into ZIP codes

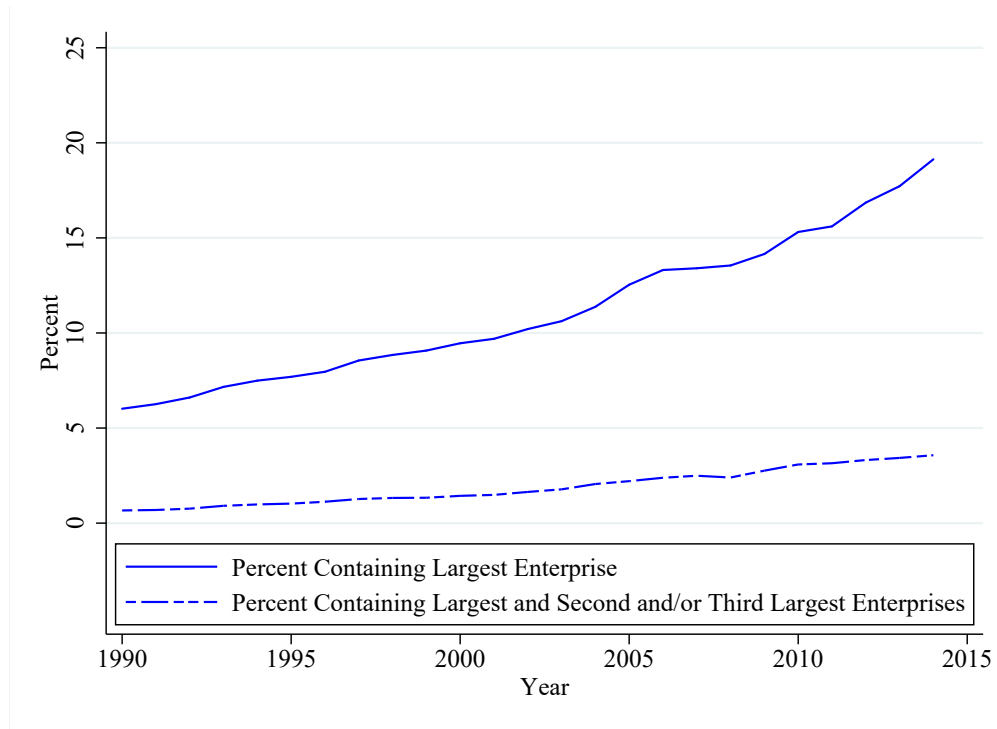


Figure 31: Removing Enterprises with Fewer than 5 Employees: Effect on concentration when a top enterprise enters a local market in diverging industries

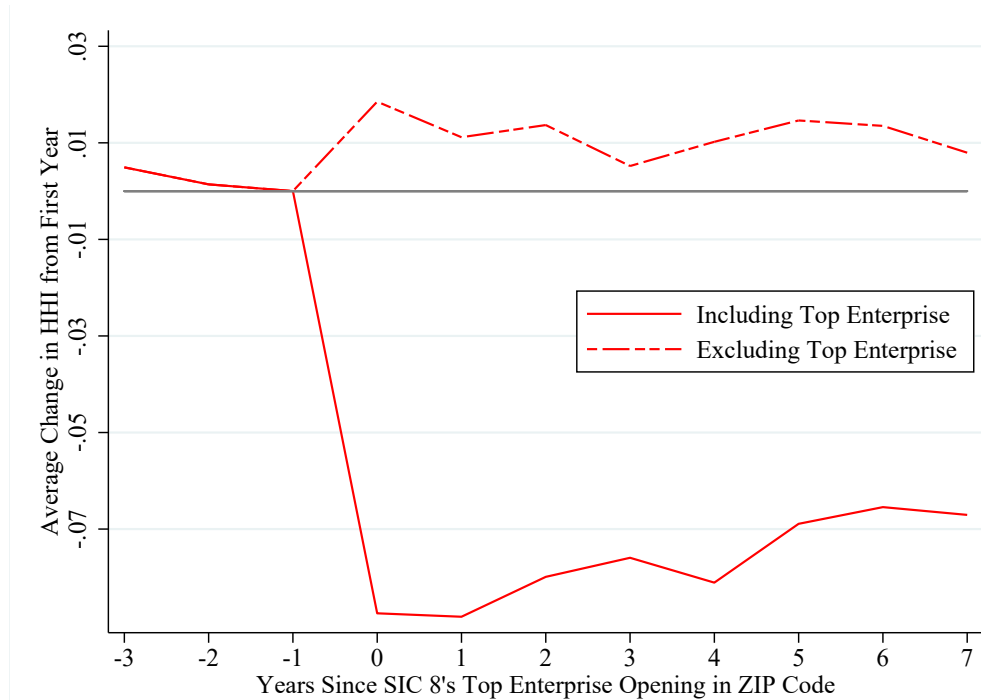


Figure 32: Removing Enterprises with Fewer than 5 Employees: Effect on concentration when a top enterprise enters a local market in concentrating industries

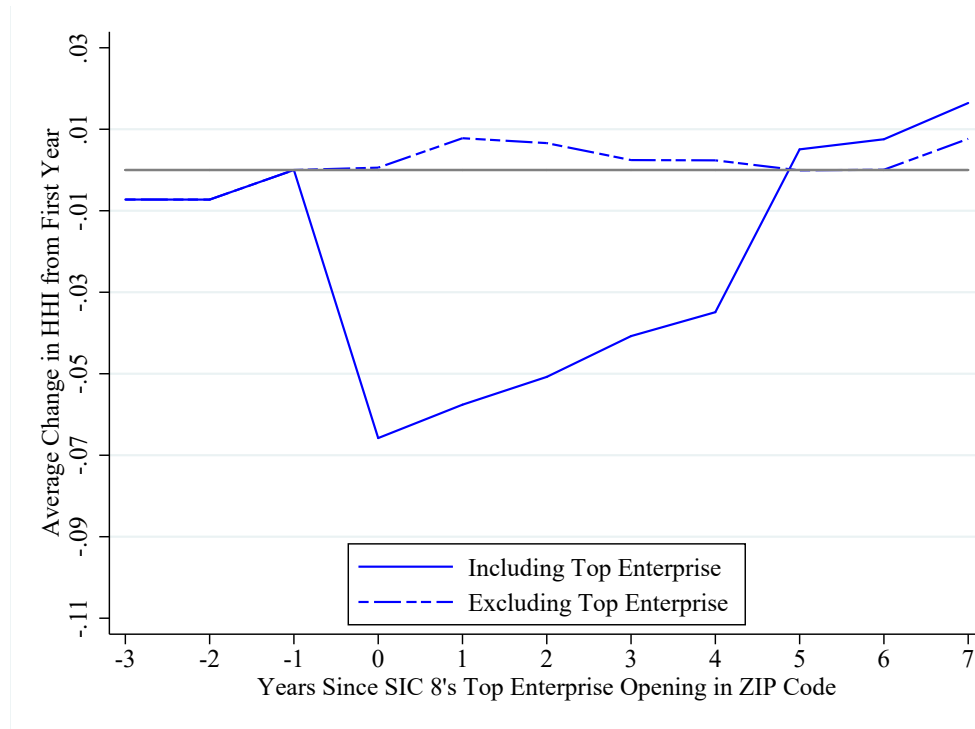


Figure 33: Removing Enterprises with Fewer than 5 Employees: Effect on concentration when Walmart enters a local market



Figure 34: Removing Enterprises with Fewer than 5 Employees: Effect on number of establishments when Walmart enters a local market

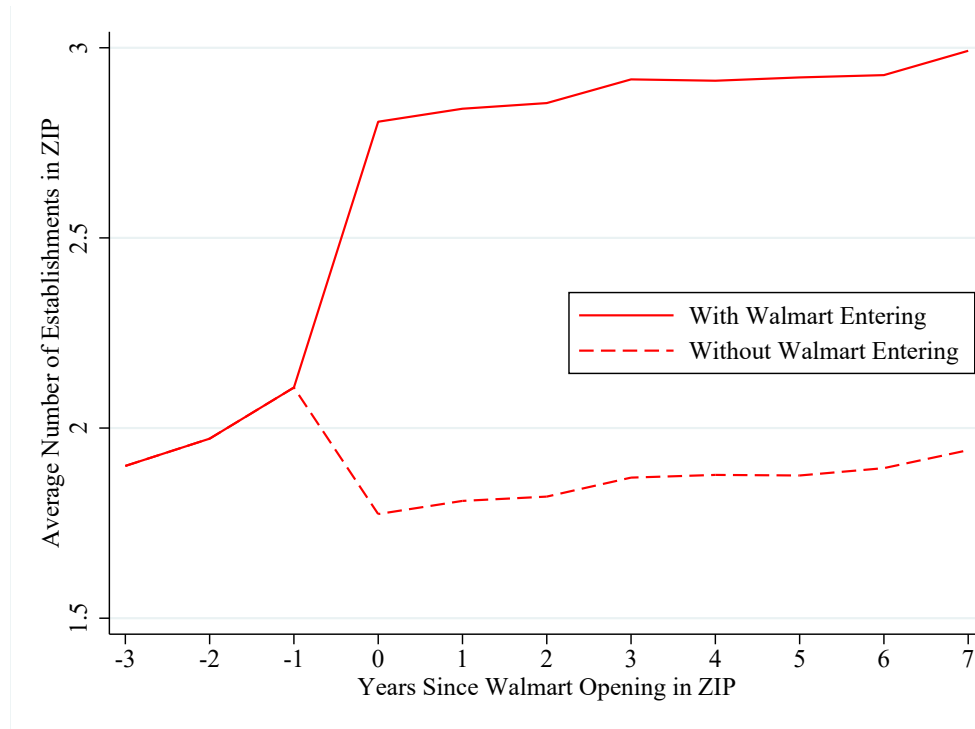


Figure 35: Removing Enterprises with Fewer than 5 Employees: Effect on concentration when Cemex enters a local market

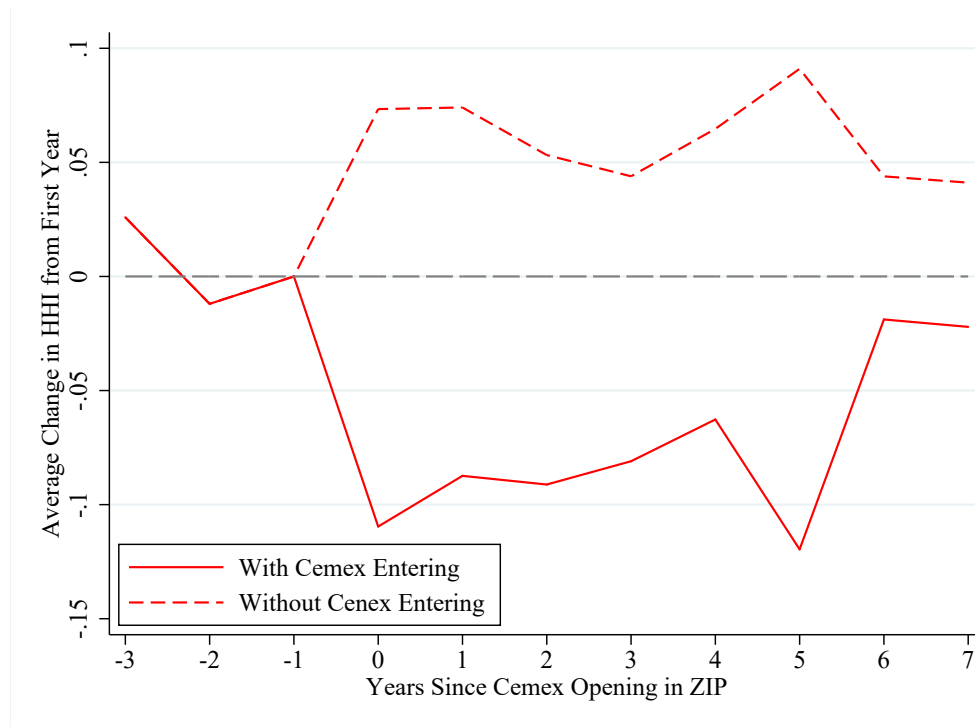
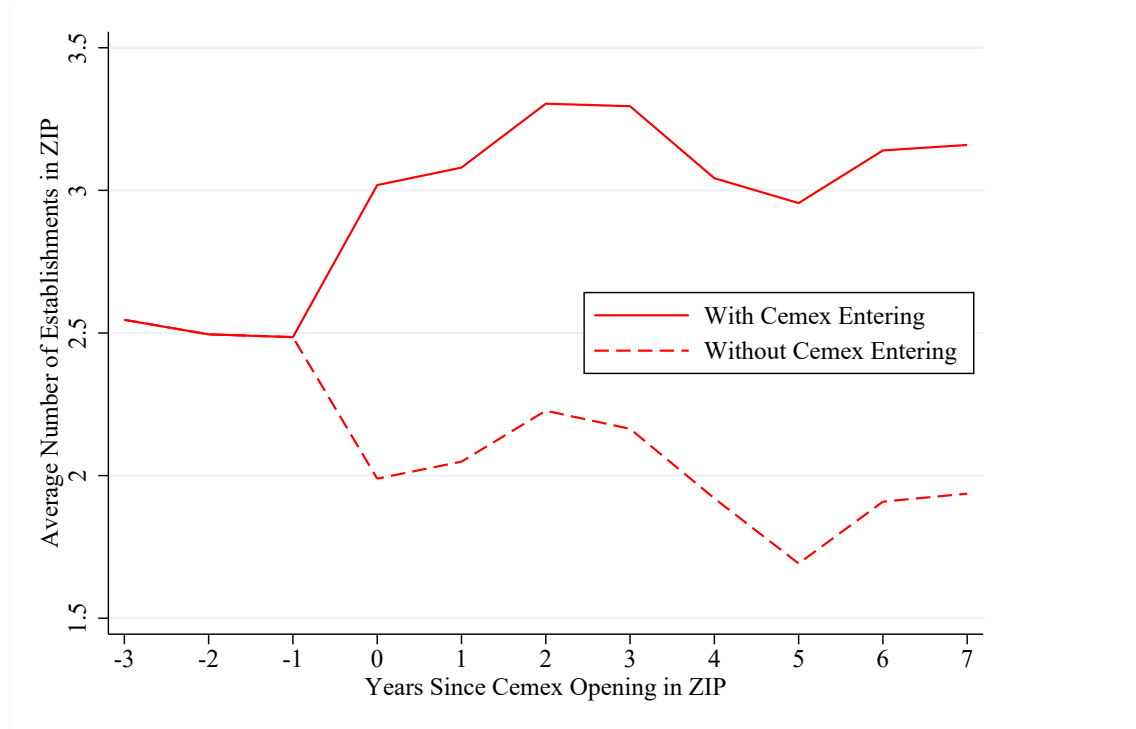


Figure 36: Removing Enterprises with Fewer than 5 Employees: Effect on number of establishments when Cemex enters a local market



2.1.3 Removing Enterprises with Fewer than 10 Employees

Figure 37: Removing Enterprises with Fewer than 10 Employees: Diverging economy-wide national and local concentration trends

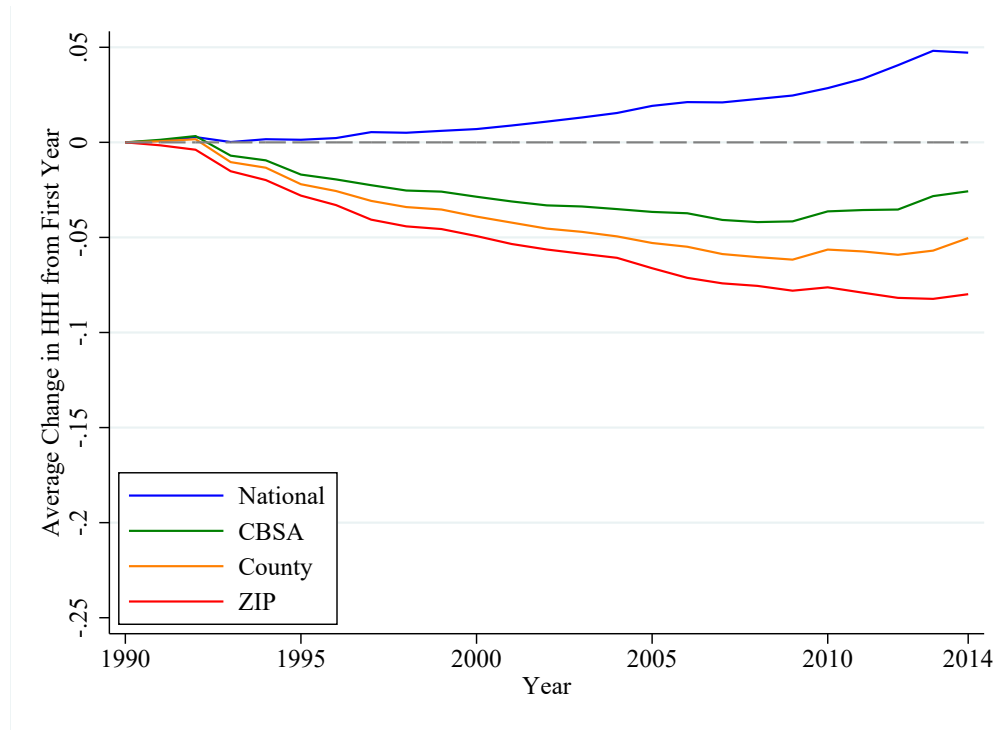


Figure 38: Removing Enterprises with Fewer than 10 Employees: Diverging division-level national and local concentration trends

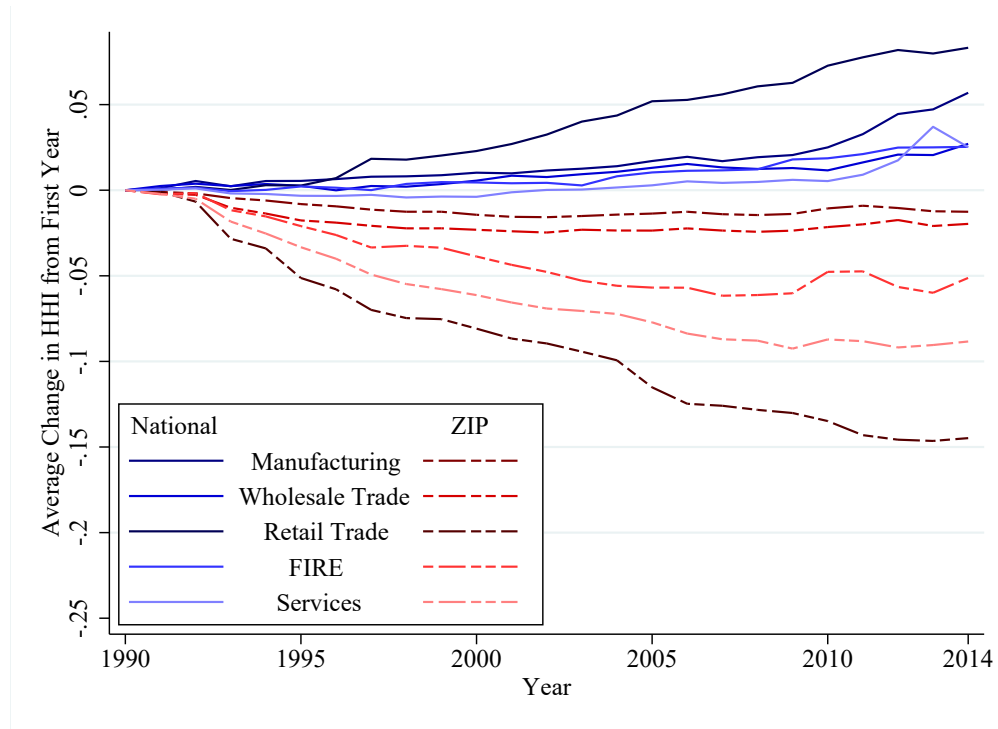


Figure 39: Removing Enterprises with Fewer than 10 Employees: Diverging economy-wide trends in sales concentration

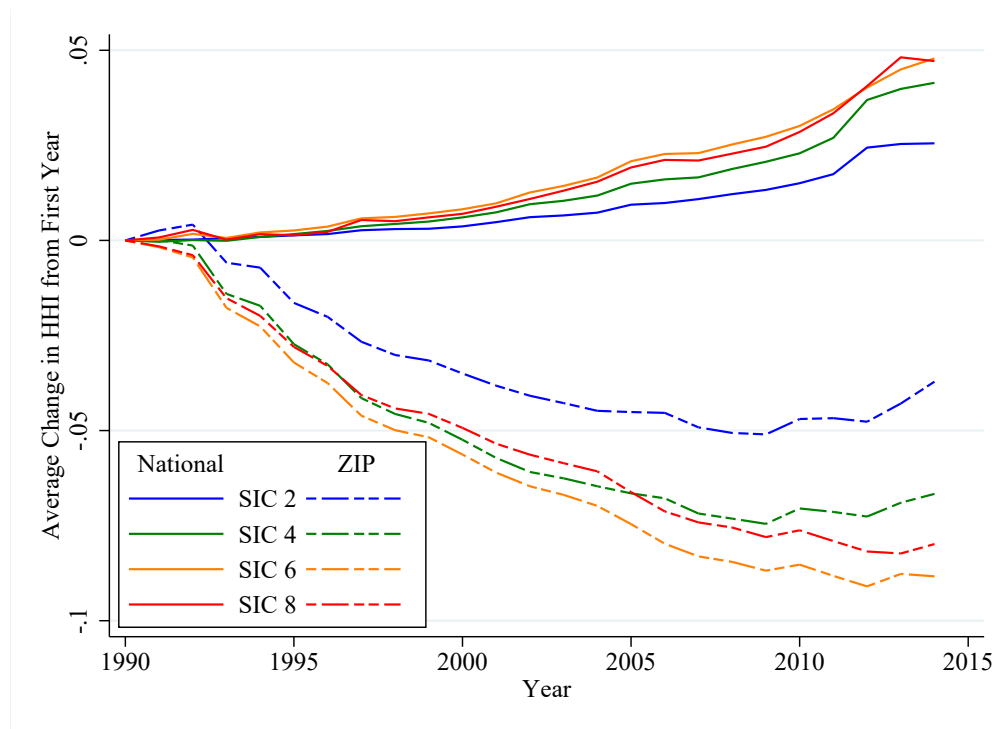


Figure 40: Removing Enterprises with Fewer than 10 Employees: Diverging economy-wide trends in employment concentration

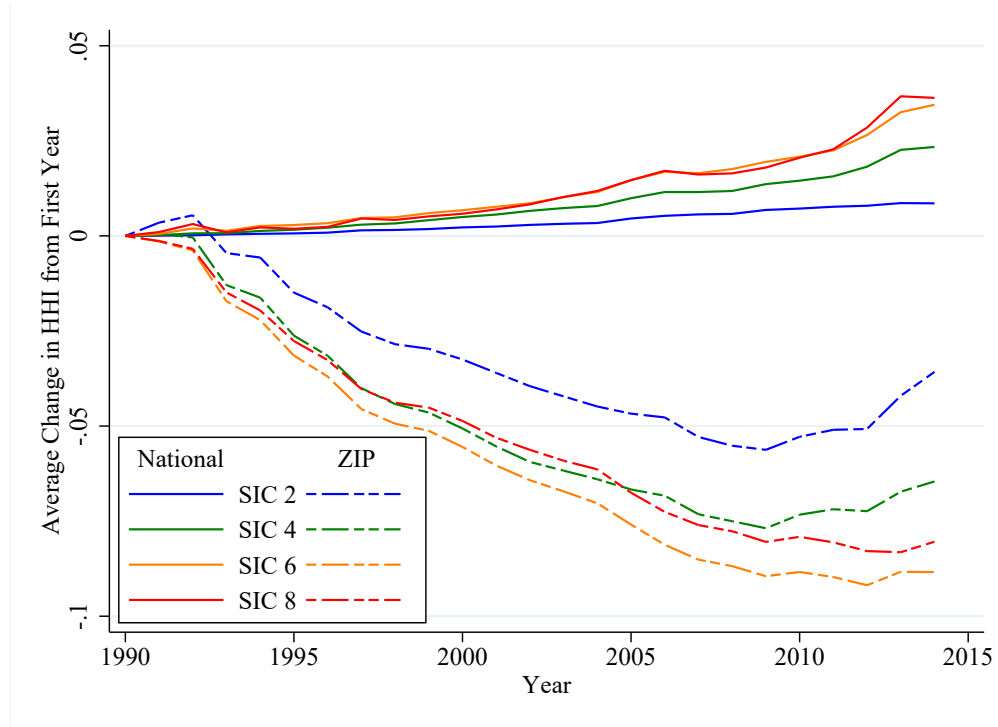


Figure 41: Removing Enterprises with Fewer than 10 Employees: Diverging economy-wide national and local concentration trends with a balanced panel

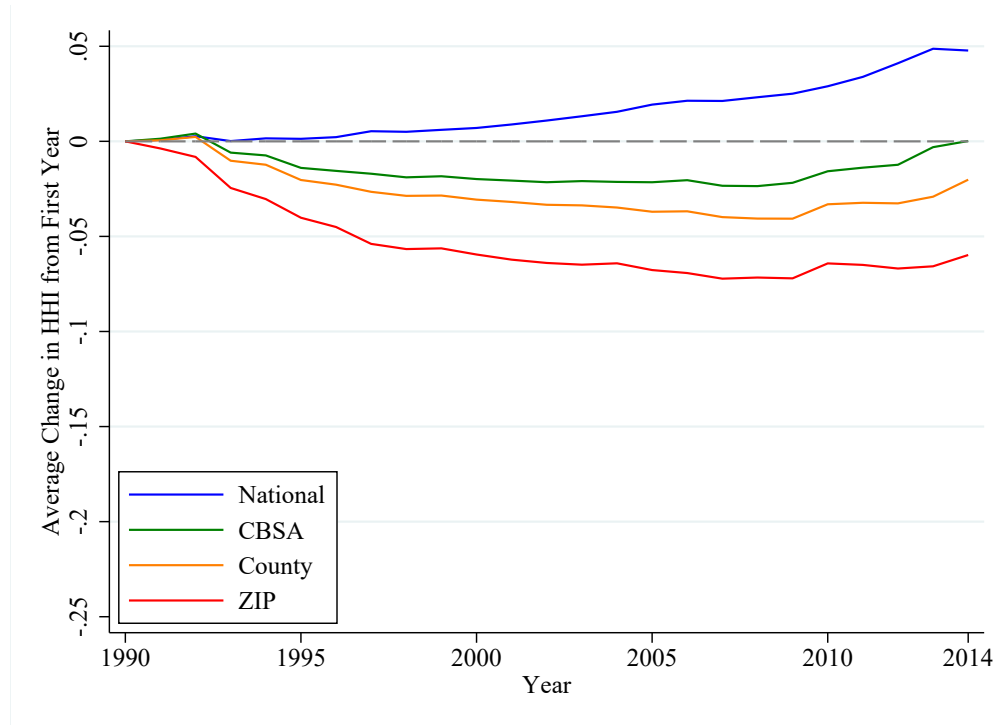


Figure 42: Removing Enterprises with Fewer than 10 Employees: Diverging division-level national and local concentration trends with a balanced panel

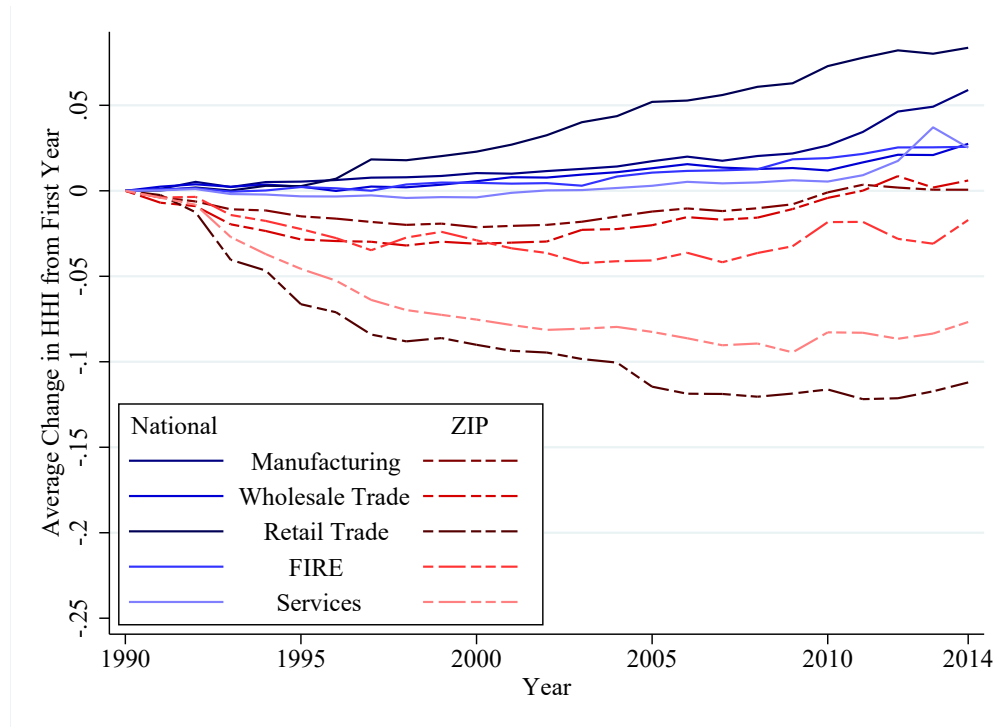


Figure 43: Removing Enterprises with Fewer than 10 Employees: Pervasive diverging trends across 2-digit sectors

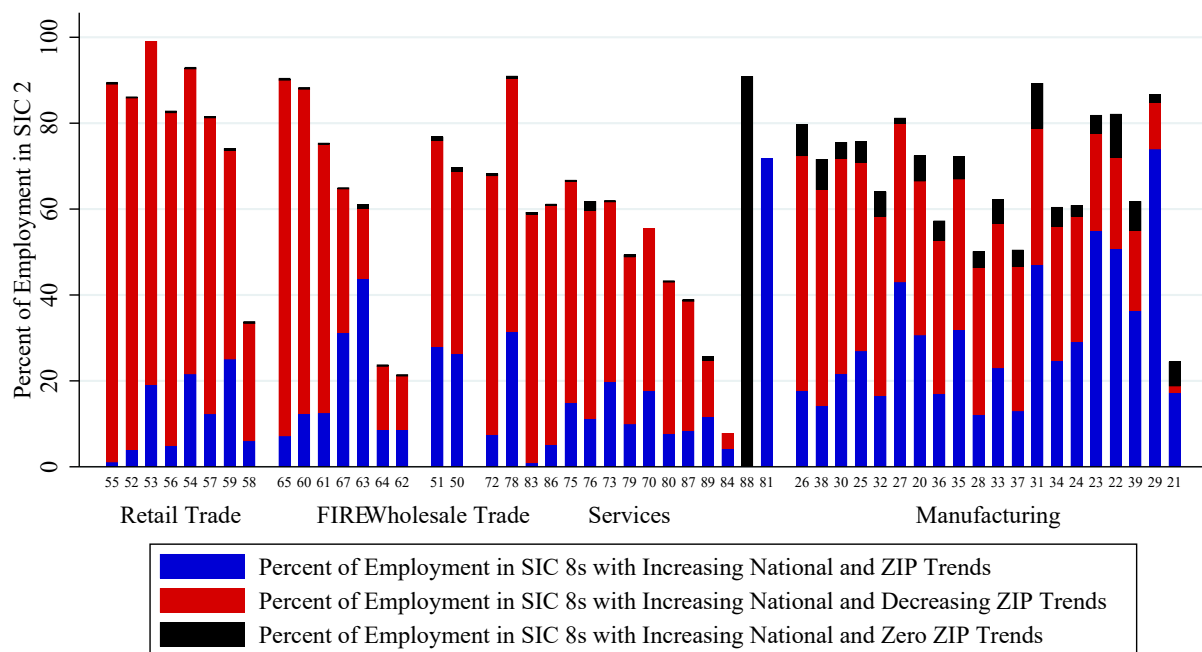


Figure 44: Removing Enterprises with Fewer than 10 Employees: The role of top enterprises in national and local concentration trends in diverging industries

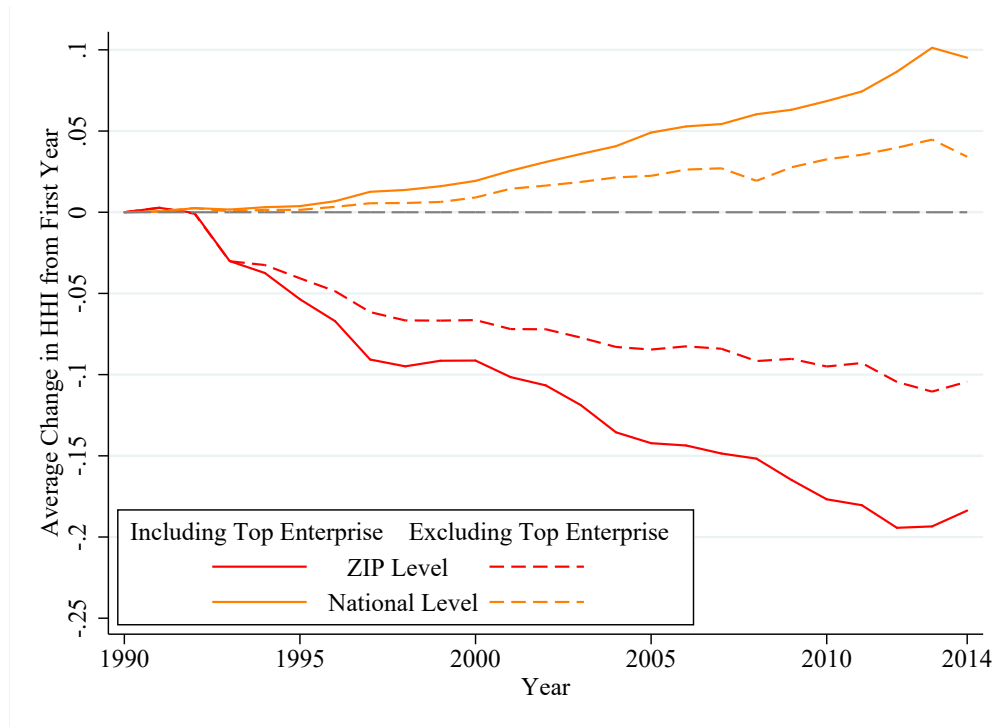


Figure 45: Removing Enterprises with Fewer than 10 Employees: The role of top enterprises in national and local concentration trends in concentrating industries

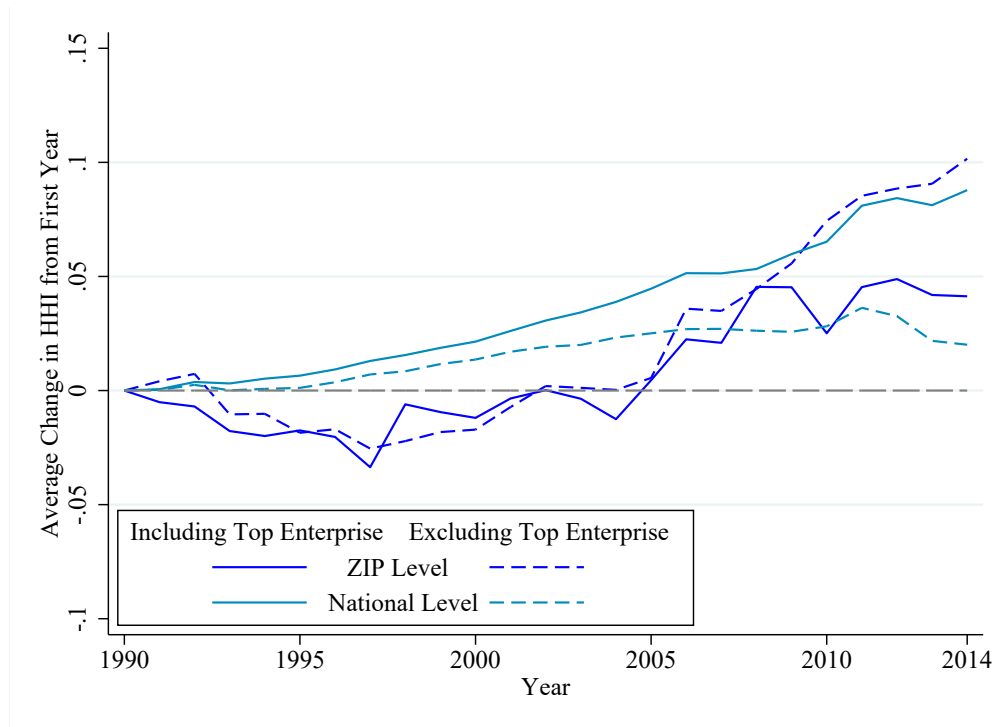


Figure 46: Removing Enterprises with Fewer than 10 Employees: The role of the second and third largest enterprises in diverging industries

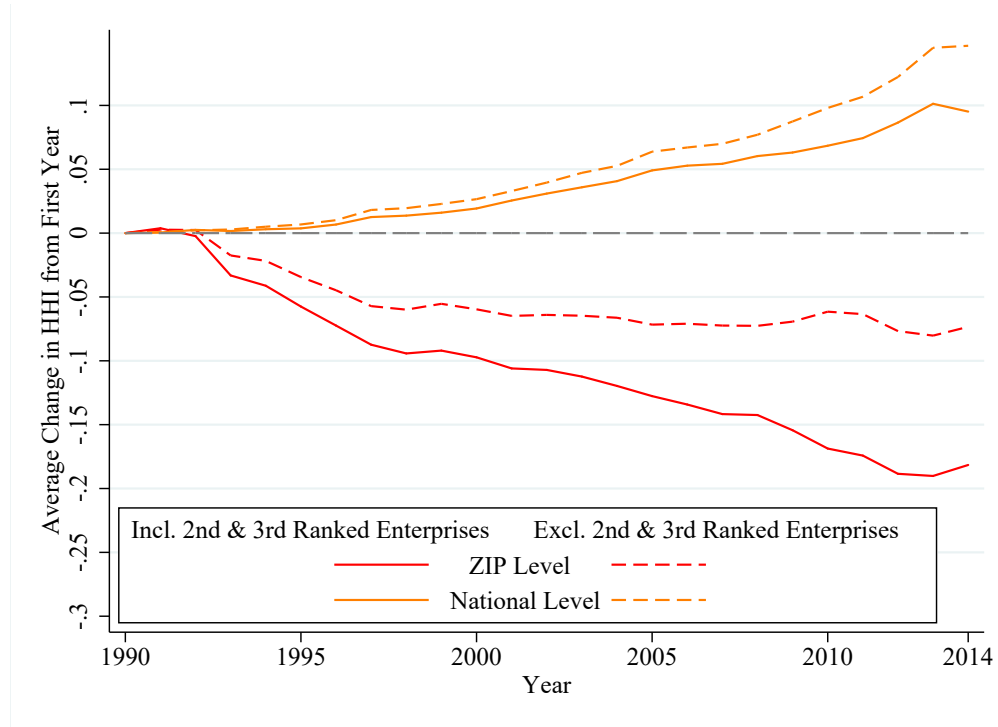


Figure 47: Removing Enterprises with Fewer than 10 Employees: The role of the second and third largest enterprises in concentrating industries

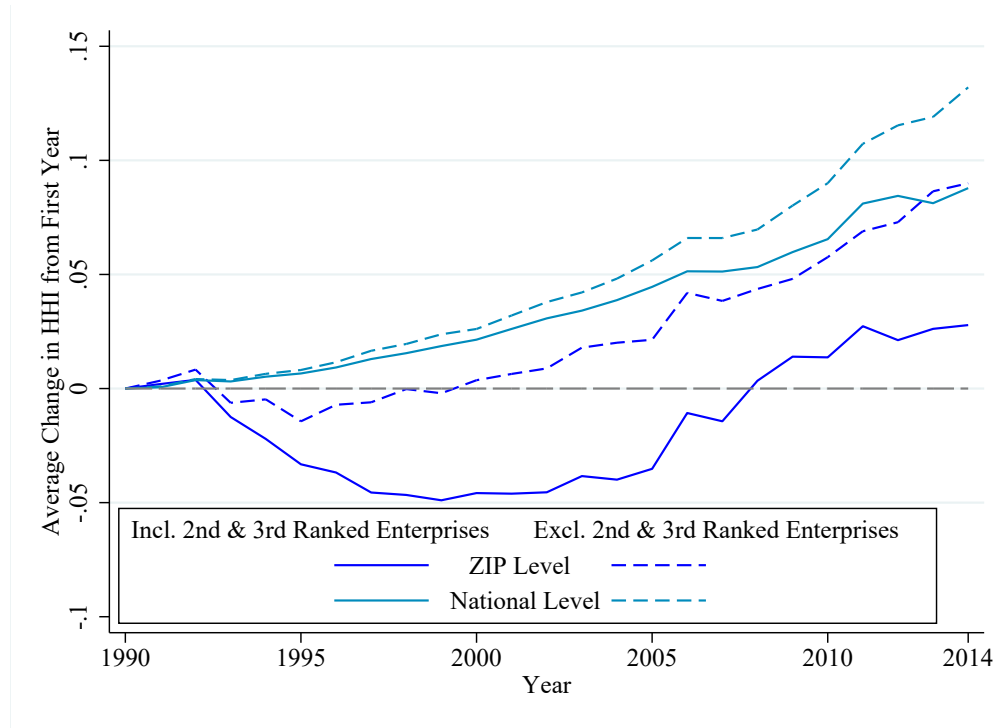


Figure 48: Removing Enterprises with Fewer than 10 Employees: Expansion of top enterprises into ZIP codes

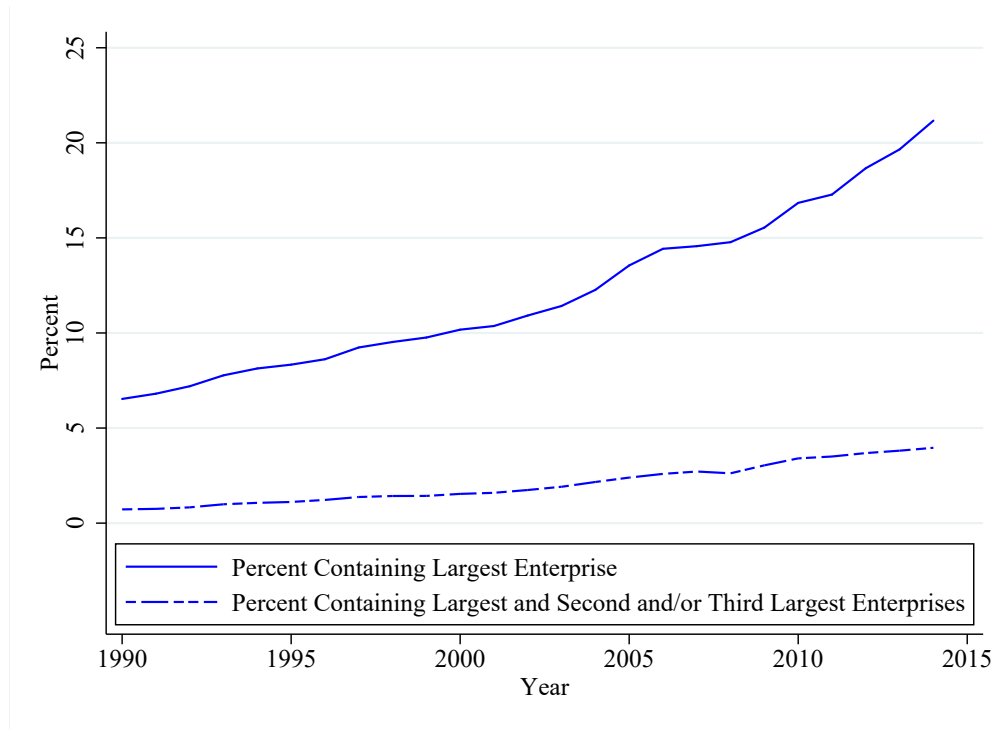


Figure 49: Removing Enterprises with Fewer than 10 Employees: Effect on concentration when a top enterprise enters a local market in diverging industries

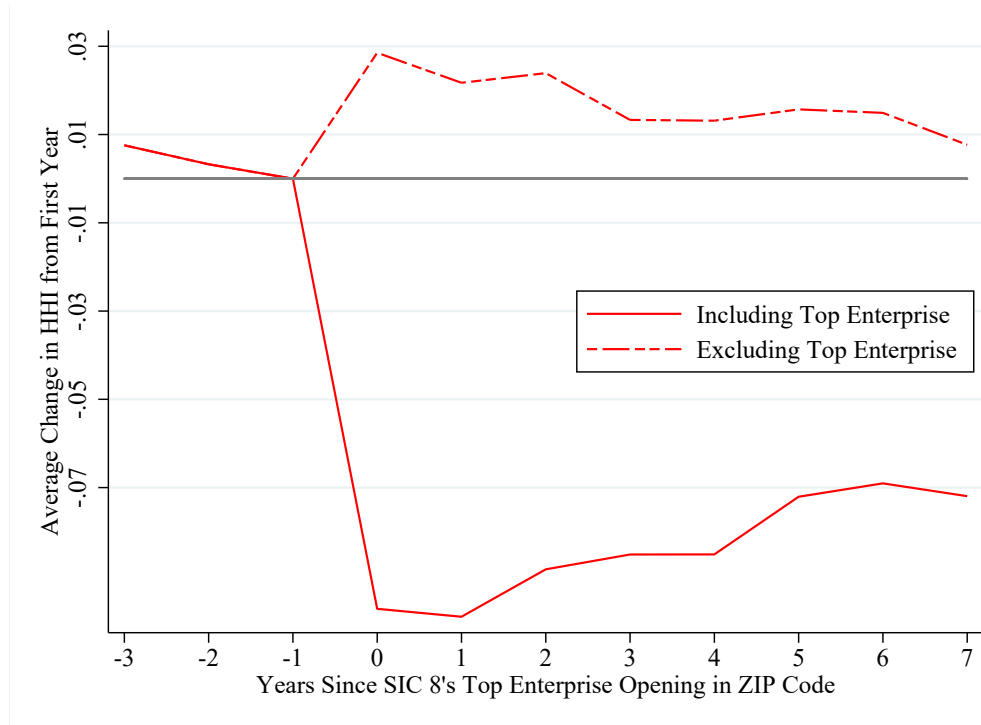


Figure 50: Removing Enterprises with Fewer than 10 Employees: Effect on concentration when a top enterprise enters a local market in concentrating industries

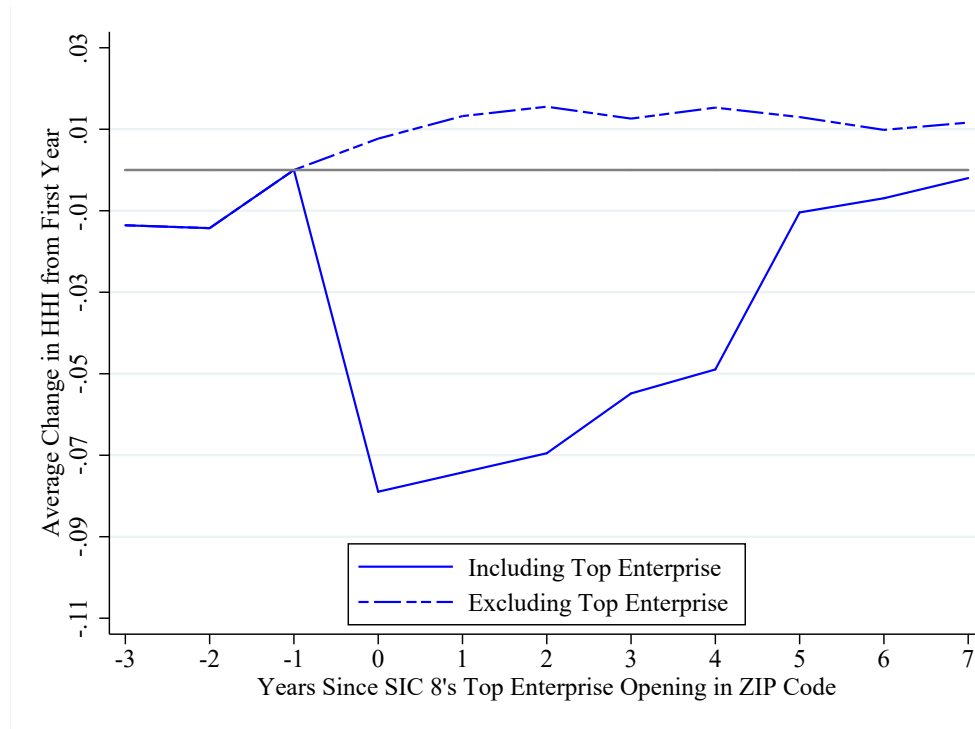


Figure 51: Removing Enterprises with Fewer than 10 Employees: Effect on concentration when Walmart enters a local market

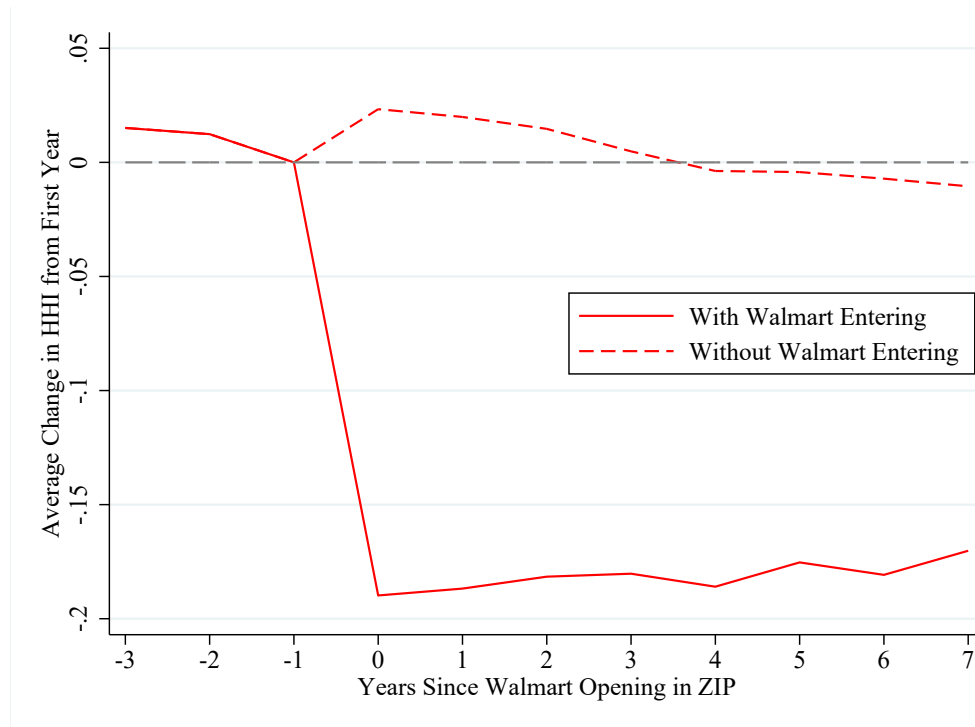


Figure 52: Removing Enterprises with Fewer than 10 Employees: Effect on number of establishments when Walmart enters a local market

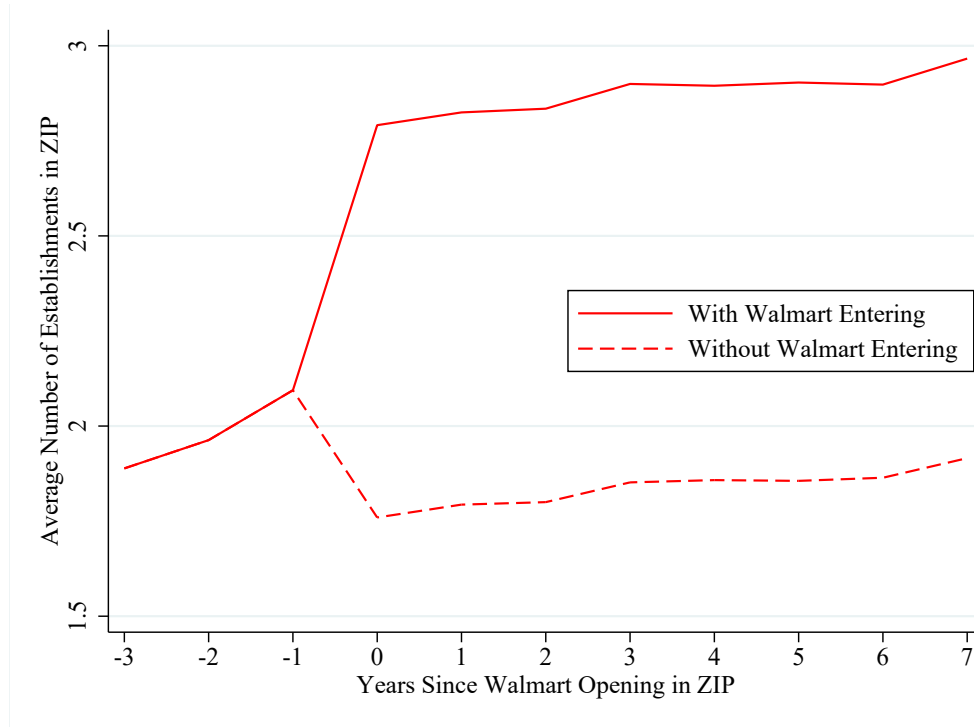
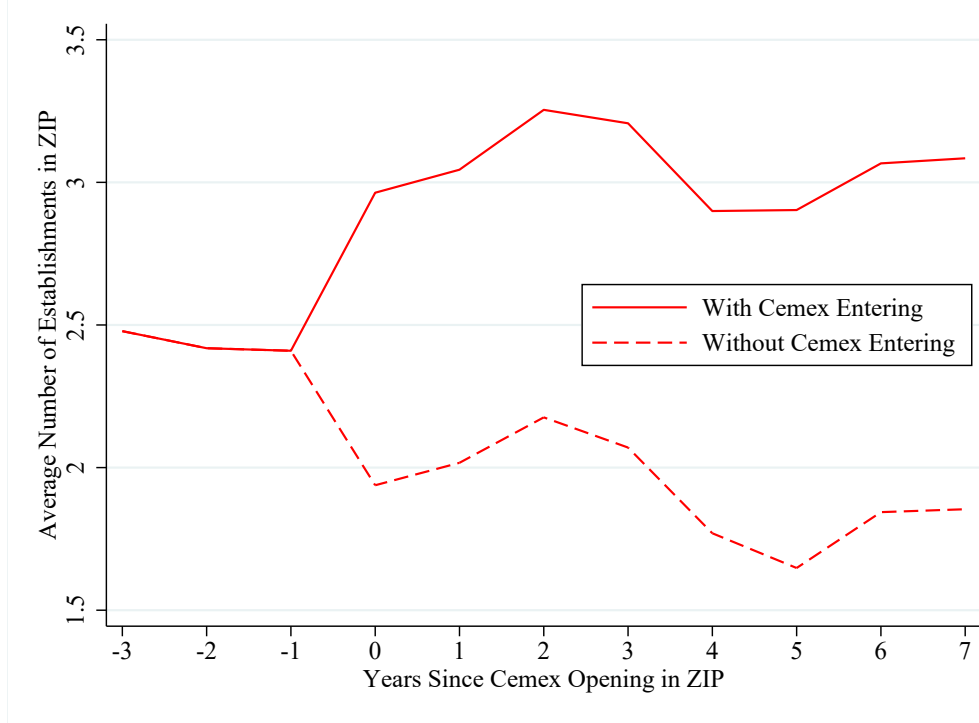


Figure 53: Removing Enterprises with Fewer than 10 Employees: Effect on concentration when Cemex enters a local market



Figure 54: Removing Enterprises with Fewer than 10 Employees: Effect on number of establishments when Cemex enters a local market



2.2 Alternative Measures of Concentration

While the figures in the main text all rely on the Herfindahl-Hirschman Index (HHI), here we replicate them for alternative measures of concentration. In particular, we look at the adjusted HHI, which modifies the HHI for the number of enterprises in a market, as well as the share of the top enterprise, as measured by sales, for each industry-geography grouping in every year. For reasons discussed in more detail below, we believe the HHI used in the main text remains the best measure of concentration; however, the results in this section show that all the findings in the main text still hold using these alternative measures.¹⁰

2.2.1 Adjusted HHI

Let $C_{i,g,t}^{I,G}$ denote the HHI for industry i in geography g in year t (using the level of industrial and geographic aggregations I and G , respectively), and let $N_{i,g,t}^{I,G}$ denote the number of enterprises in this industry-geography-year grouping. Then $C_{i,g,t}^{I,G} \in [1/N_{i,g,t}^{I,G}, 1]$. Because $C_{i,g,t}^{I,G}$ is bounded below by the inverse of the number of enterprises, comparisons of the HHI between groupings with different numbers of enterprises can be somewhat difficult. While

¹⁰When using alternative measures of concentration, we do not replicate Figures (12), (16), and (18) in the main text as those figures are not dependent on the measure of concentration we use.

looking at changes in concentration rather than levels, as we do in the main text, allows for efficient comparisons between groups with different numbers of enterprises, such comparisons can also be made using the adjusted Herfindahl-Hirschman Index, which for any pair with more than 1 enterprise can take on any value between 0 and 1, inclusive. In particular, the adjusted HHI of industry i in geography g in year t , $\tilde{C}_{i,g,t}^{I,G}$, can be defined as

$$\tilde{C}_{i,g,t}^{I,G} = \begin{cases} \frac{C_{i,g,t}^{I,G} - \frac{1}{N_{i,g,t}^{I,G}}}{1 - \frac{1}{N_{i,g,t}^{I,G}}} & N_{i,g,t}^{I,G} > 1 \\ 1 & N_{i,g,t}^{I,G} = 1 \end{cases} . \quad (1)$$

For groupings with a very large numbers of enterprises (for example, most groupings with a geography defined at the national level), the adjusted and unadjusted HHIs will be very close. However, groupings defined at the ZIP code level typically have a small number of enterprises, leading to potentially large differences between the adjusted and unadjusted measures. In such cases, the unadjusted HHI is preferable because, in some sense, the number of an enterprises in a market itself partly determines concentration. That is, a market with, say, 3 enterprises is arguably more concentrated than a market with 10, even if all enterprises have equal sales in both markets.

The figures below replicate the figures in the main text using changes in the adjusted HHI.

Figure 55: Adjusted HHI: Diverging economy-wide national and local concentration trends

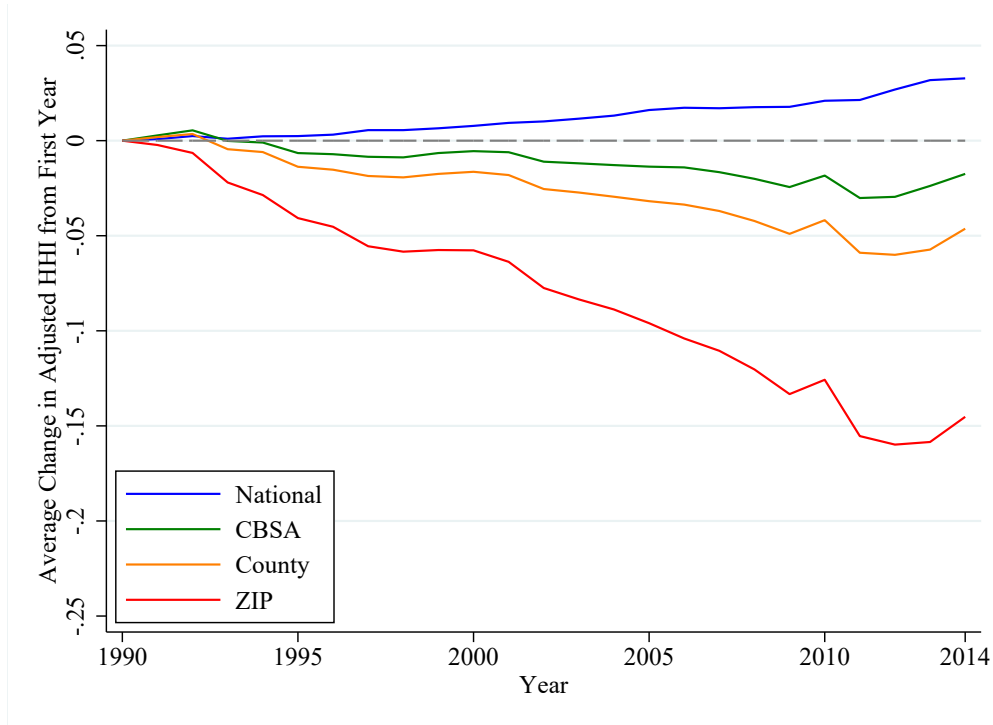


Figure 56: Adjusted HHI: Diverging division-level national and local concentration trends

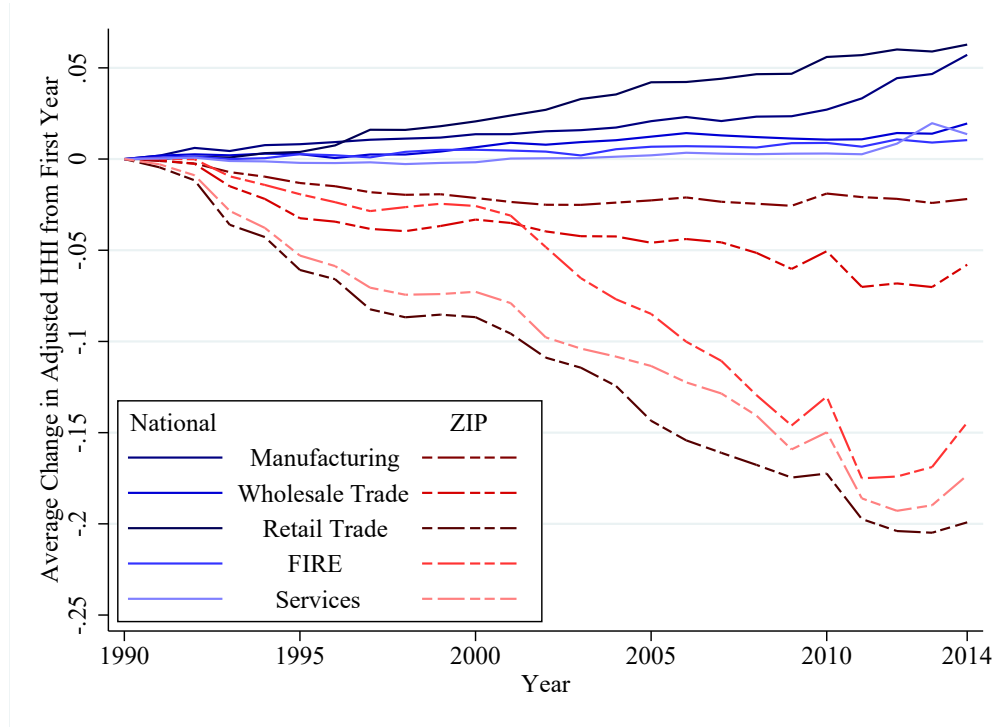


Figure 57: Adjusted HHI: Diverging economy-wide trends in sales concentration

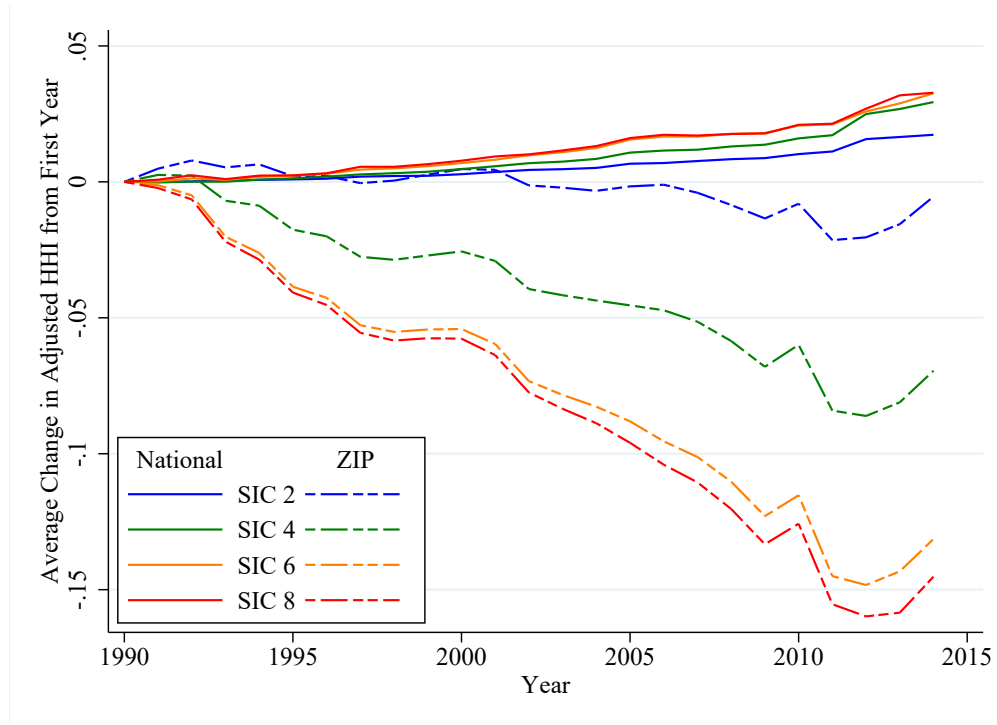


Figure 58: Adjusted HHI: Diverging economy-wide trends in employment concentration

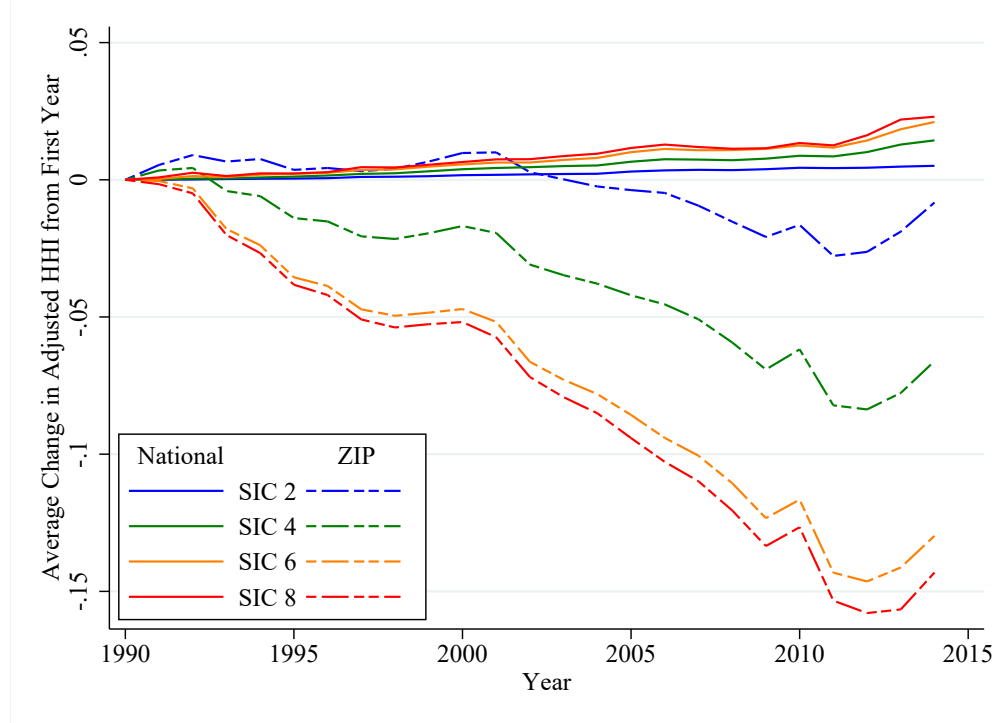


Figure 59: Adjusted HHI: Diverging economy-wide national and local concentration trends with a balanced panel

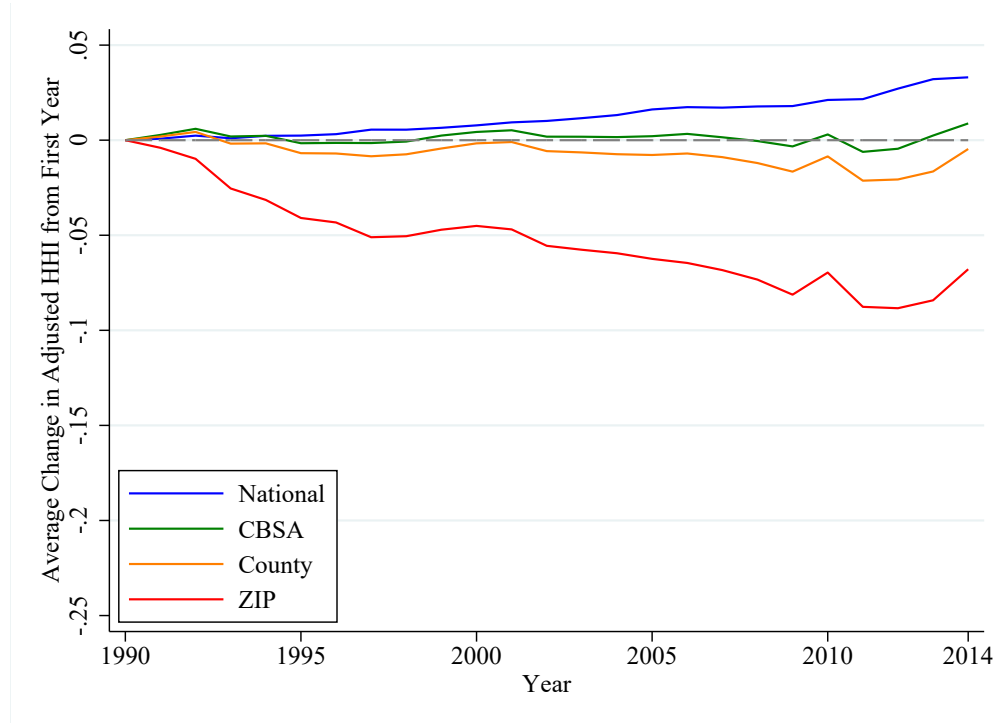


Figure 60: Adjusted HHI: Diverging division-level national and local concentration trends with a balanced panel

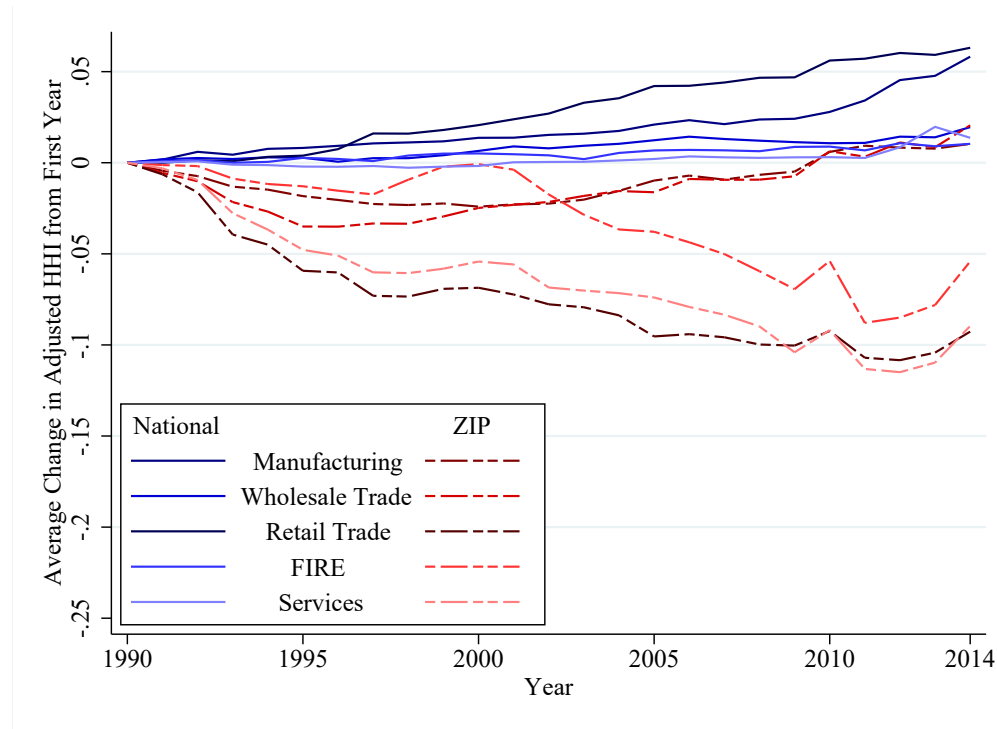


Figure 61: Adjusted HHI: Pervasive diverging trends across 2-digit sectors

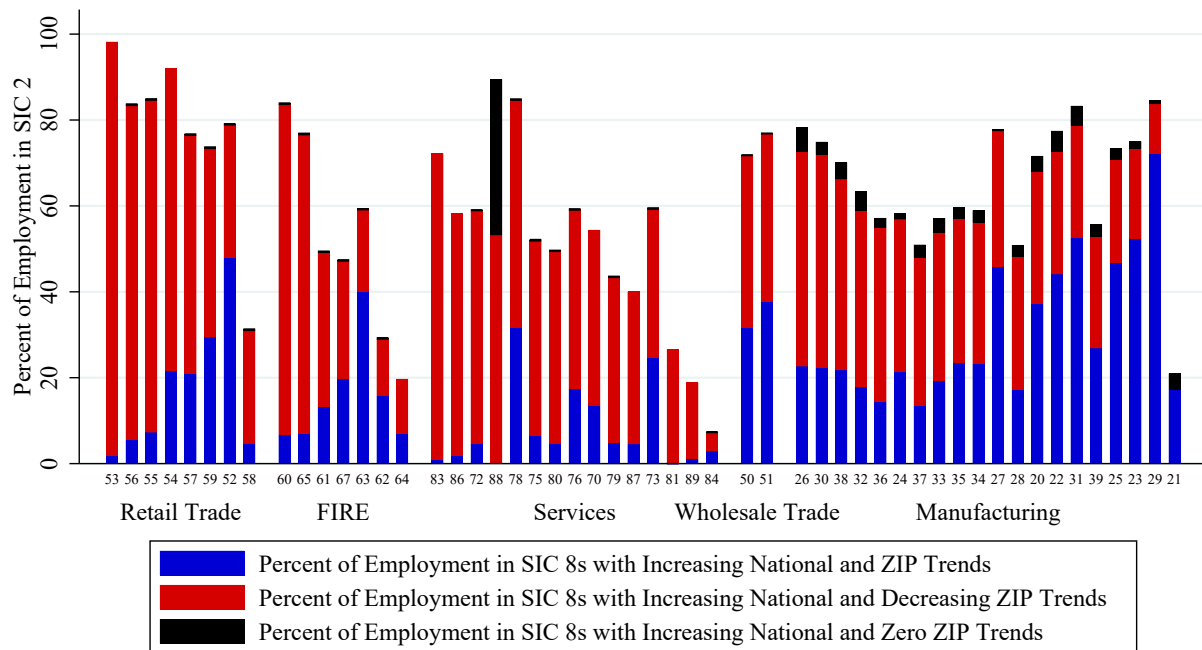


Figure 62: Adjusted HHI: The role of top enterprises in national and local concentration trends in diverging industries

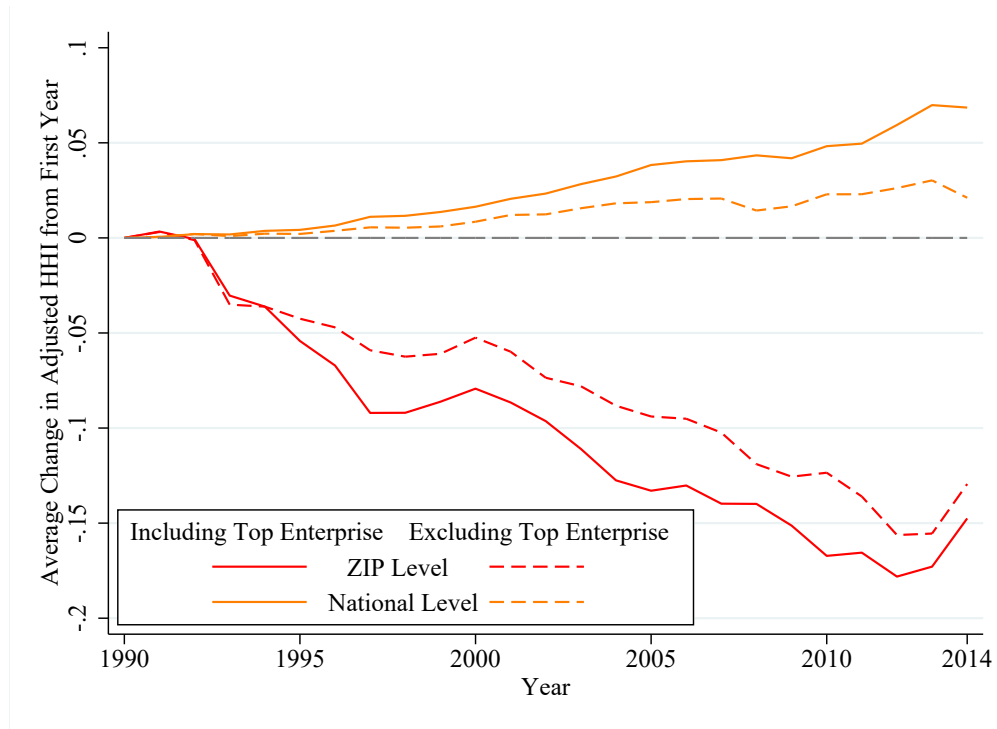


Figure 63: Adjusted HHI: The role of top enterprises in national and local concentration trends in concentrating industries

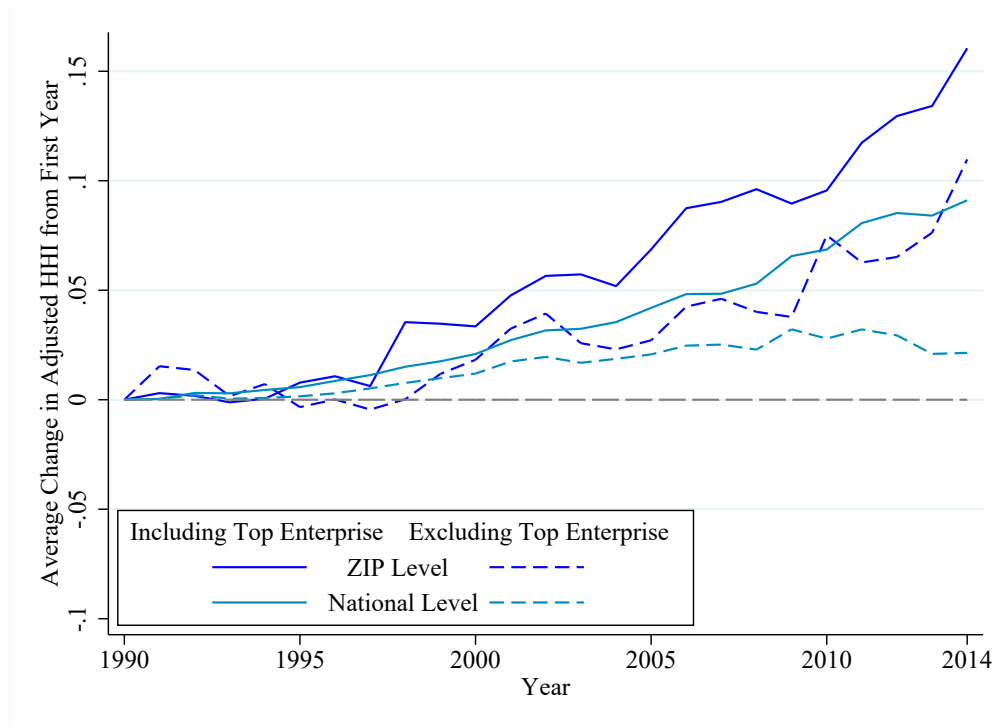


Figure 64: Adjusted HHI: Effect on concentration when the second and third largest enterprises enter a market in diverging industries

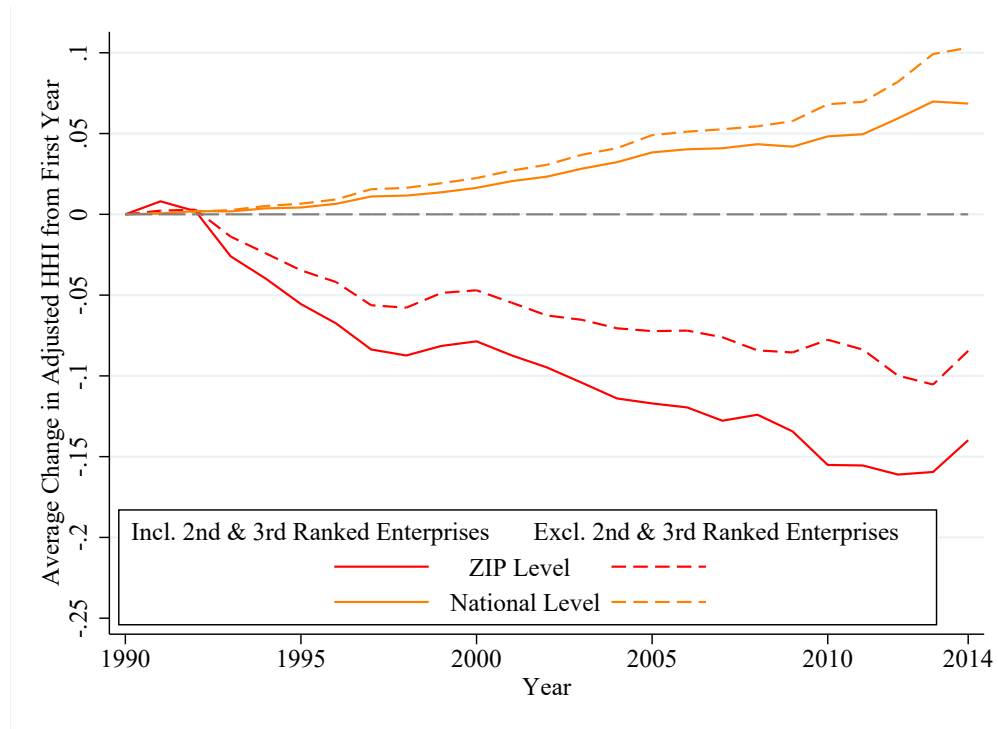


Figure 65: Adjusted HHI: Effect on concentration when the second and third largest enterprises enter a market in concentrating industries

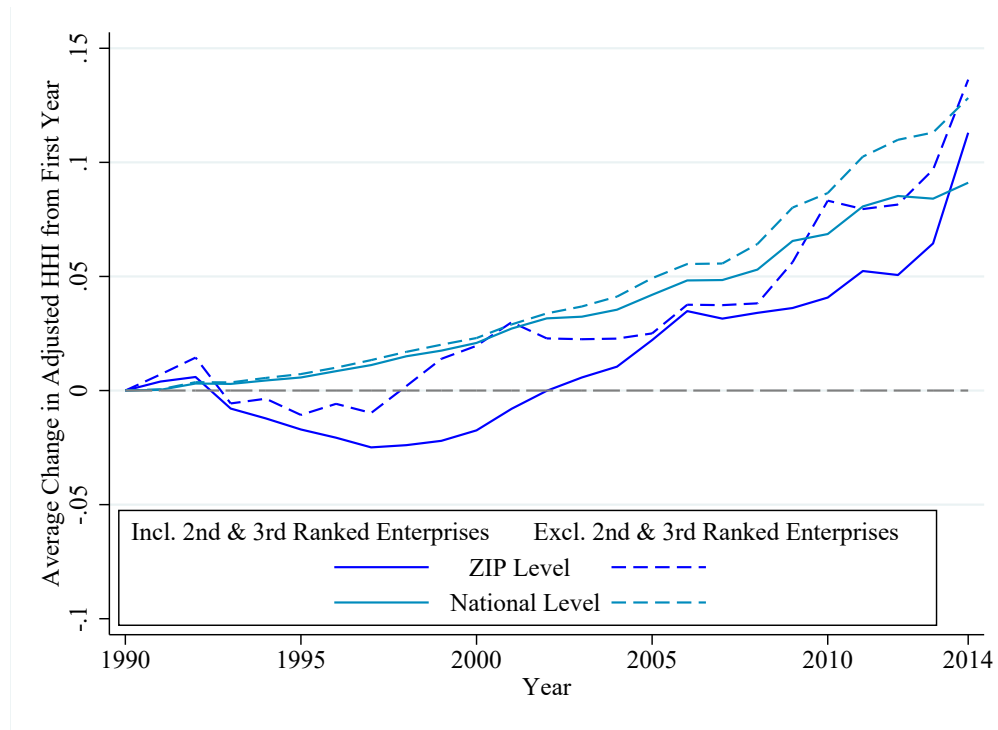


Figure 66: Adjusted HHI: Effect on concentration when a top enterprise enters a local market in diverging industries

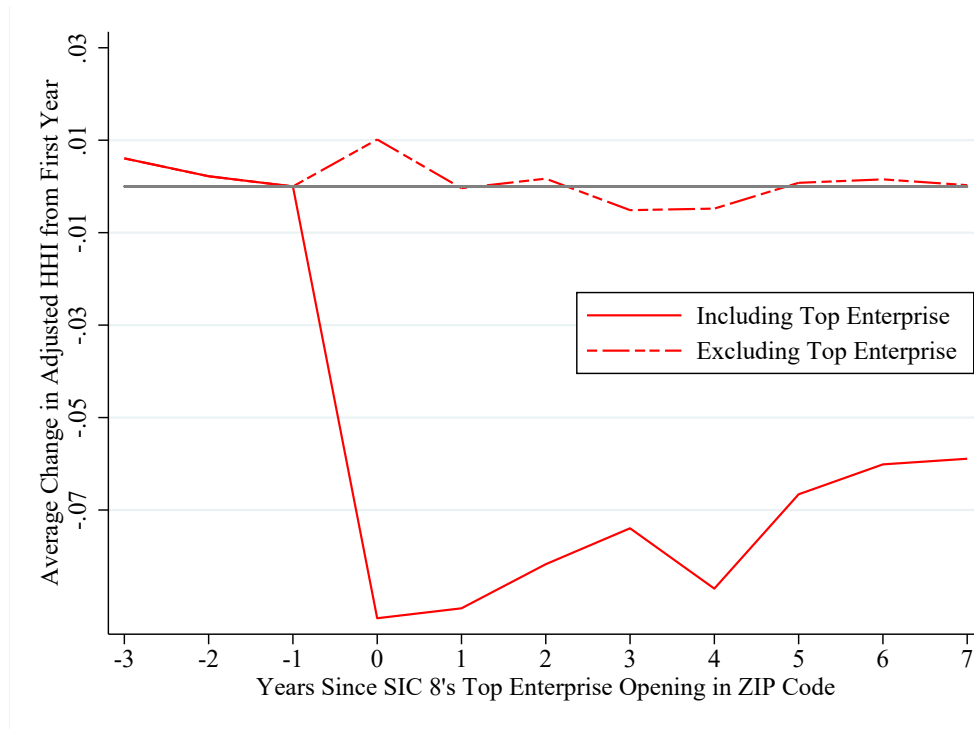


Figure 67: Adjusted HHI: Effect on concentration when a top enterprise enters a local market in concentrating industries

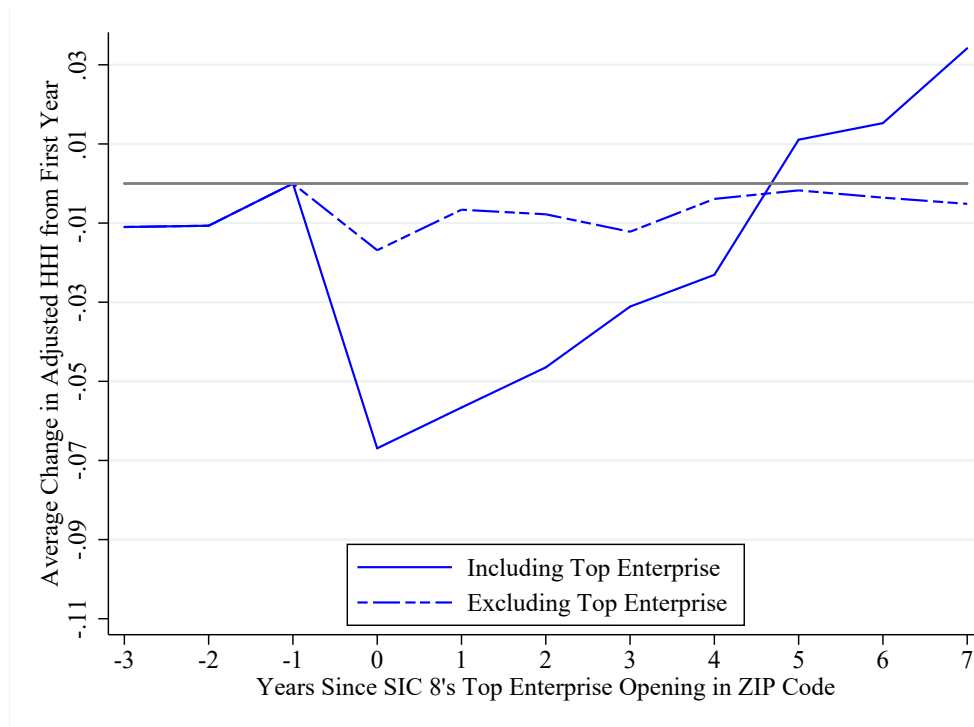


Figure 68: Adjusted HHI: Effect on concentration when Walmart enters a local market



Figure 69: Adjusted HHI: Effect on concentration when Cemex enters a local market



2.2.2 Share of Top Enterprise

Another common measure of market concentration is the concentration ratio, which looks at the total market share accounted for by a certain number of top firms in a market. Here, we measure concentration in a geography-industry-year grouping as that pair's share of total sales in the top enterprise measured by sales. This share will obviously equal 1 for any geography-industry-year groupings with only one enterprise.

We prefer the HHI as a measure of concentration because the HHI captures in a more precise way the entire distribution of market shares. The share of the top enterprise fails to capture any variation in the structure of market shares among enterprises beyond the top enterprise. For instance, this measure would conclude that among two markets in which the top enterprises control 60% of total sales, a market in which there is only one other enterprise comprising the remaining 40% of sales is just as concentrated as one in which ten enterprises each have 4% of sales. In contrast, the HHI would indicate considerably more concentration in the first market.

Figure 70: Share of Top Enterprise: Diverging economy-wide national and local concentration trends

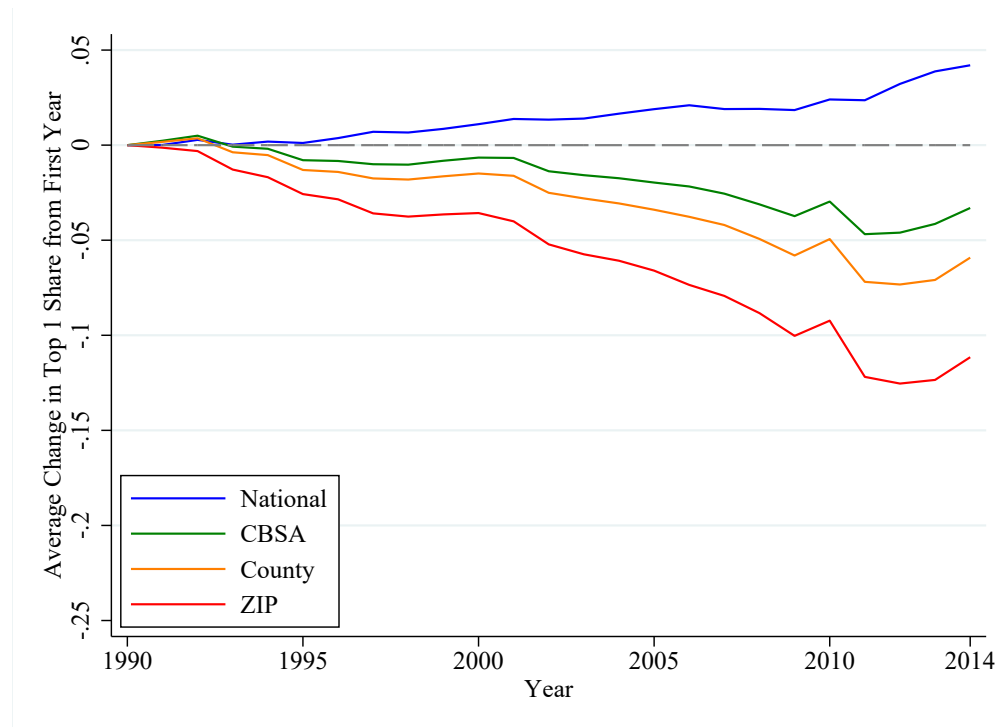


Figure 71: Share of Top Enterprise: Diverging division-level national and local concentration trends

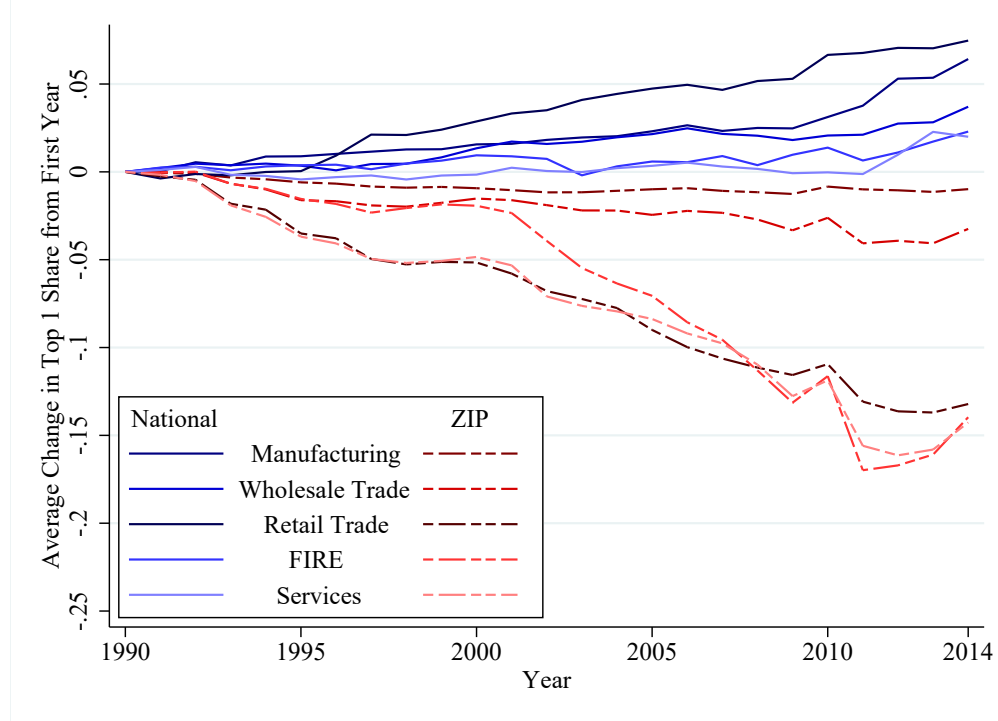


Figure 72: Share of Top Enterprise: Diverging economy-wide trends in sales concentration

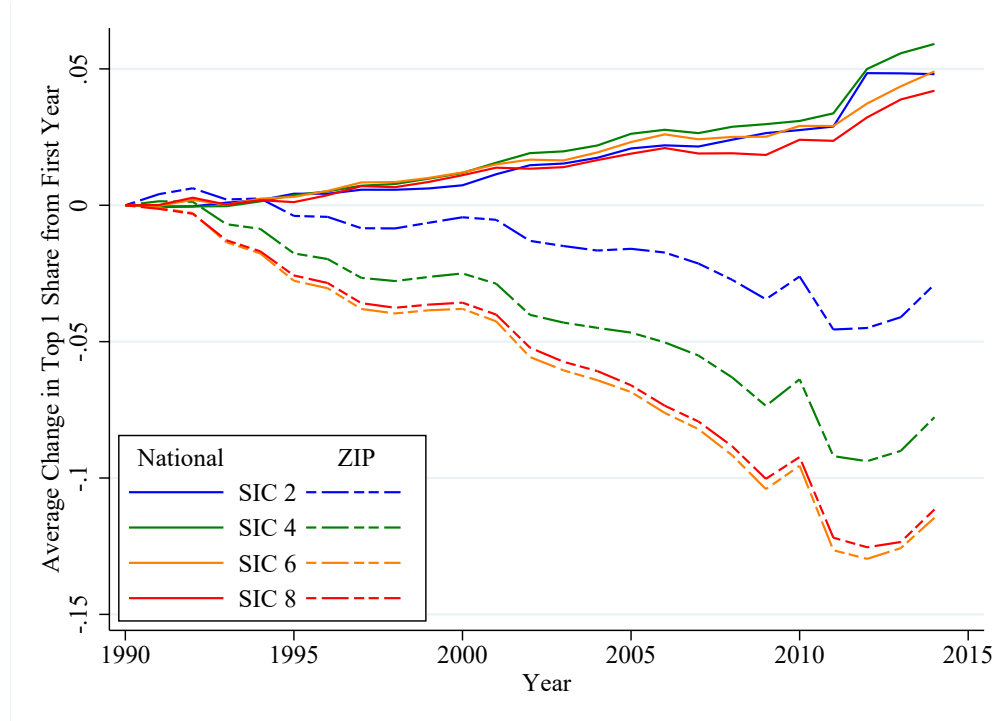


Figure 73: Share of Top Enterprise: Diverging economy-wide trends in employment concentration

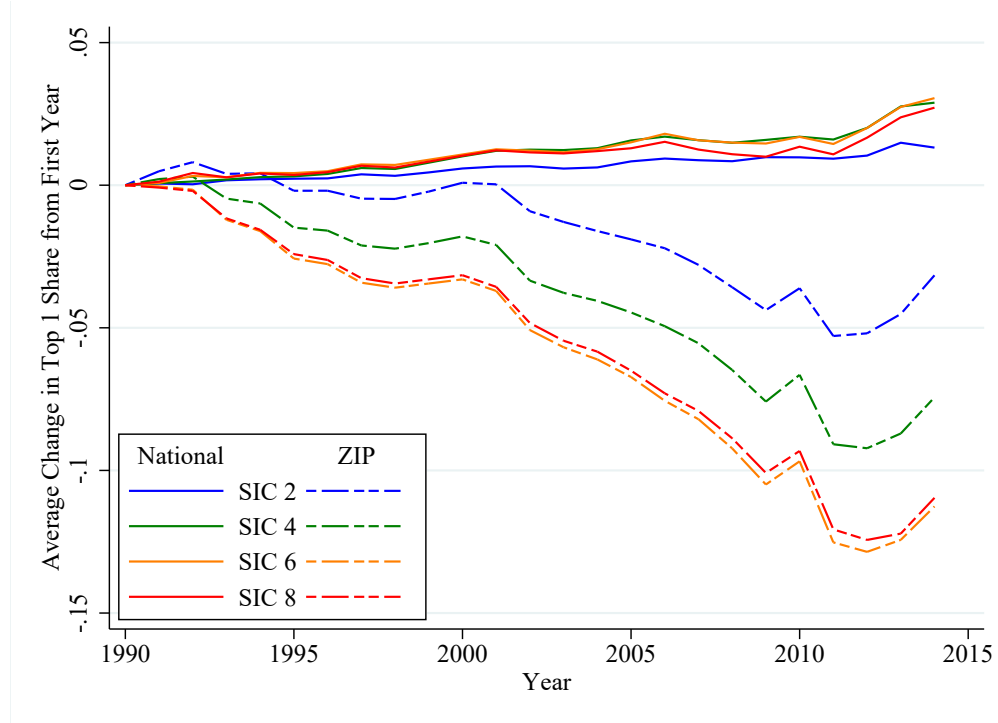


Figure 74: Share of Top Enterprise: Diverging economy-wide national and local concentration trends with a balanced panel

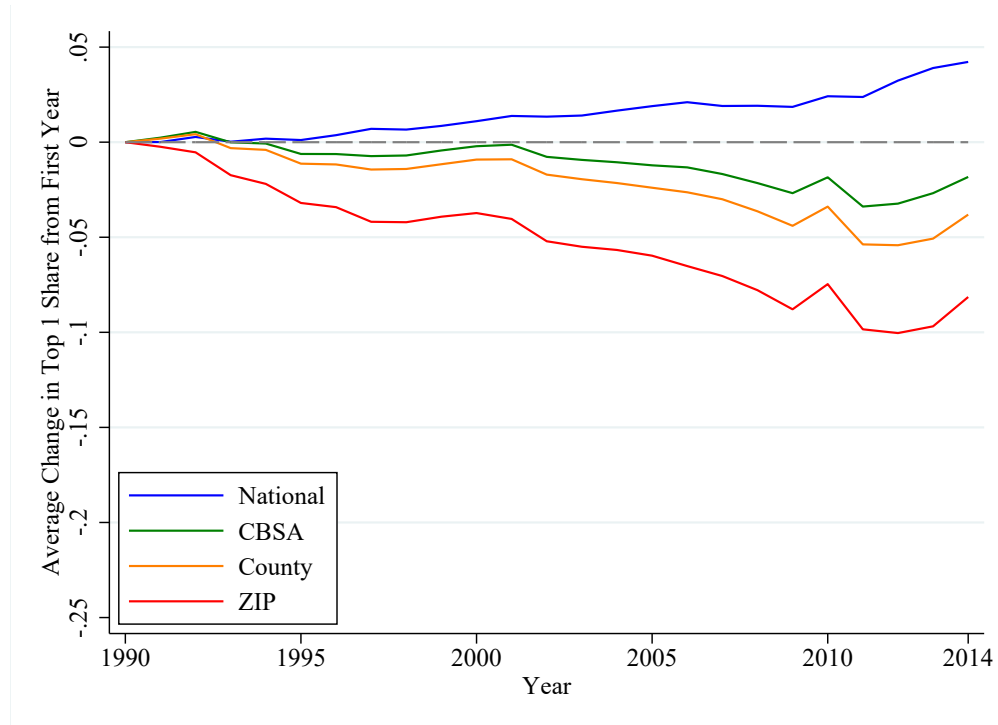


Figure 75: Share of Top Enterprise: Diverging division-level national and local concentration trends with a balanced panel

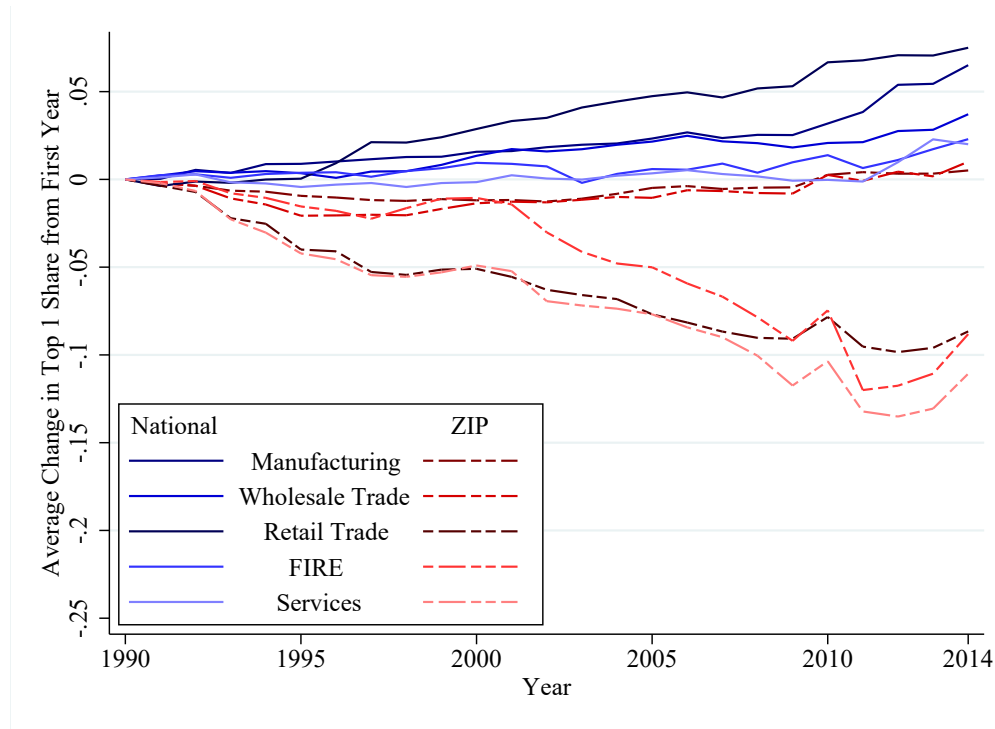


Figure 76: Share of Top Enterprise: Pervasive diverging trends across 2-digit sectors

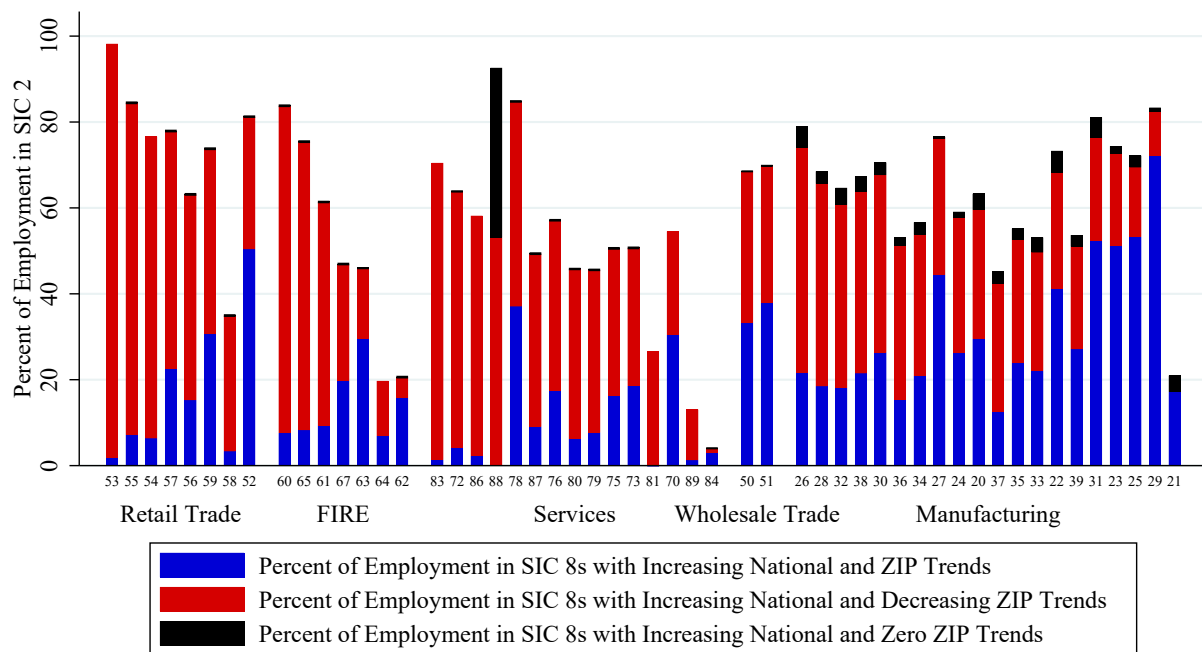


Figure 77: Share of Top Enterprise: The role of top enterprises in national and local concentration trends in diverging industries

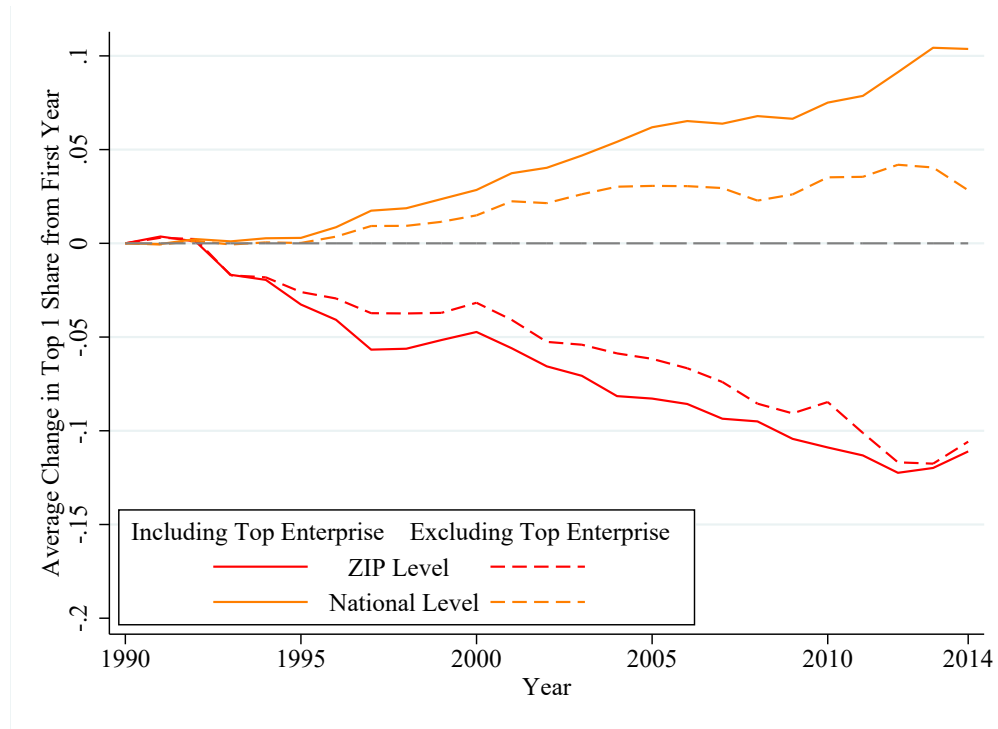


Figure 78: Share of Top Enterprise: The role of top enterprises in national and local concentration trends in concentrating industries

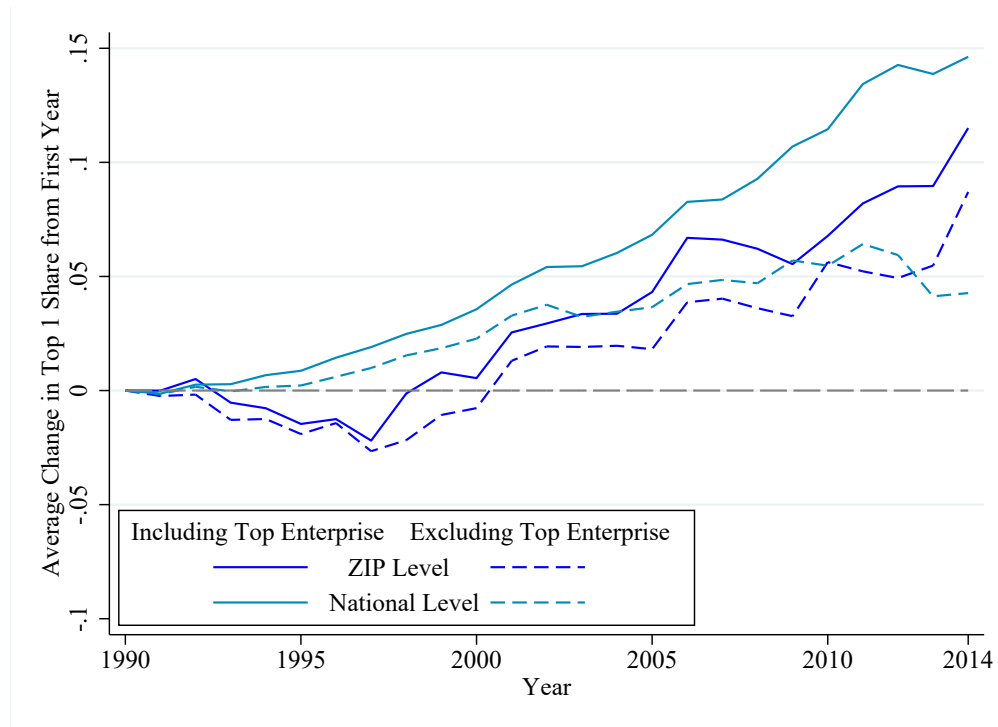


Figure 79: Share of Top Enterprise: The role of the second and third largest enterprises in diverging industries

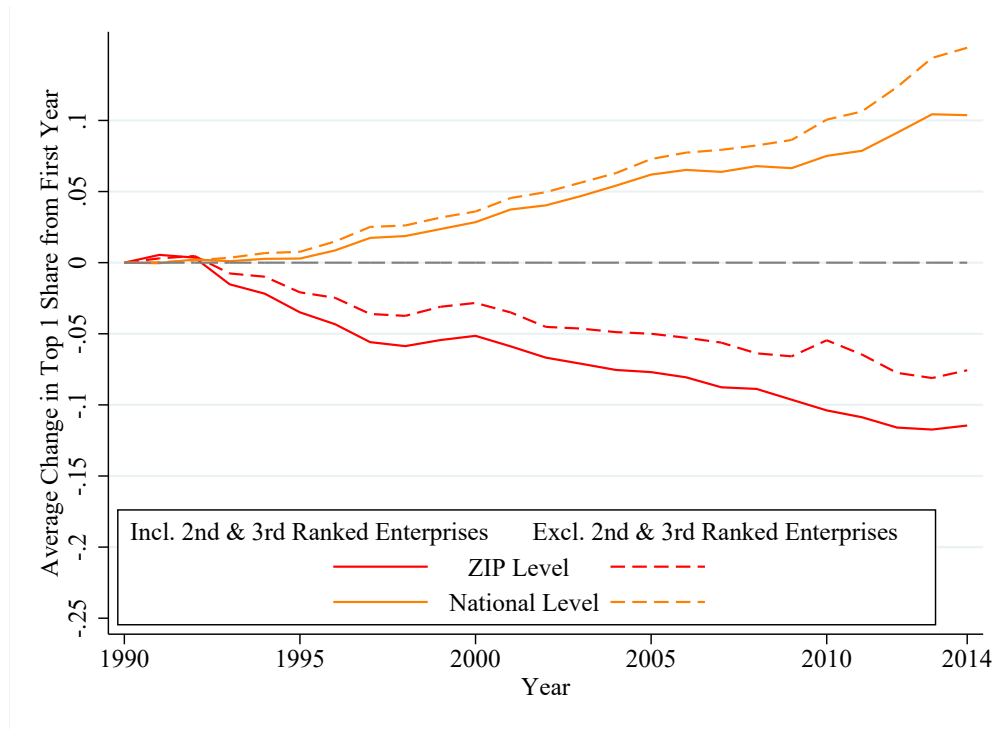


Figure 80: Share of Top Enterprise: The role of the second and third largest enterprises in concentrating industries

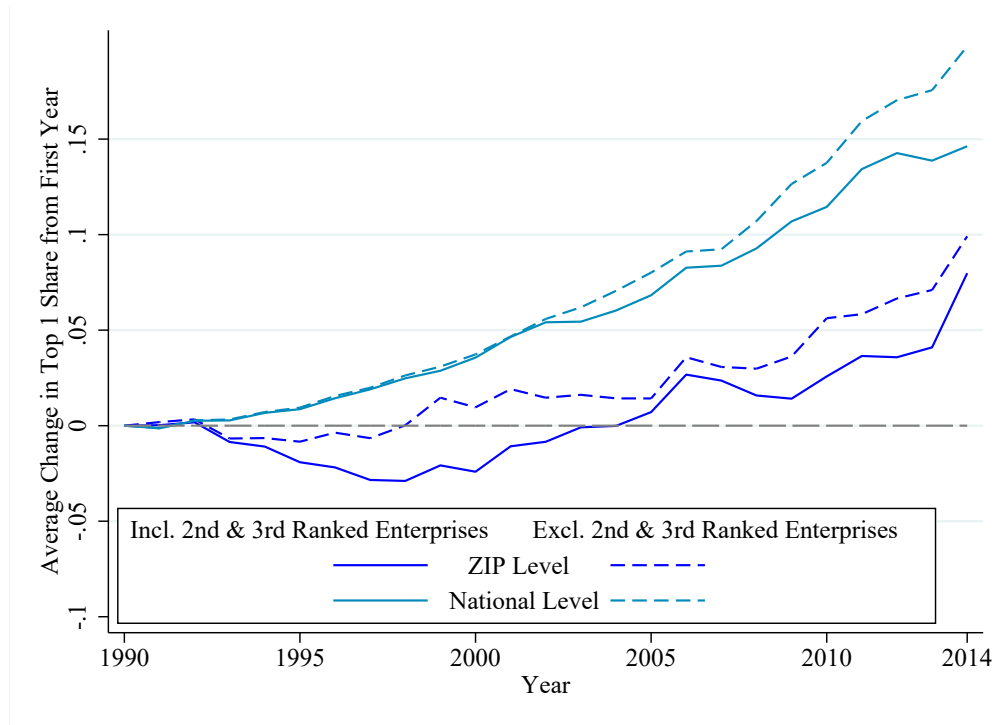


Figure 81: Share of Top Enterprise: Effect on concentration when a top enterprise enters a local market in diverging industries

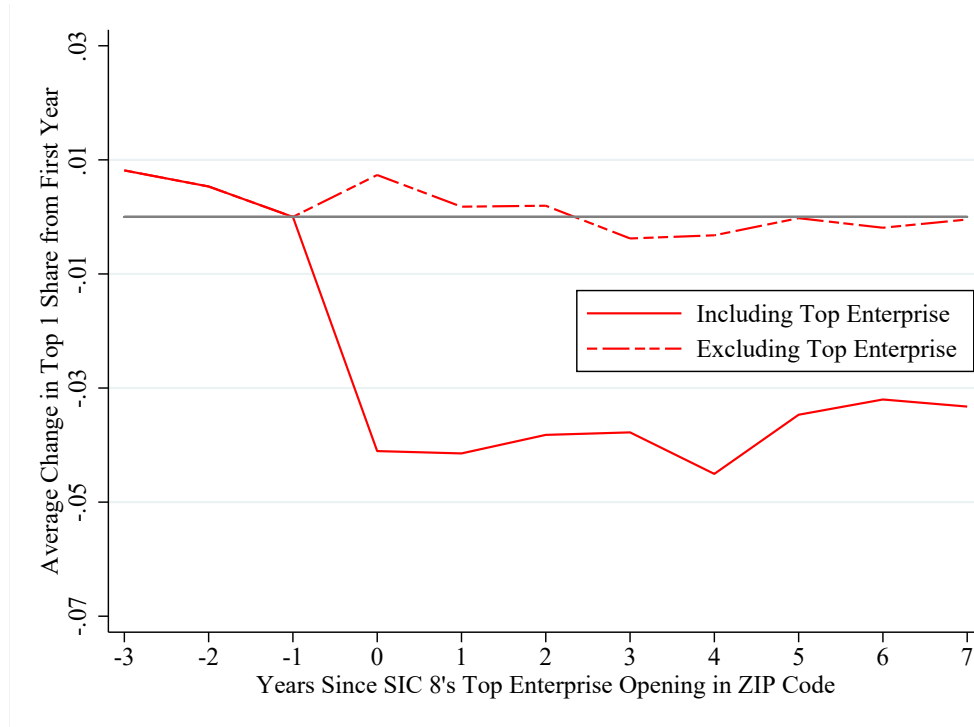


Figure 82: Share of Top Enterprise: Effect on concentration when a top enterprise enters a local market in concentrating industries



Figure 83: Share of Top Enterprise: Effect on concentration when Walmart enters a local market



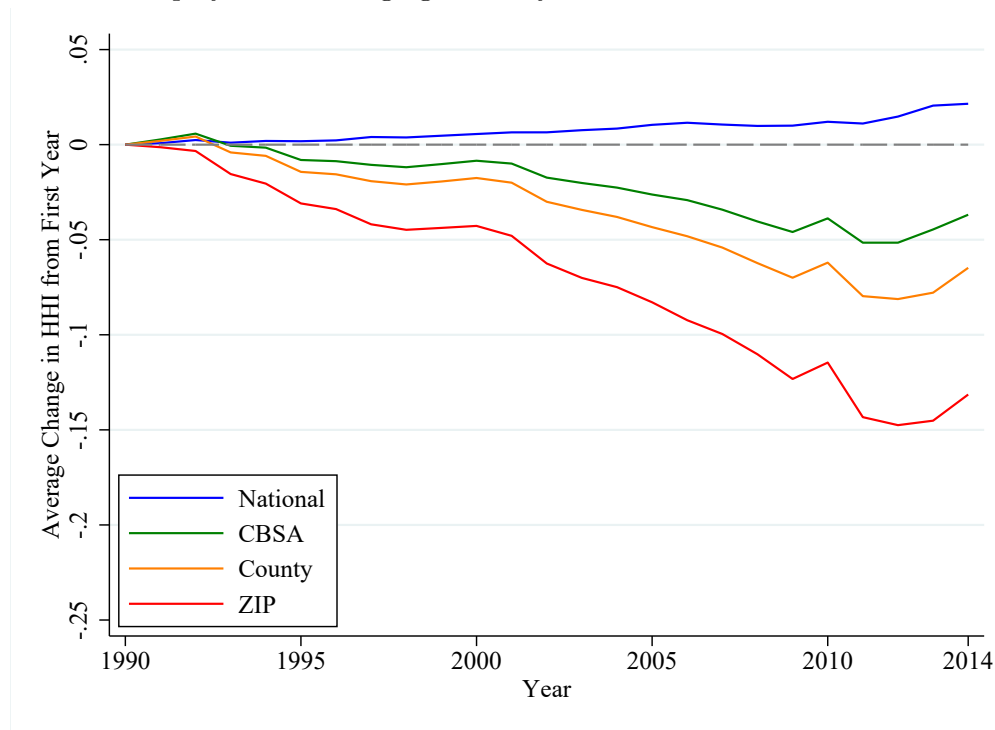
Figure 84: Share of Top Enterprise: Effect on concentration when Cemex enters a local market



2.3 Employment Concentration

In the main text, we measure concentration in terms of sales in each geography-industry pair. In this section, we replicate the figures in the main text where, for each geography-industry pair in each year, we instead calculate the HHI of employment, rather than sales.¹¹

Figure 85: HHI of Employment: Diverging economy-wide national and local concentration trends



¹¹When measuring the HHI of employment, we do not replicate Figures (12), (16), and (18) in the main text as those figures are not dependent on which measure for which we calculate concentration.

Figure 86: HHI of Employment: Diverging division-level national and local concentration trends

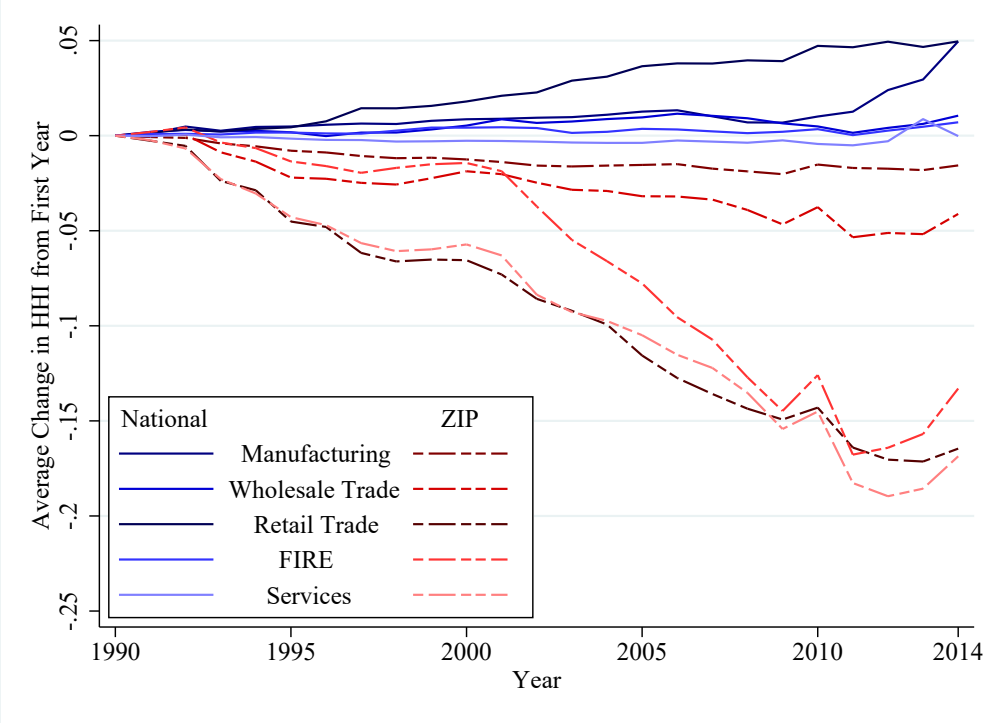


Figure 87: HHI of Employment: Diverging economy-wide national and local concentration trends with a balanced panel

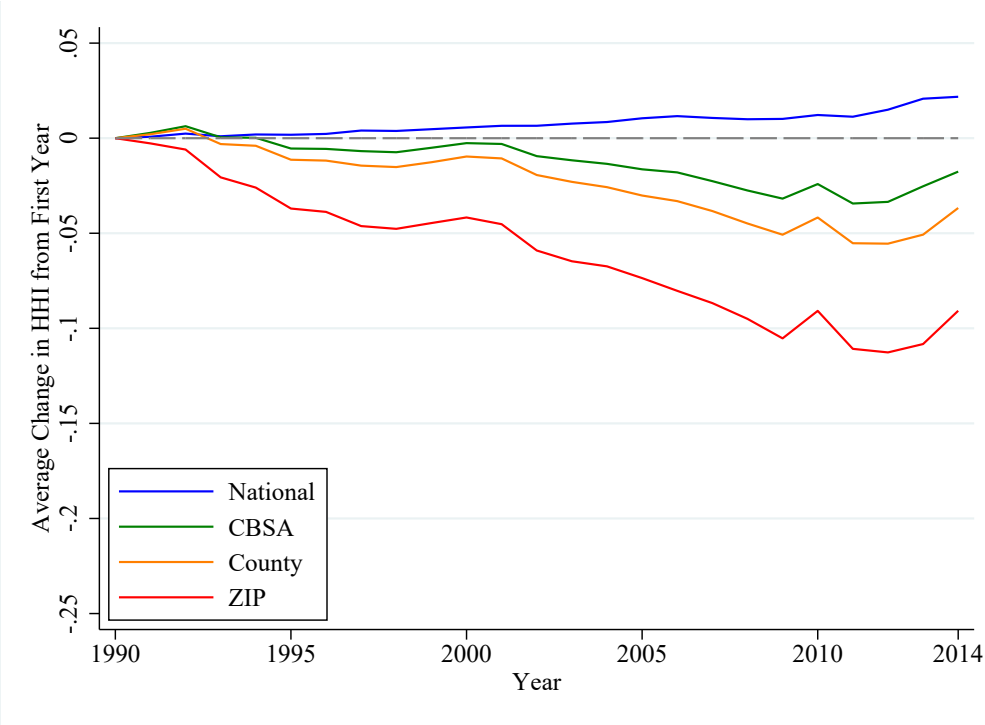


Figure 88: HHI of Employment: Diverging division-level national and local concentration trends with a balanced panel

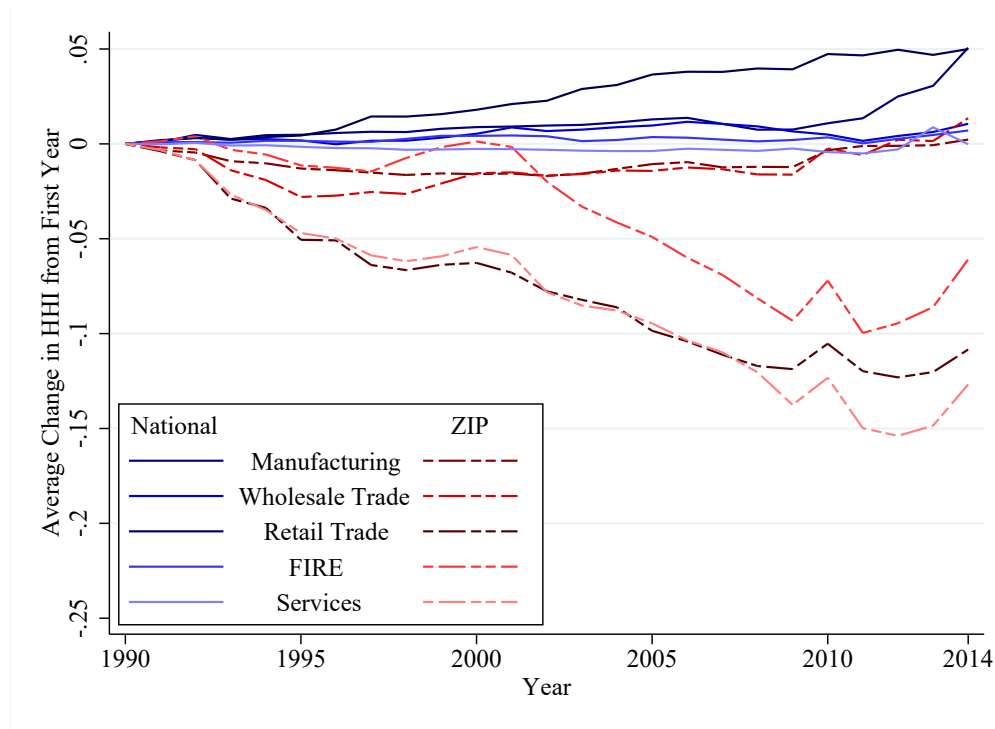


Figure 89: HHI of Employment: Pervasive diverging trends across 2-digit sectors

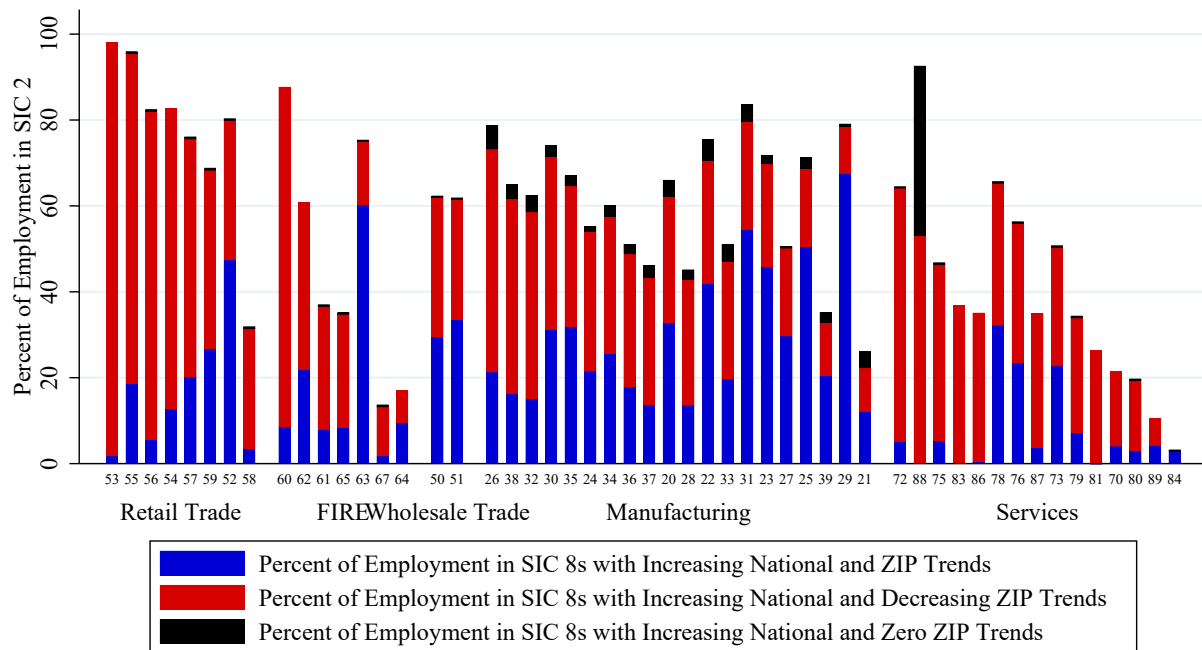


Figure 90: HHI of Employment: The role of top enterprises in national and local concentration trends in diverging industries

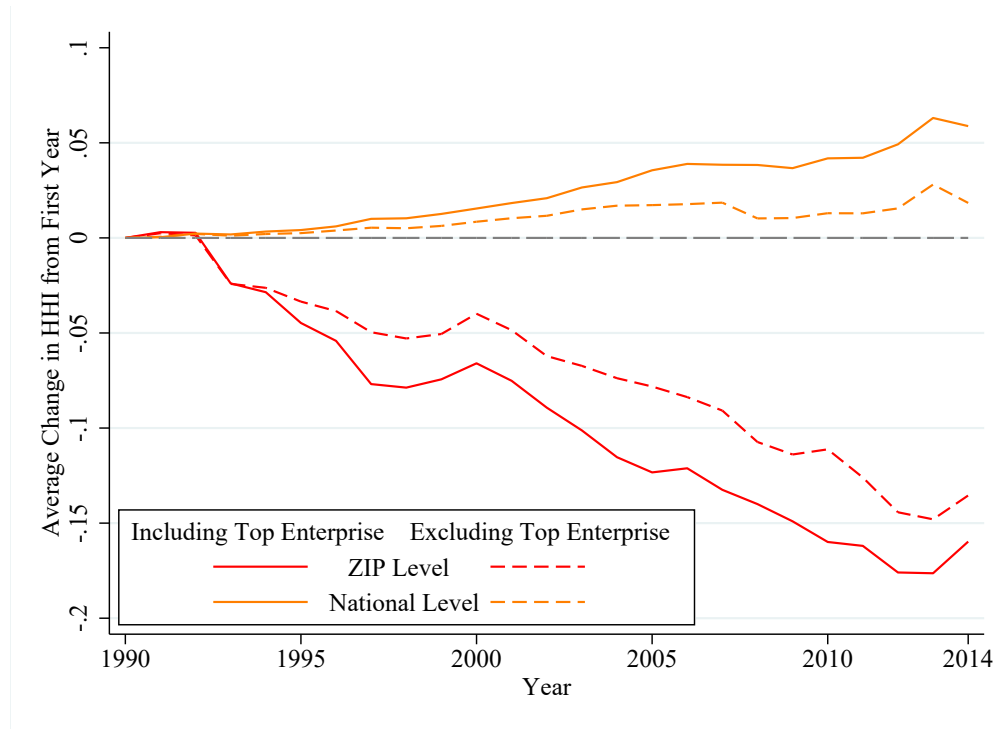


Figure 91: HHI of Employment: The role of top enterprises in national and local concentration trends in concentrating industries

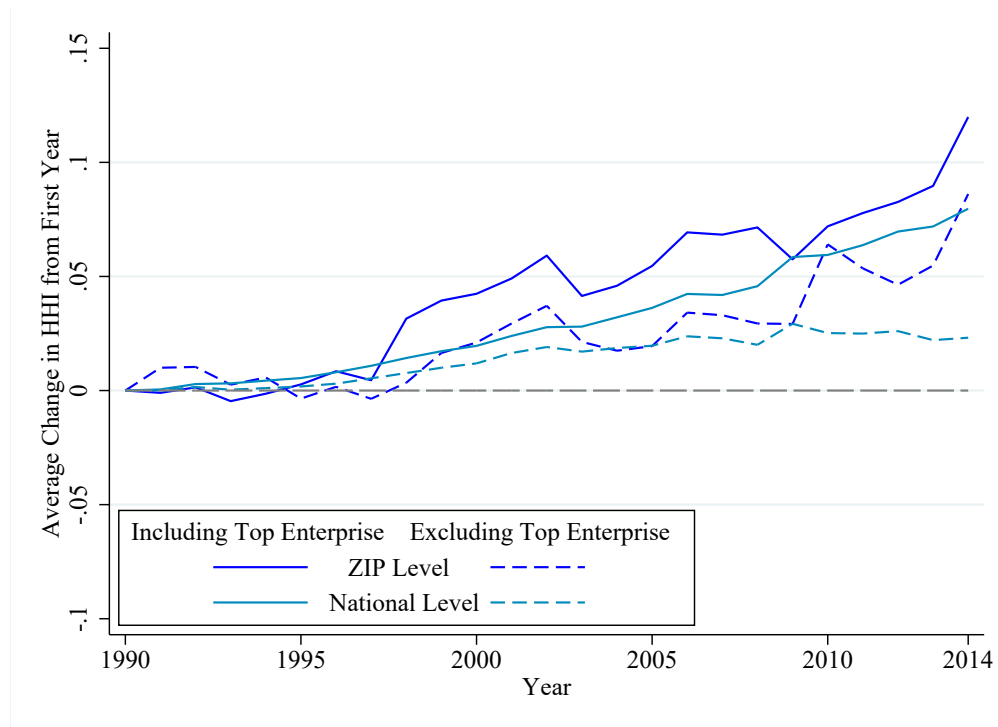


Figure 92: HHI of Employment: Effect on concentration when the second and third largest enterprises enter a market in diverging industries

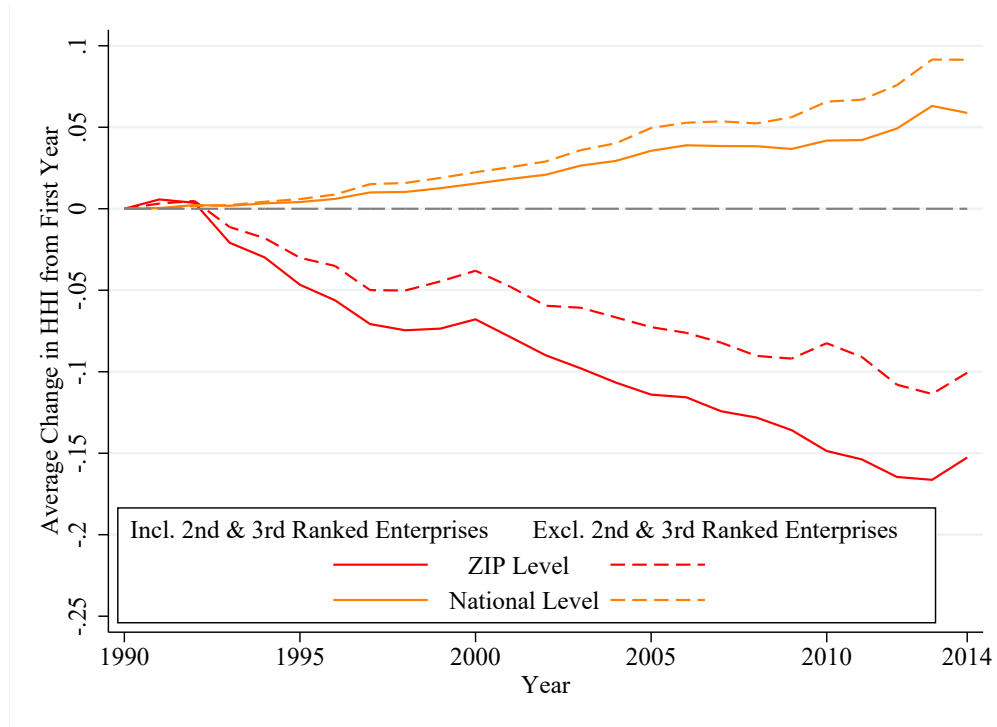


Figure 93: HHI of Employment: The role of the second and third largest enterprises in concentrating industries

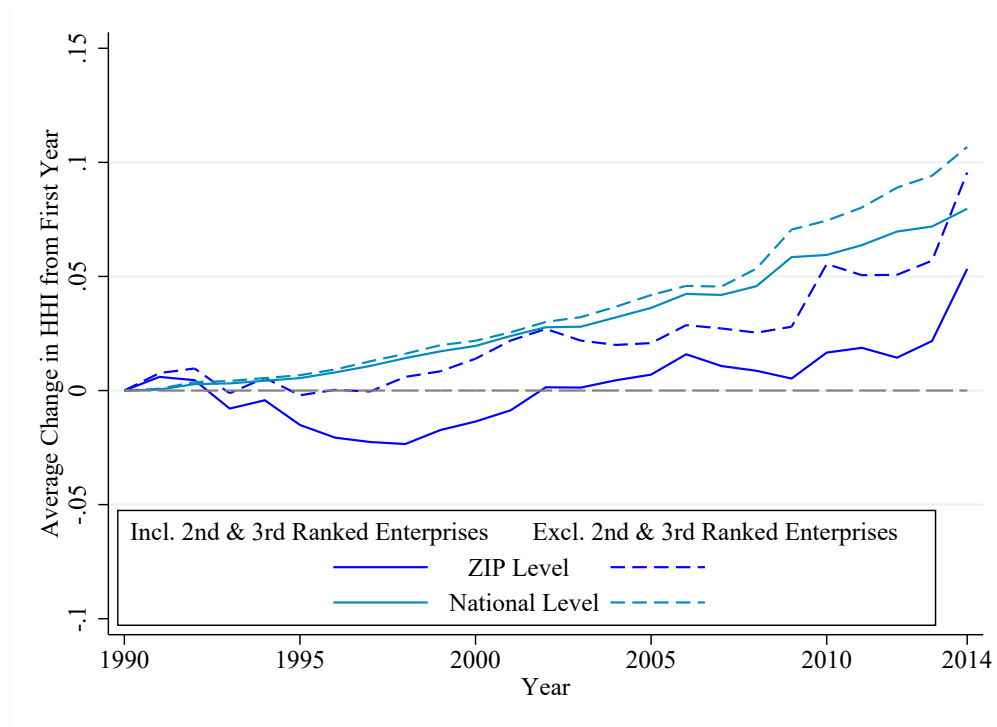


Figure 94: HHI of Employment: Effect on concentration when a top enterprise enters a local market in diverging industries

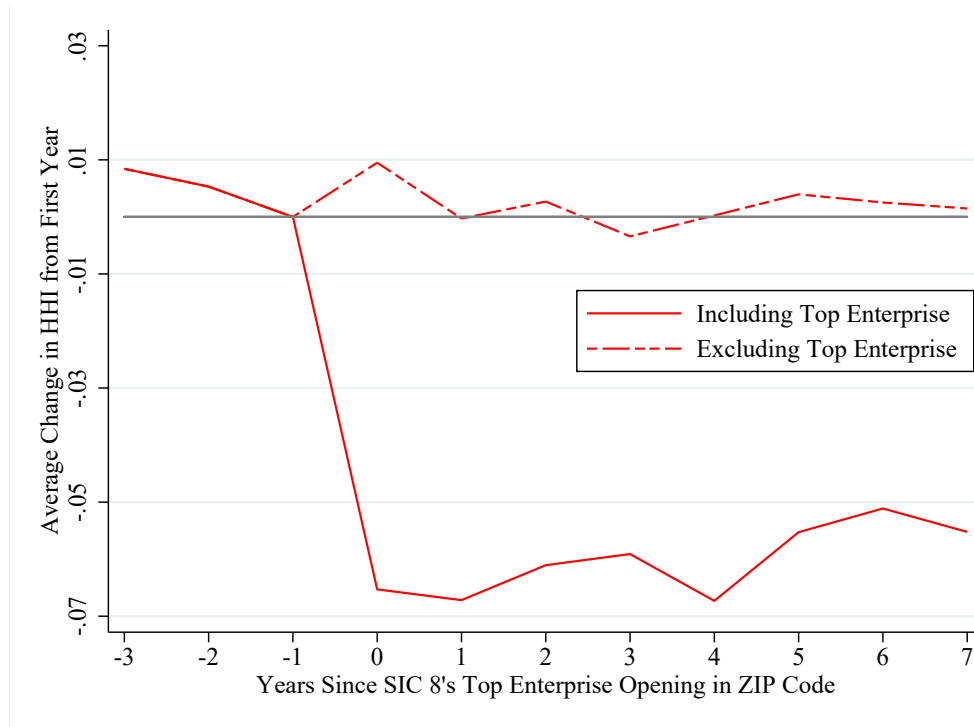


Figure 95: HHI of Employment: Effect on concentration when a top enterprise enters a local market in concentrating industries

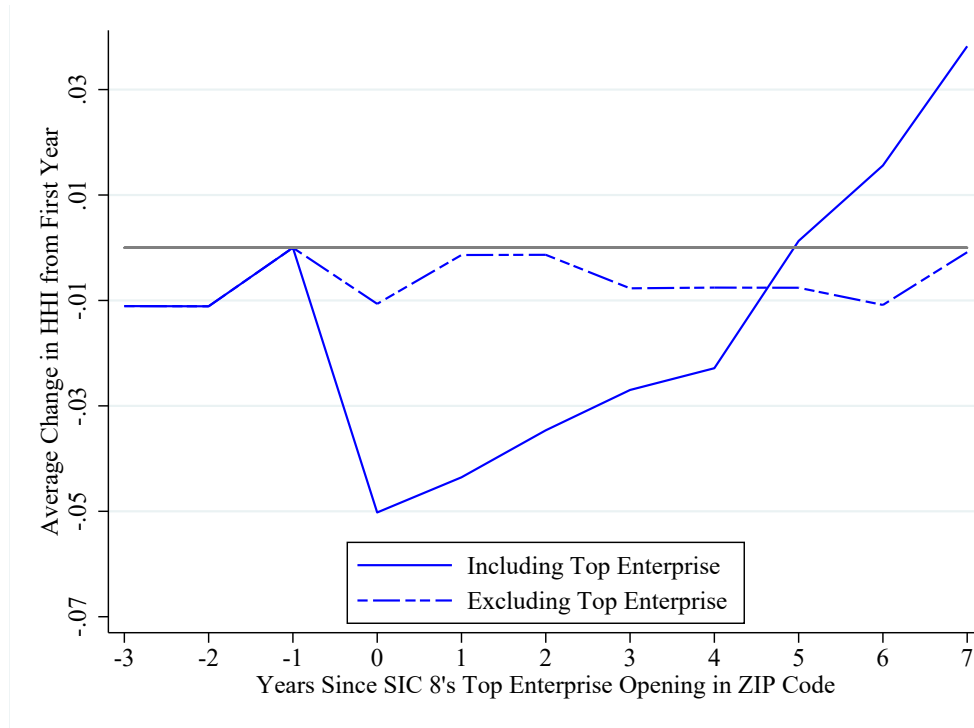


Figure 96: HHI of Employment: Effect on concentration when Walmart enters a local market

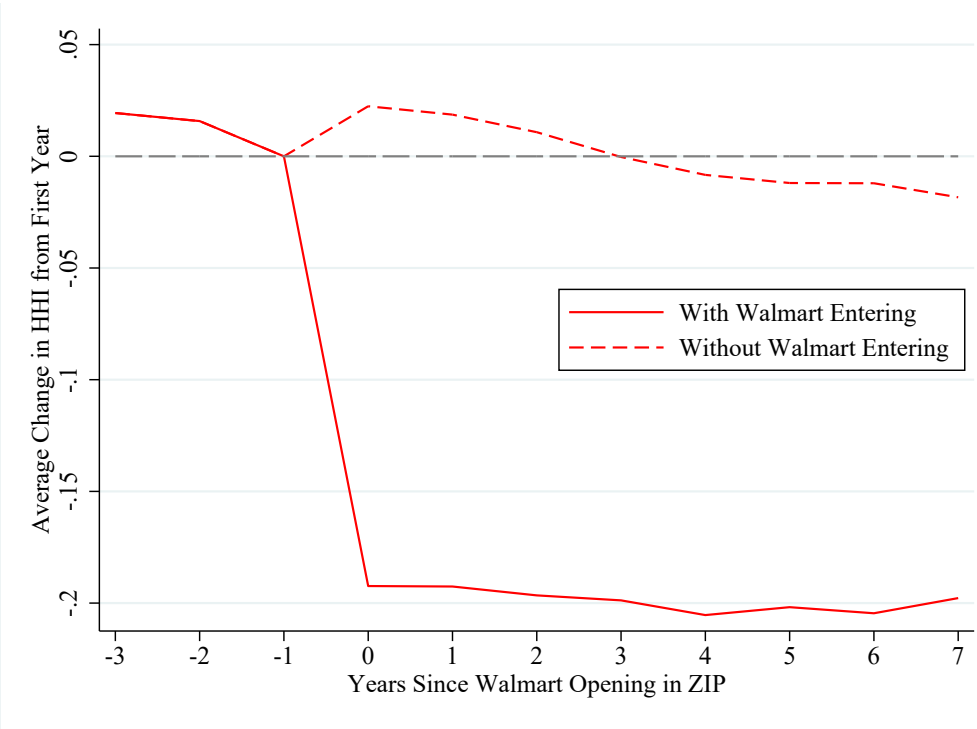
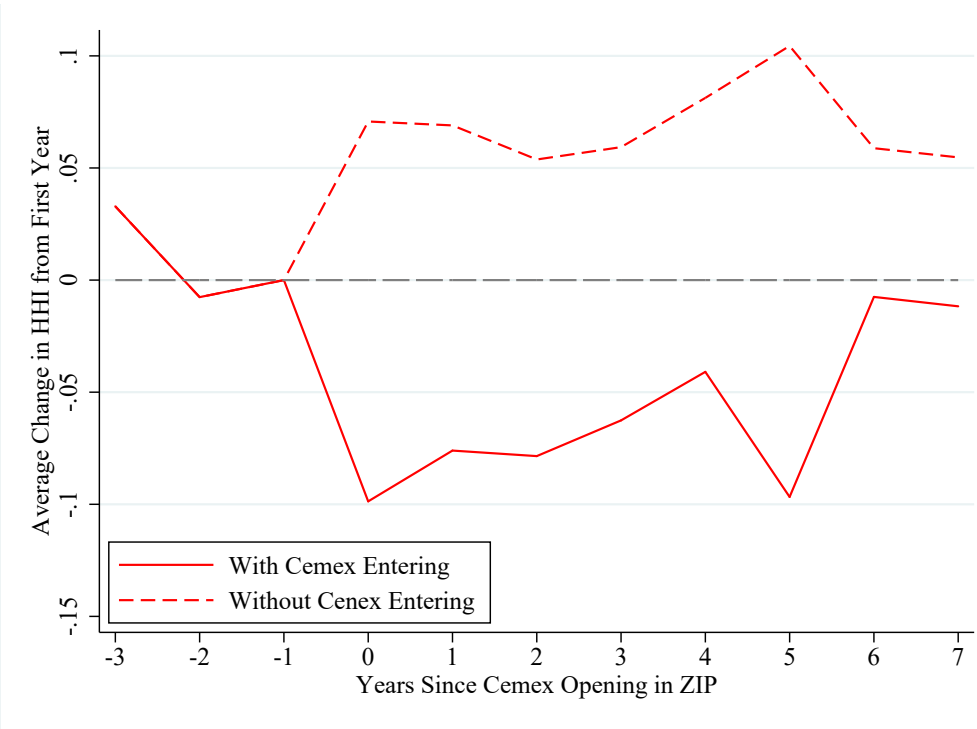


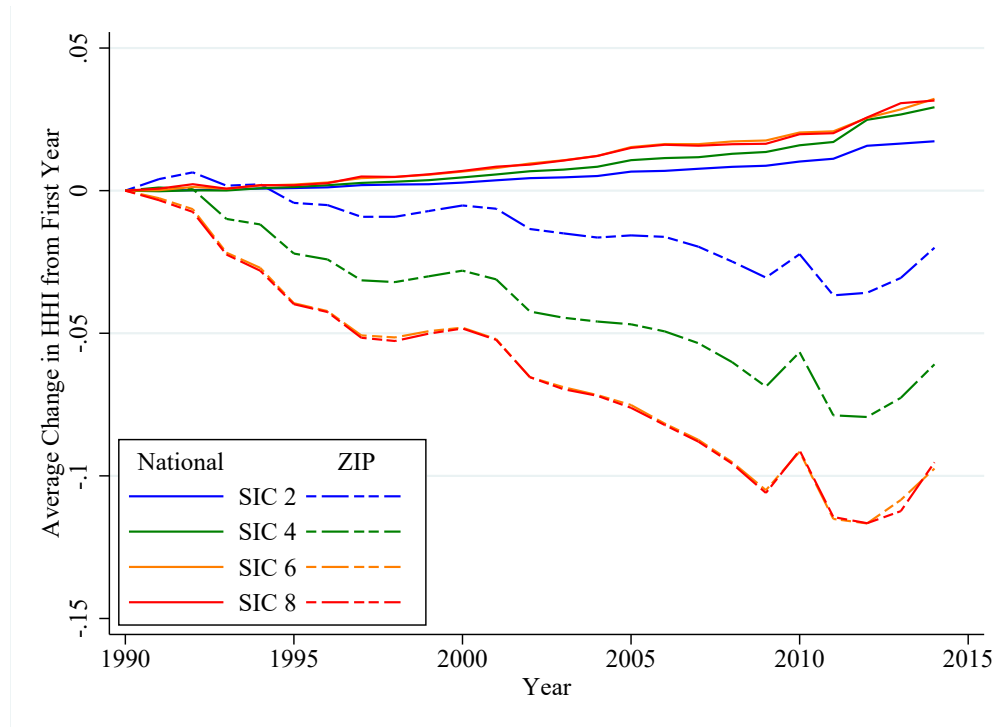
Figure 97: HHI of Employment: Effect on concentration when Cemex enters a local market



2.4 Using a Balanced Panel

In the main text, in every year we consider all industry-geography pairs which have at least one establishment present. Because establishments are entering and exiting local markets over time, some industry-geography pairs may have establishments present in some years but not others. In this section, we reproduce the figures in the main text considering only those industry-geography pairs which have at least one establishment present in all 25 years in our sample.¹²

Figure 98: Balanced Panel: Diverging economy-wide trends in sales concentration



¹²In this section, we do not reproduce Figures (1), (2), (5), and (6) in the main text as Figures (5) and (6) already reproduce Figures (1) and (2), respectively, with a balanced panel.

Figure 99: Balanced Panel: Diverging economy-wide trends in employment concentration

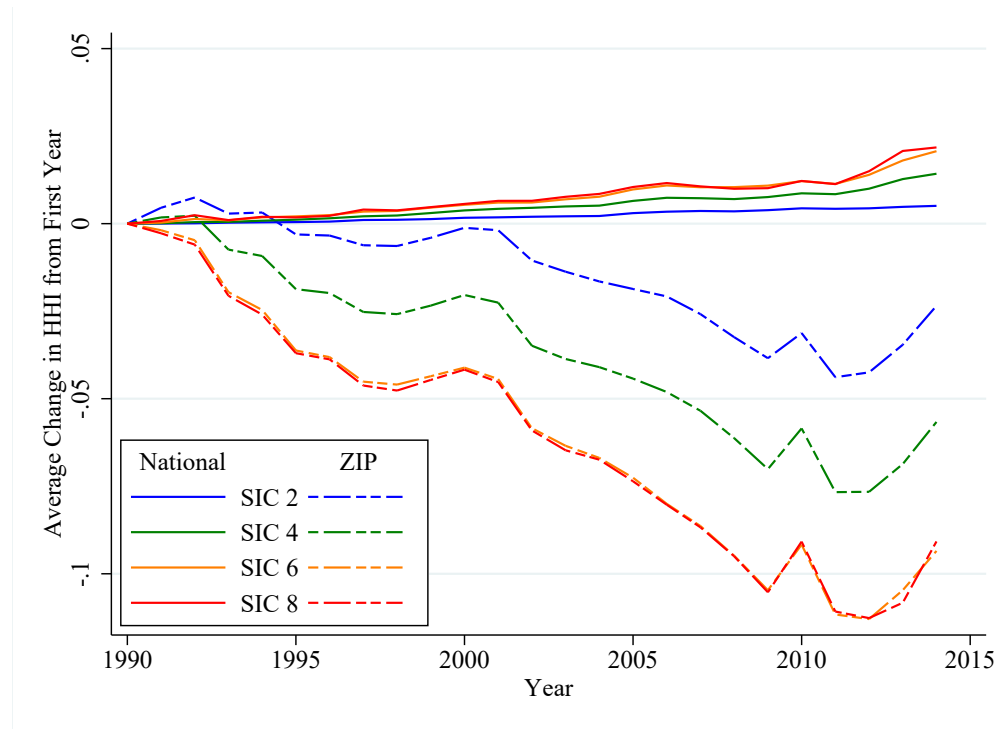


Figure 100: Balanced Panel: Pervasive diverging trends across 2-digit sectors

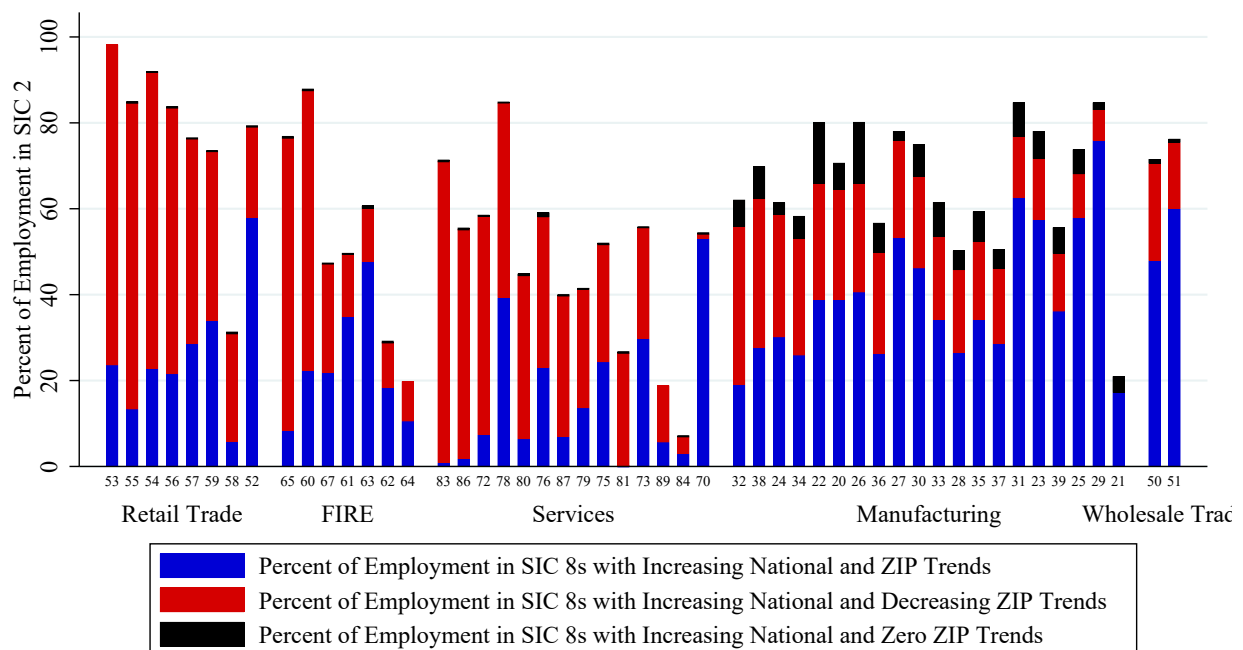


Figure 101: Balanced Panel: The role of top enterprises in national and local concentration trends in diverging industries

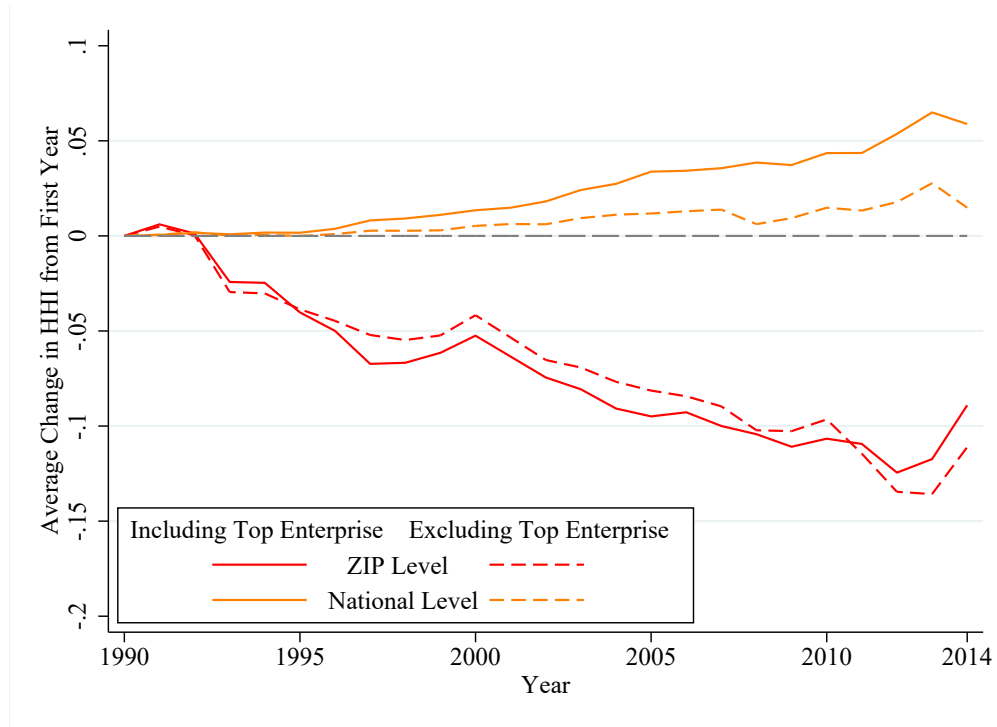


Figure 102: Balanced Panel: The role of top enterprises in national and local concentration trends in concentrating industries

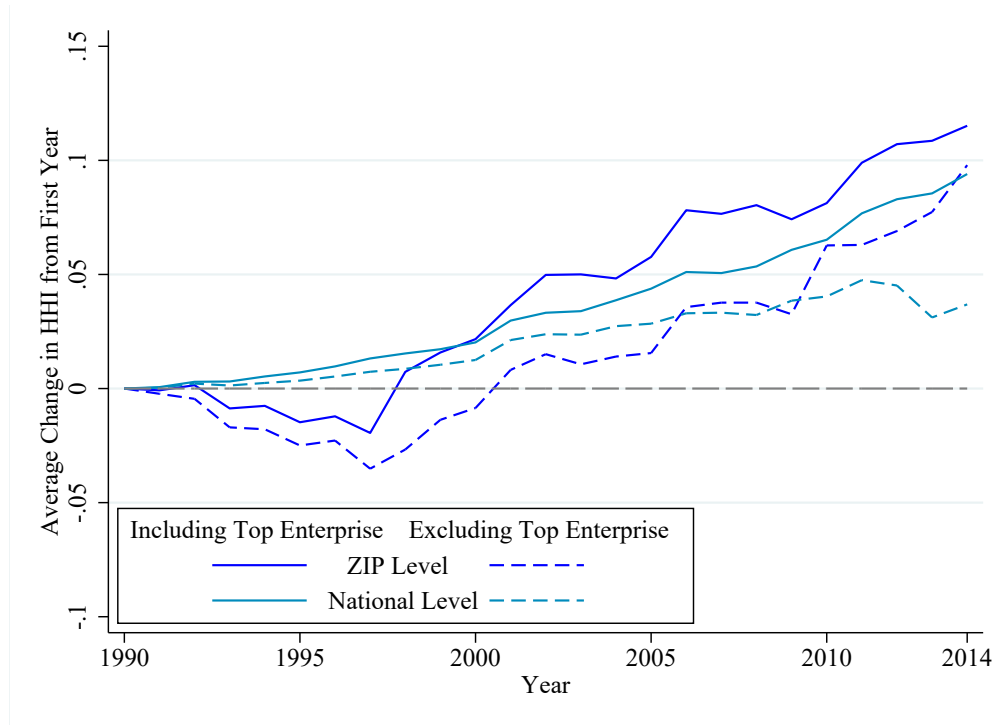


Figure 103: Balanced Panel: Effect on concentration when the second and third largest enterprises enter a market in diverging industries

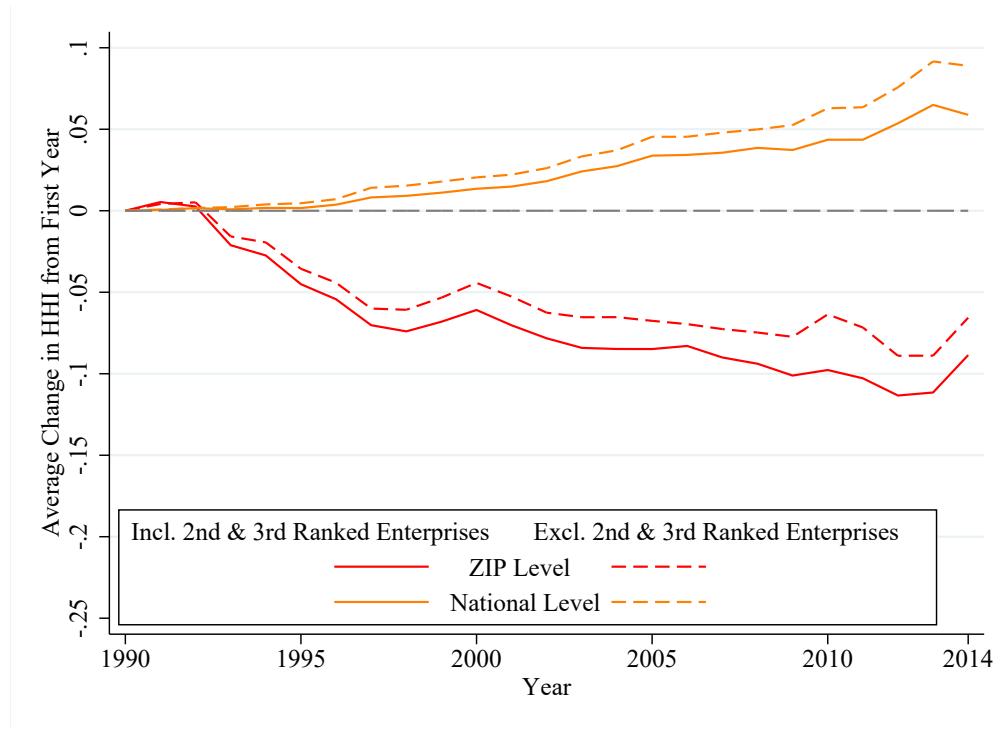


Figure 104: Balanced Panel: Effect on concentration when the second and third largest enterprises enter a market in concentrating industries

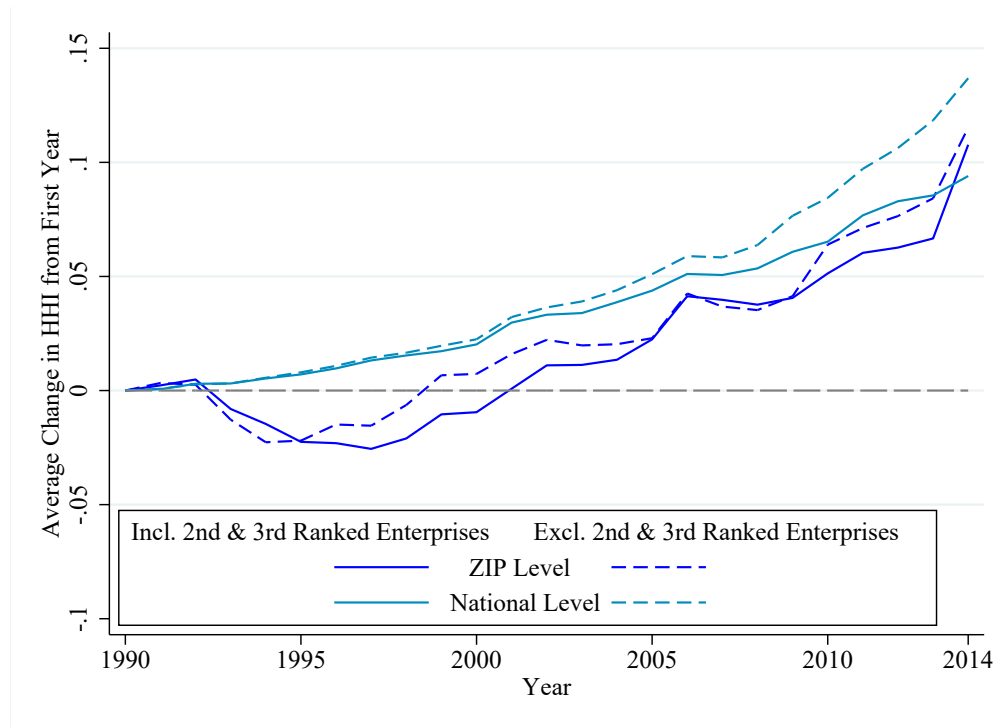


Figure 105: Balanced Panel: Effect on concentration when a top enterprise enters a local market in diverging industries

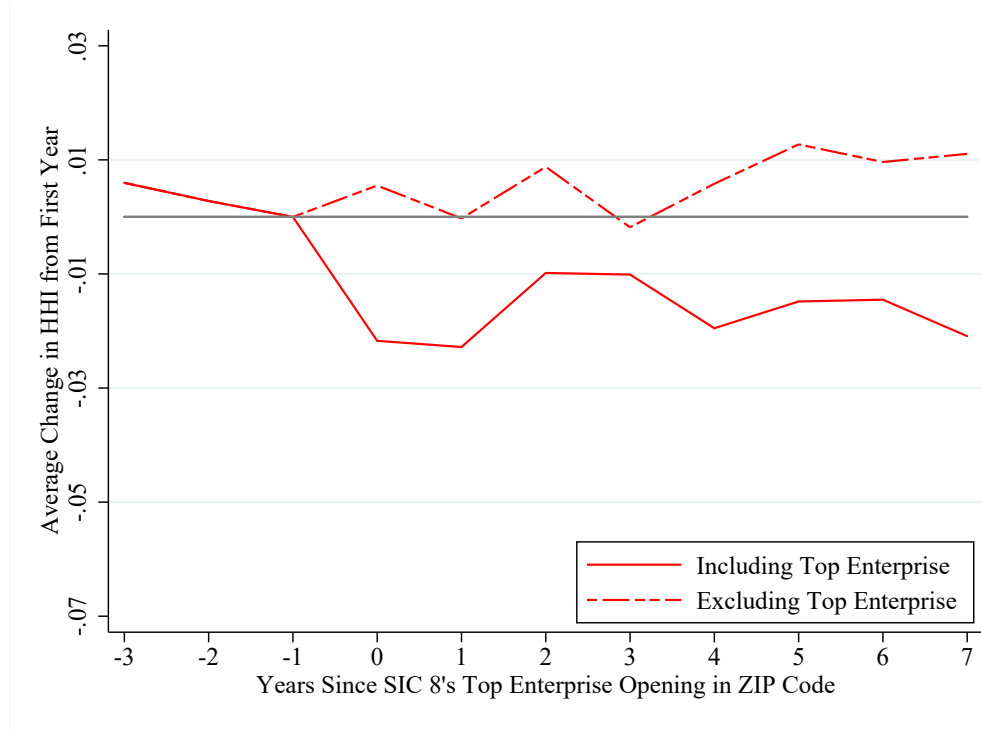


Figure 106: Balanced Panel: Effect on concentration when a top enterprise enters a local market in concentrating industries

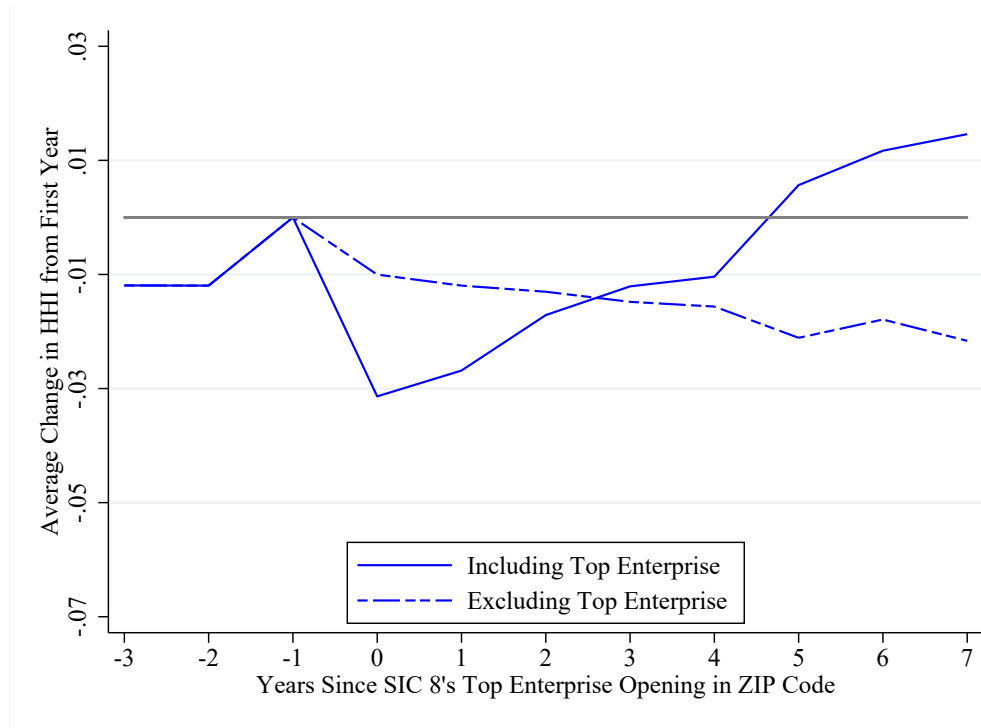


Figure 107: Balanced Panel: Effect on concentration when Walmart enters a local market



Figure 108: Balanced Panel: Effect on number of establishments when Walmart enters a local market



Figure 109: Balanced Panel: Effect on concentration when Cemex enters a local market

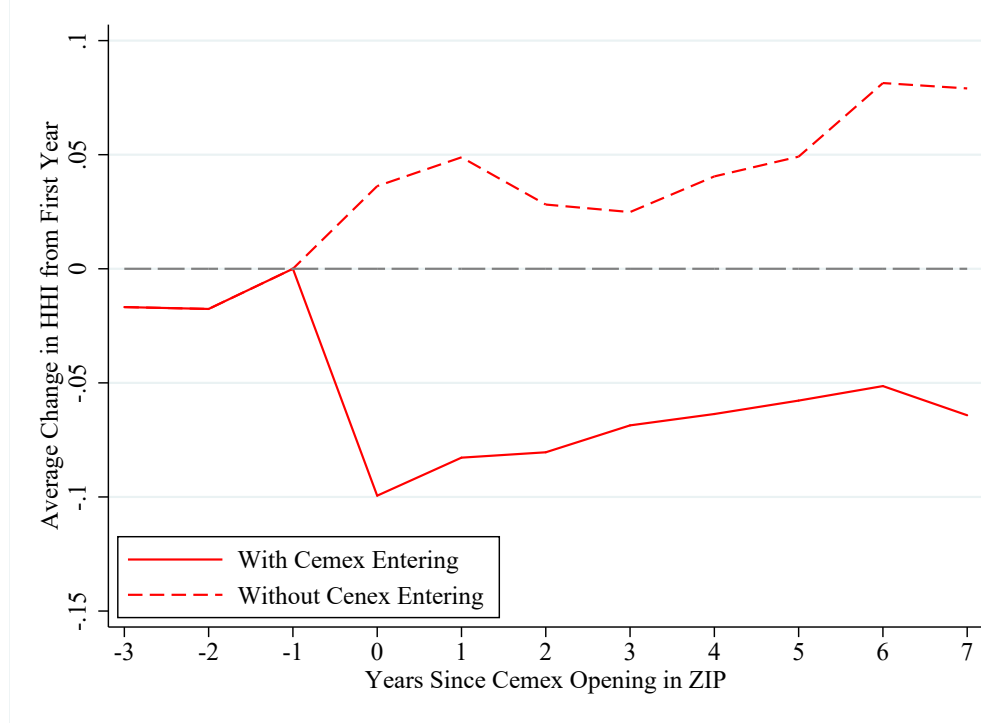
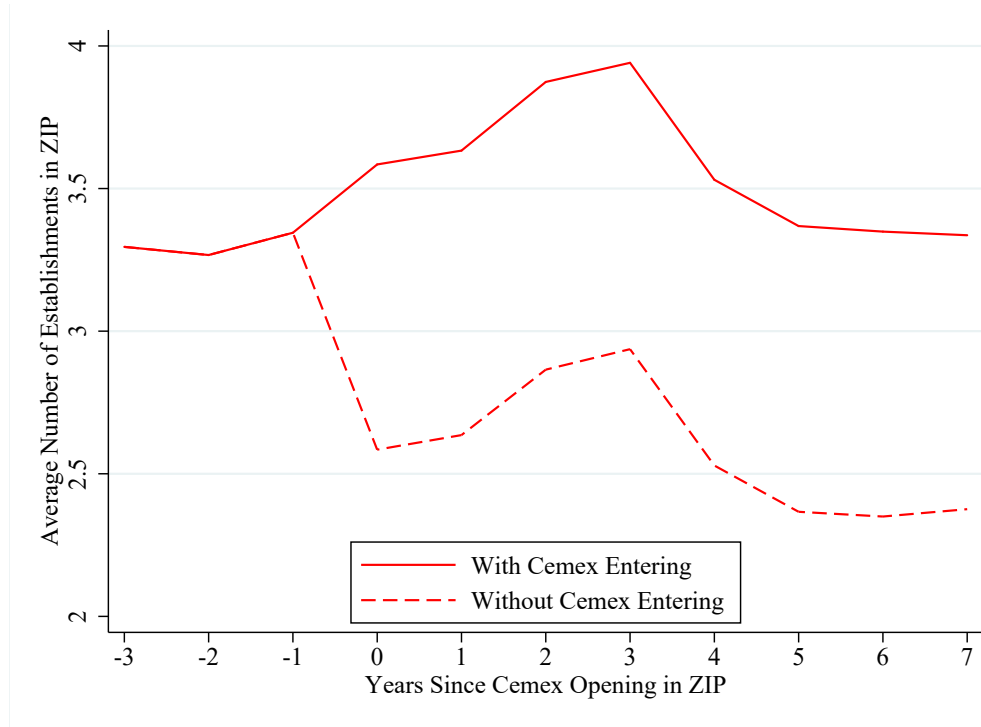


Figure 110: Balanced Panel: Effect on number of establishments when Cemex enters a local market



2.5 Non-Imputed Data

In this section, we replicate the figures in the main text where, in each year, we calculate the number of employees in each enterprise and drop those which have fewer than 10 employees. Among the remaining enterprises, we drop all establishments which report imputed employment. We use as our default concentration measure the HHI of employment (except in Figure (113), which uses the HHI of sales).

Figure 111: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Diverging economy-wide national and local concentration trends

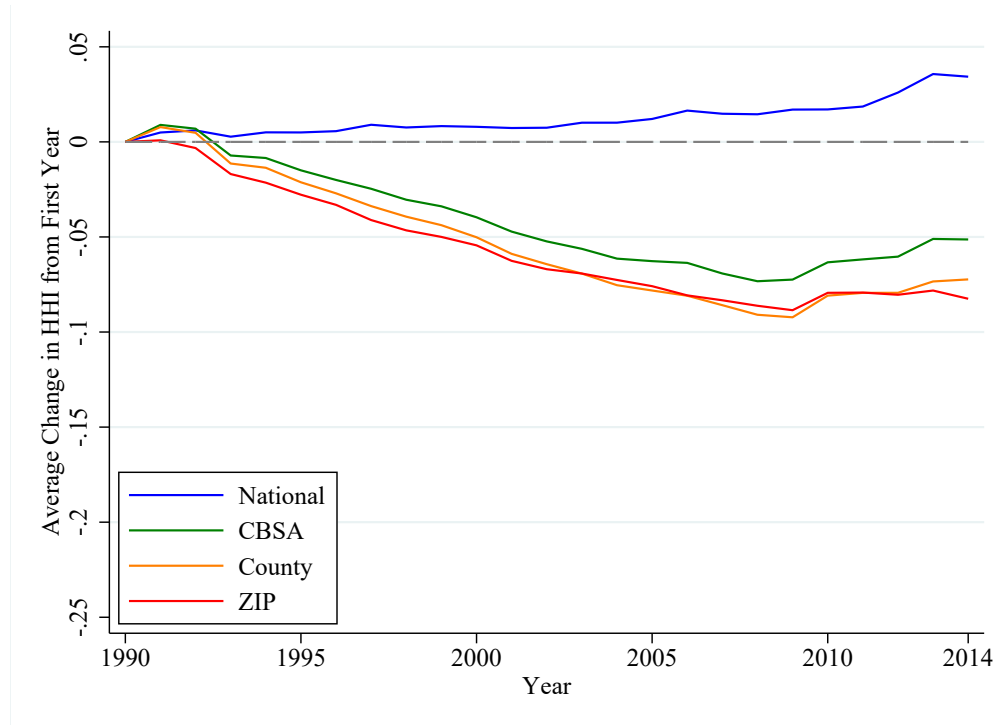


Figure 112: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Diverging division-level national and local concentration trends

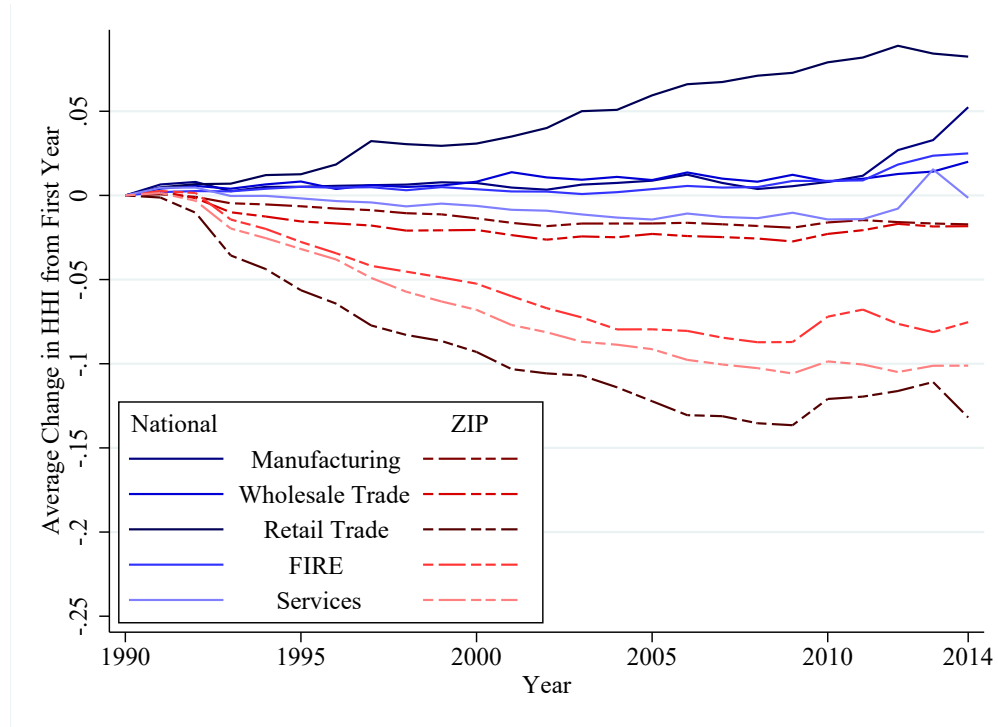


Figure 113: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Diverging economy-wide trends in sales concentration

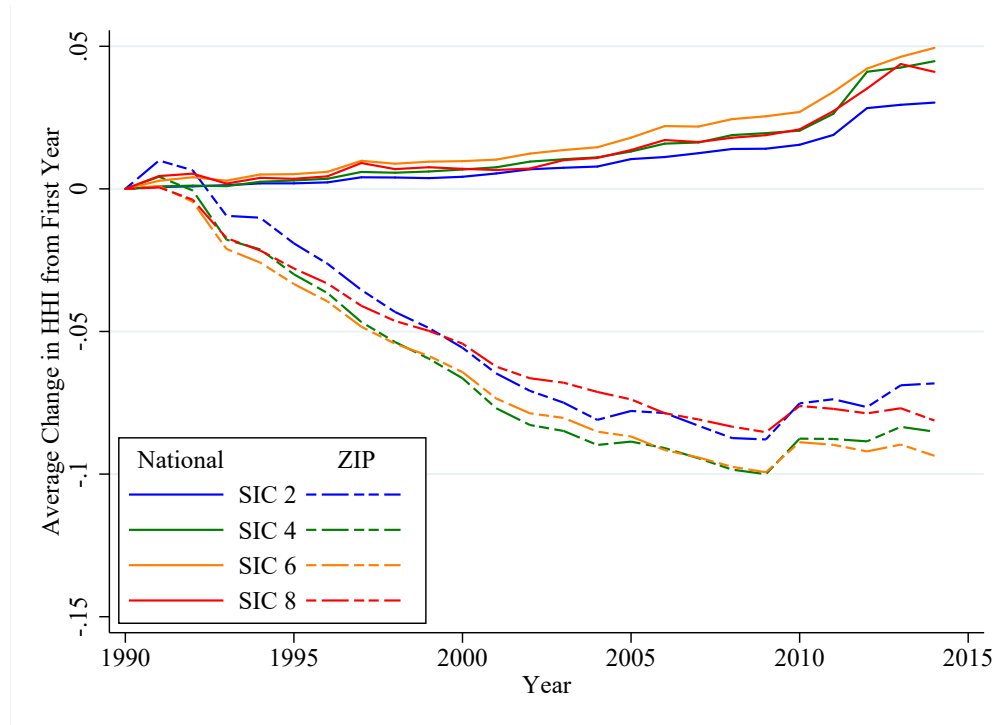


Figure 114: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Diverging economy-wide trends in employment concentration

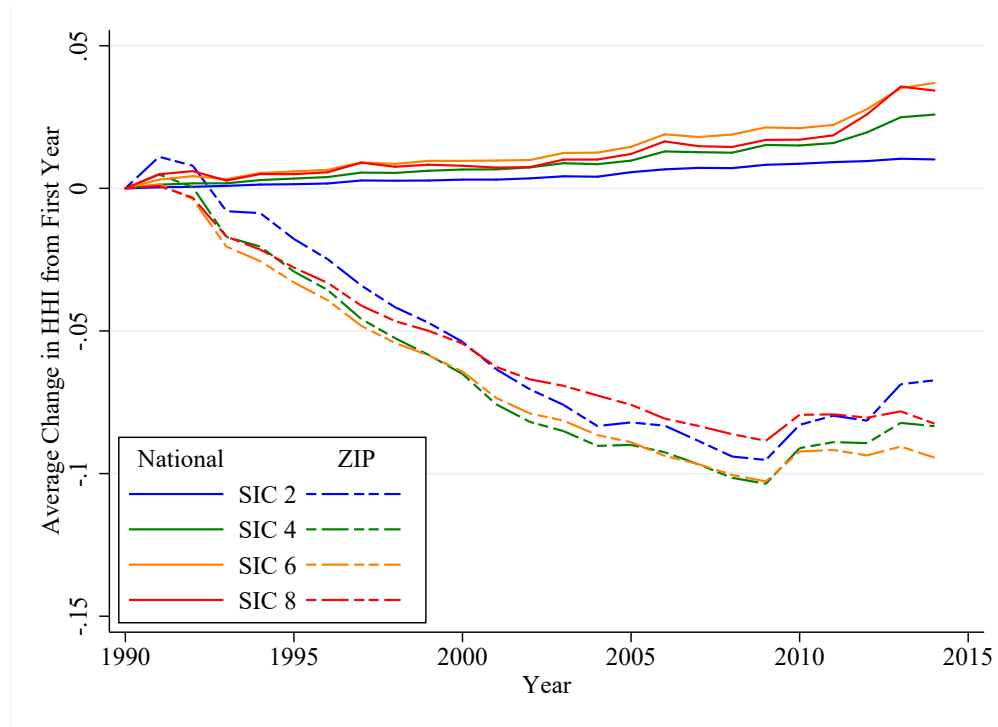


Figure 115: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Diverging economy-wide national and local concentration trends with a balanced panel

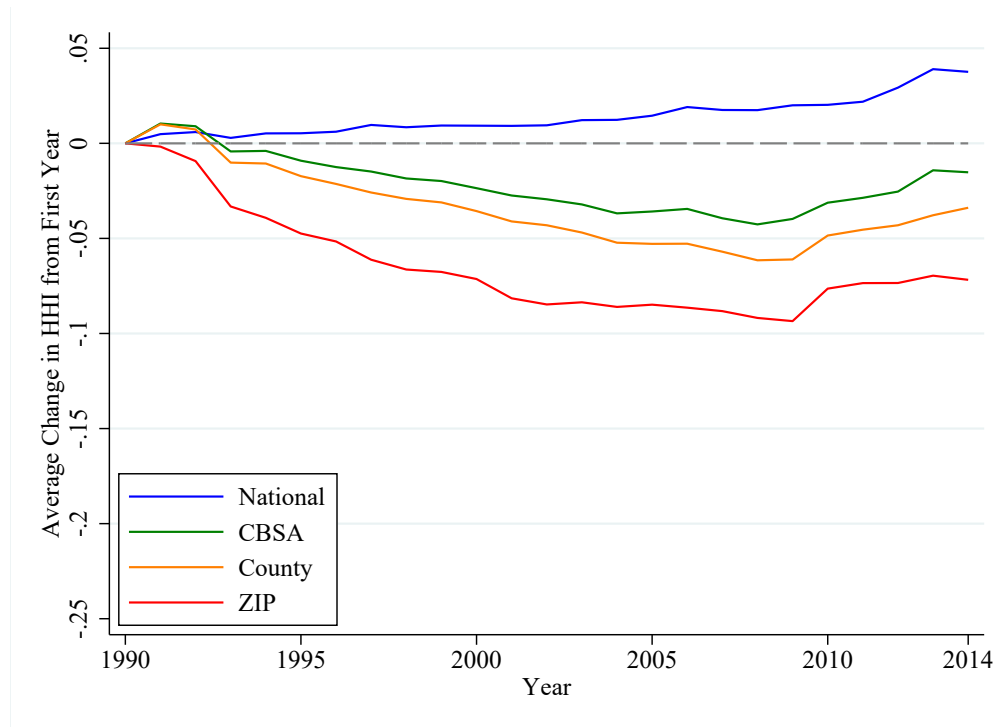


Figure 116: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Diverging division-level national and local concentration trends with a balanced panel

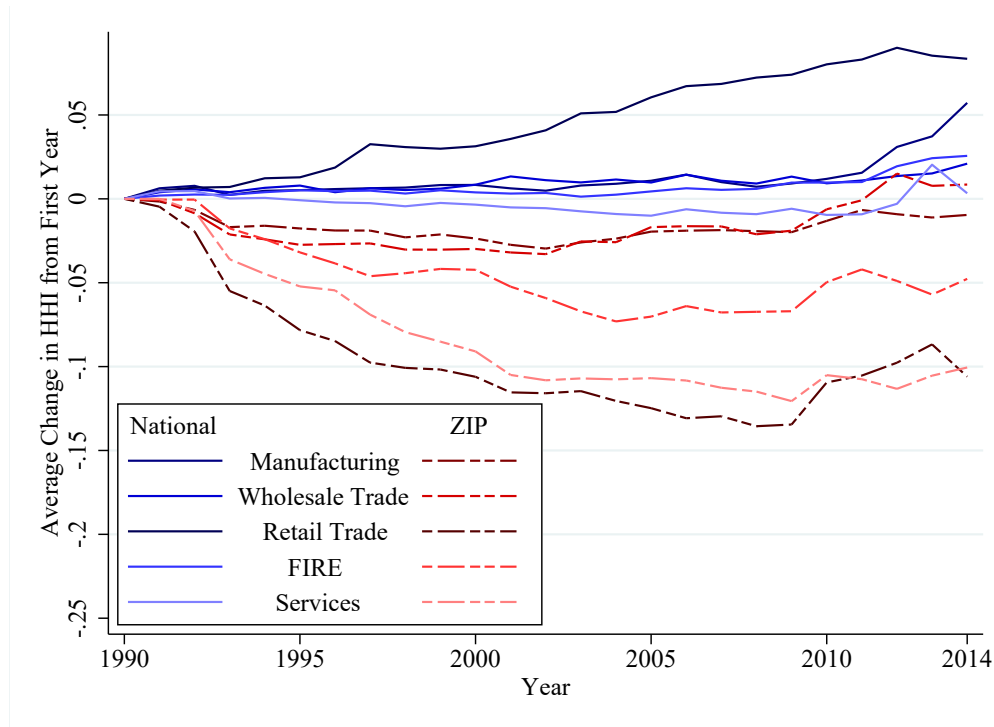


Figure 117: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Pervasive diverging trends across 2-digit sectors

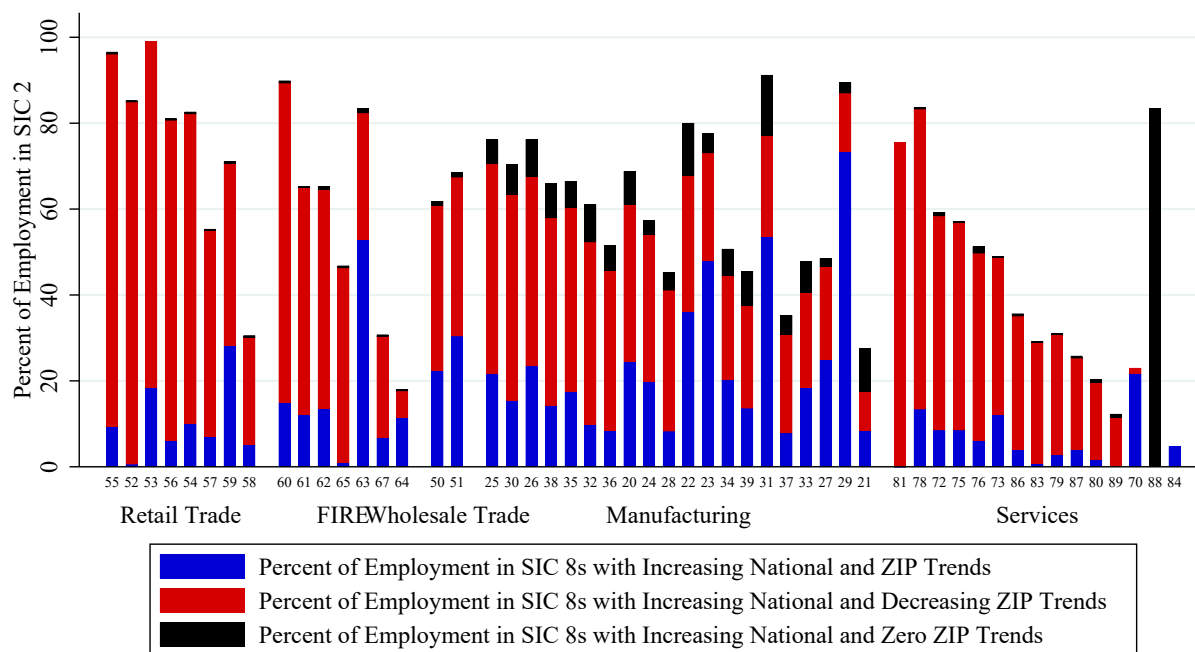


Figure 118: Non-Imputed Establishments in Enterprises with at Least 10 Employees: The role of top enterprises in national and local concentration trends in diverging industries

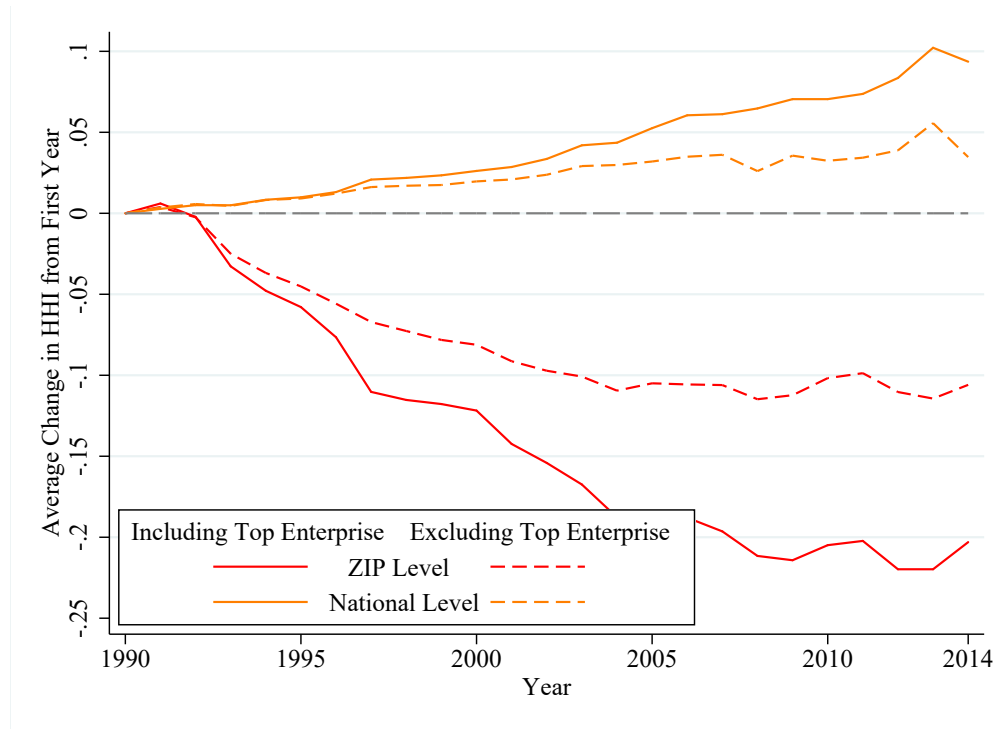


Figure 119: Non-Imputed Establishments in Enterprises with at Least 10 Employees: The role of top enterprises in national and local concentration trends in concentrating industries

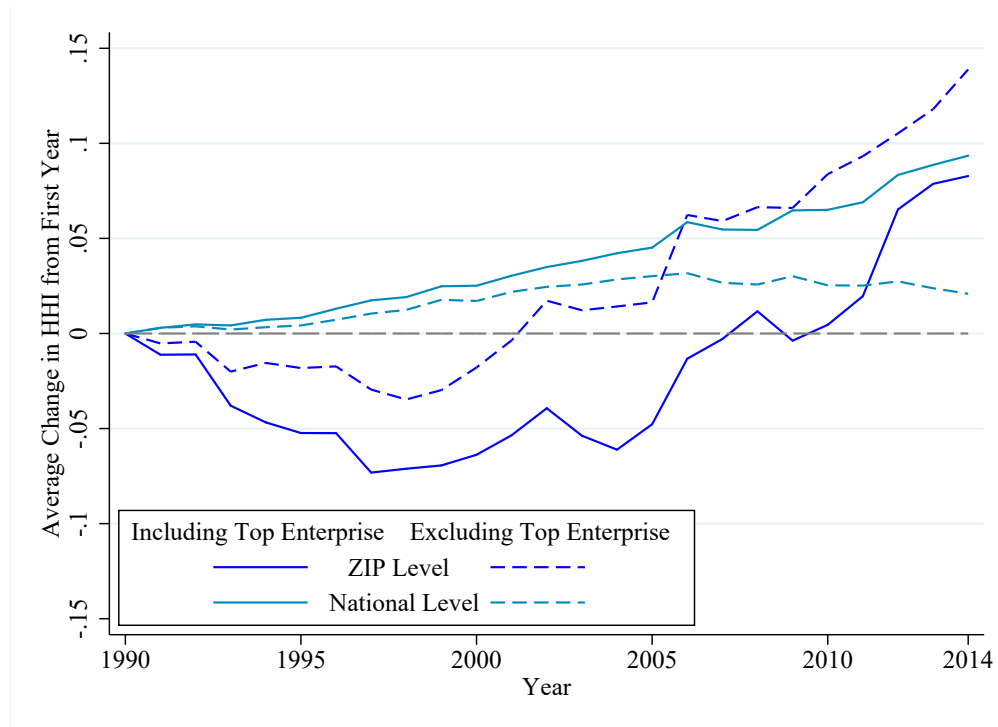


Figure 120: Non-Imputed Establishments in Enterprises with at Least 10 Employees: The role of the second and third largest enterprises in diverging industries

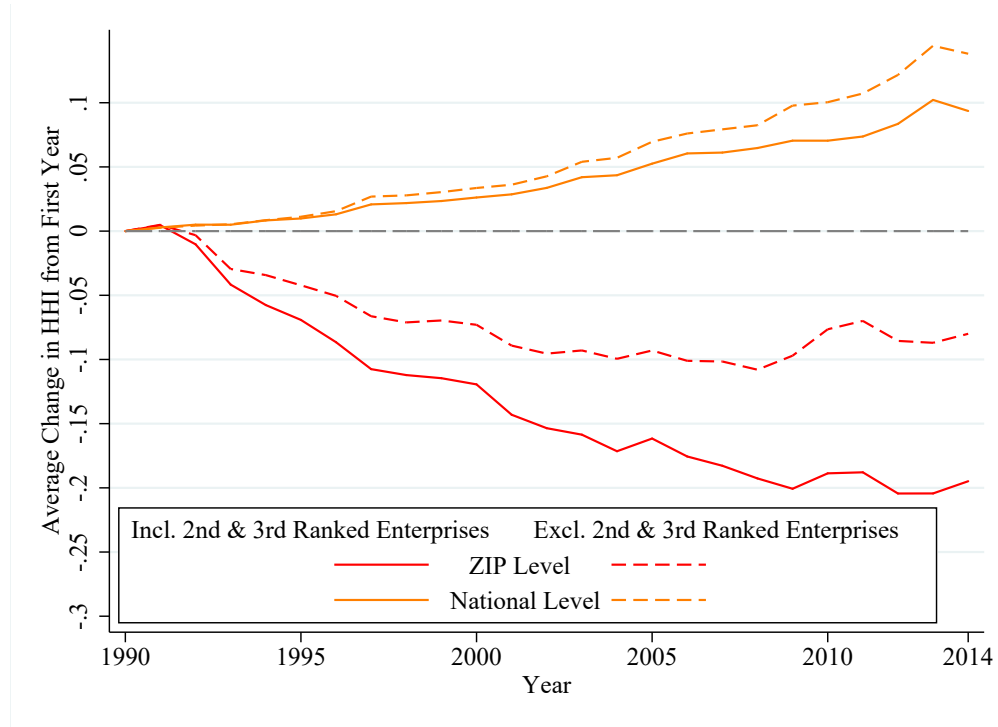


Figure 121: Non-Imputed Establishments in Enterprises with at Least 10 Employees: The role of the second and third largest enterprises in concentrating industries

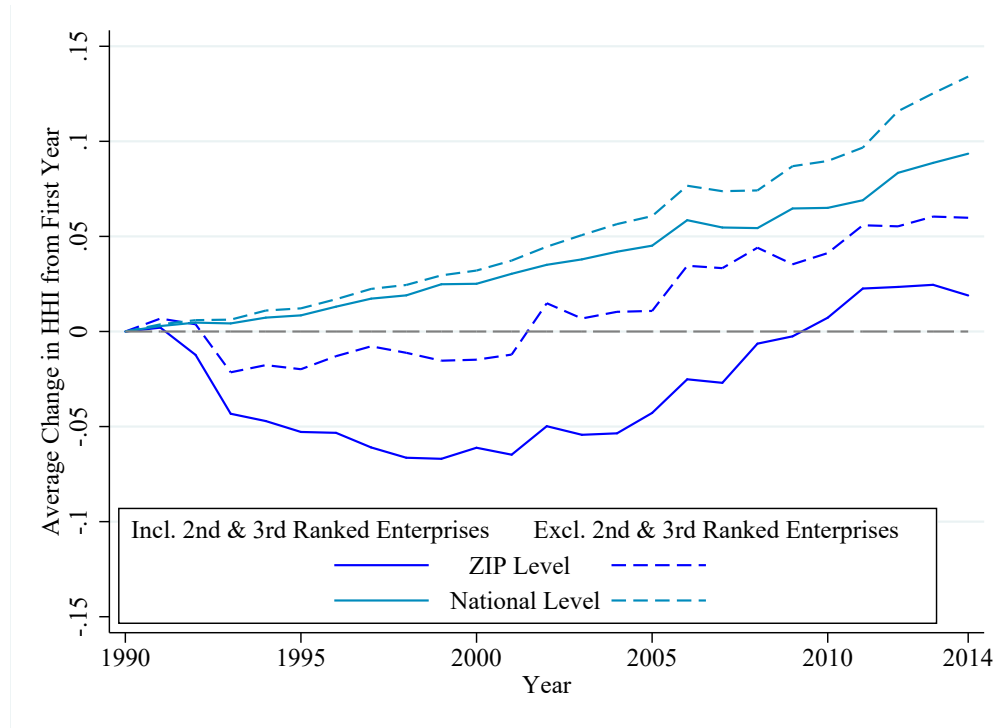


Figure 122: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Expansion of top enterprises into ZIP codes

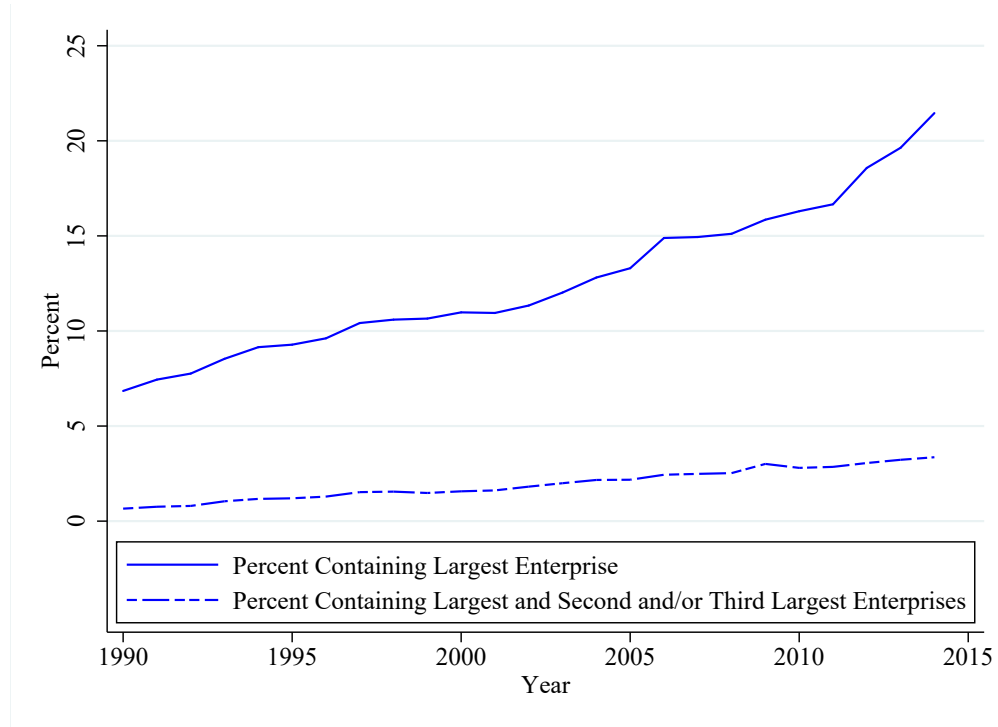


Figure 123: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Effect on concentration when a top enterprise enters a local market in diverging industries

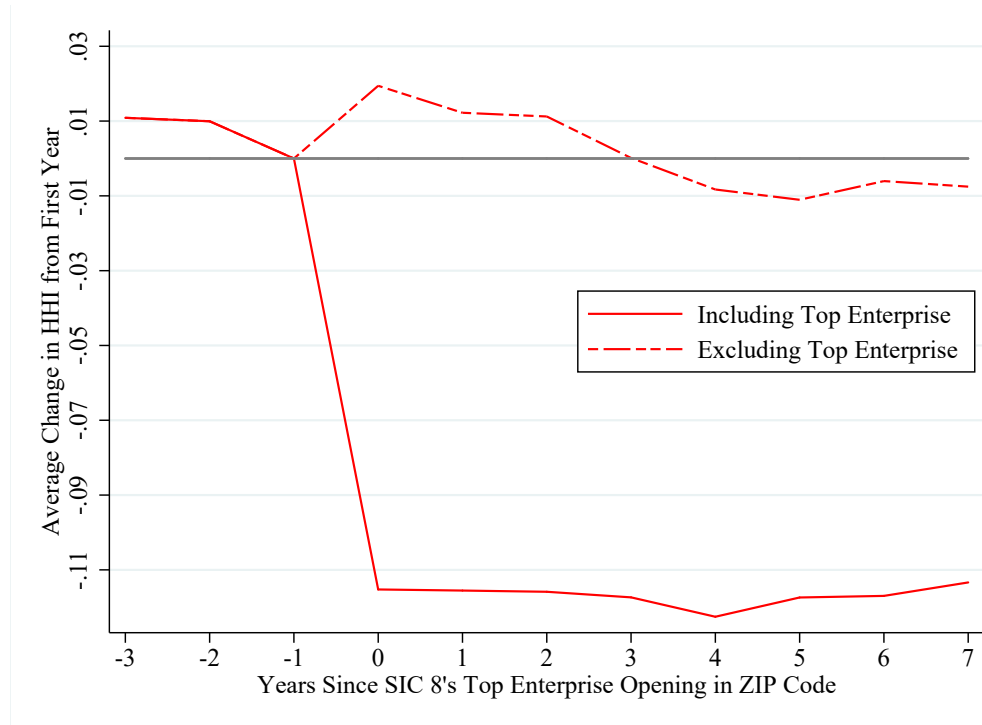


Figure 124: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Effect on concentration when a top enterprise enters a local market in concentrating industries

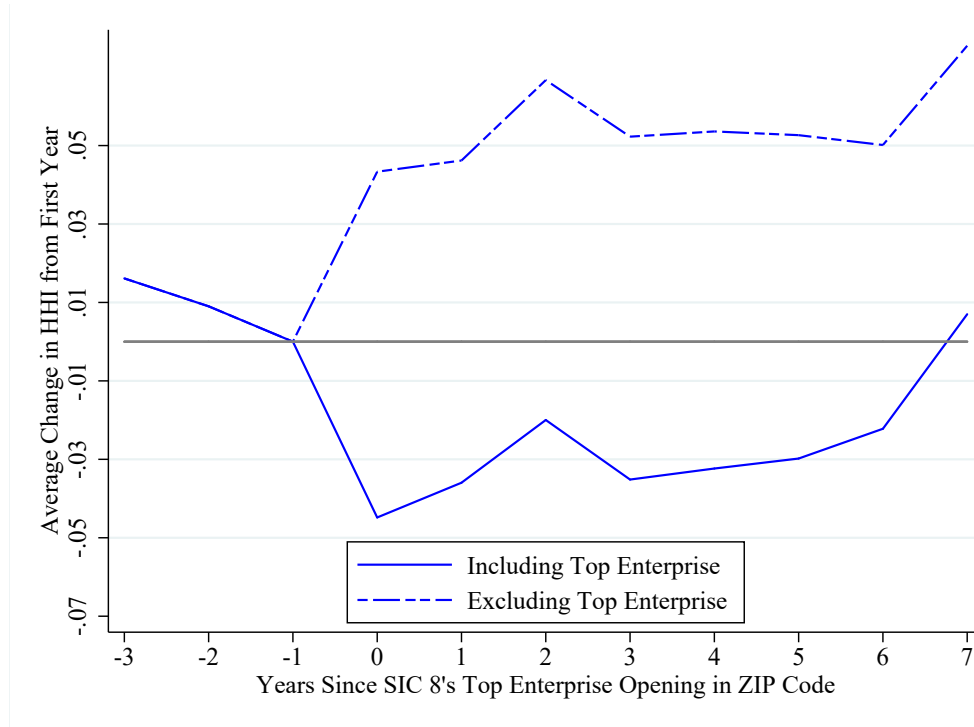


Figure 125: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Effect on concentration when Walmart enters a local market



Figure 126: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Effect on number of establishments when Walmart enters a local market

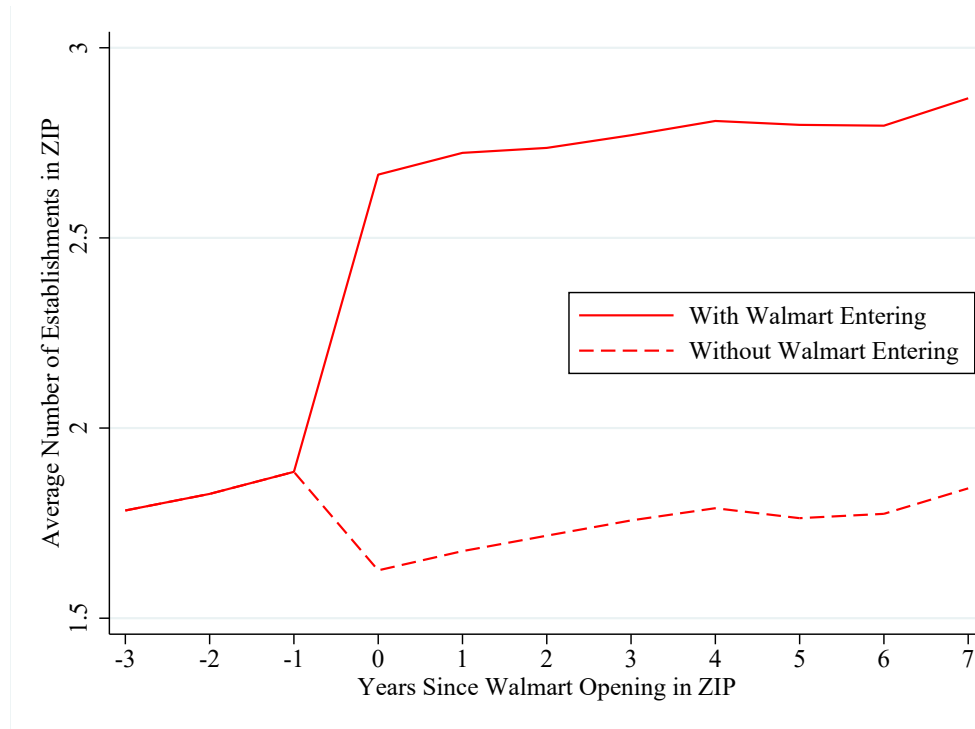


Figure 127: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Effect on concentration when Cemex enters a local market

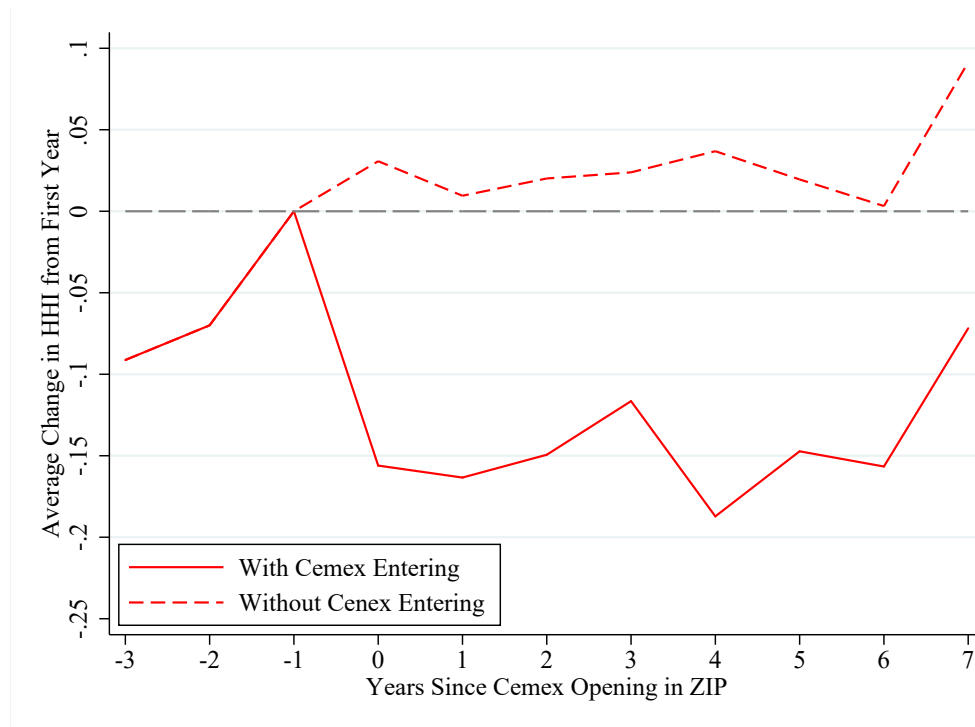
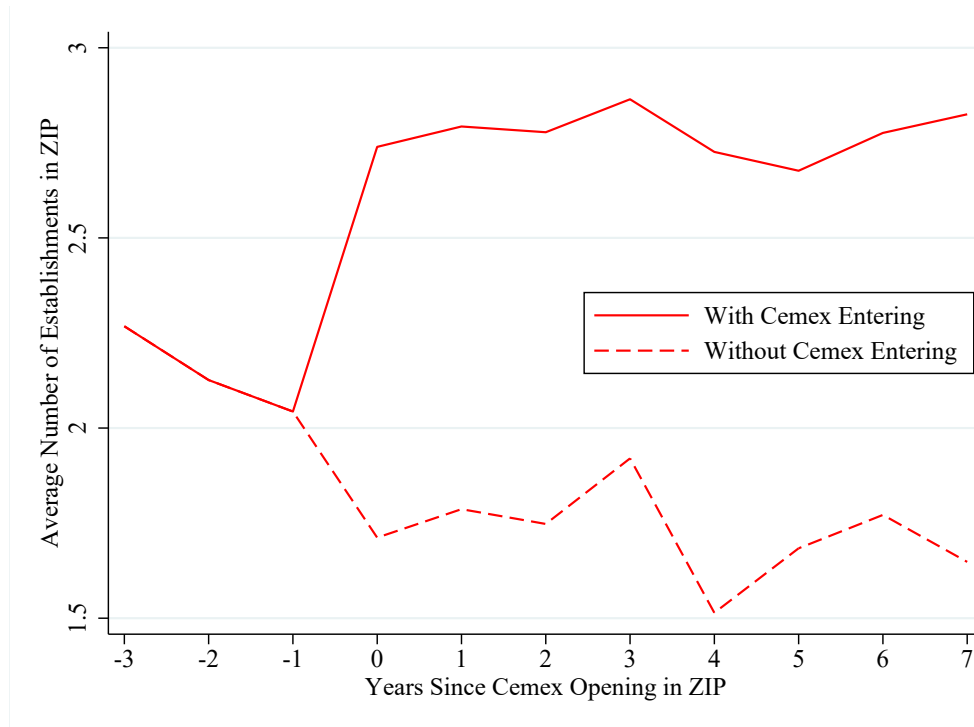


Figure 128: Non-Imputed Establishments in Enterprises with at Least 10 Employees: Effect on number of establishments when Cemex enters a local market



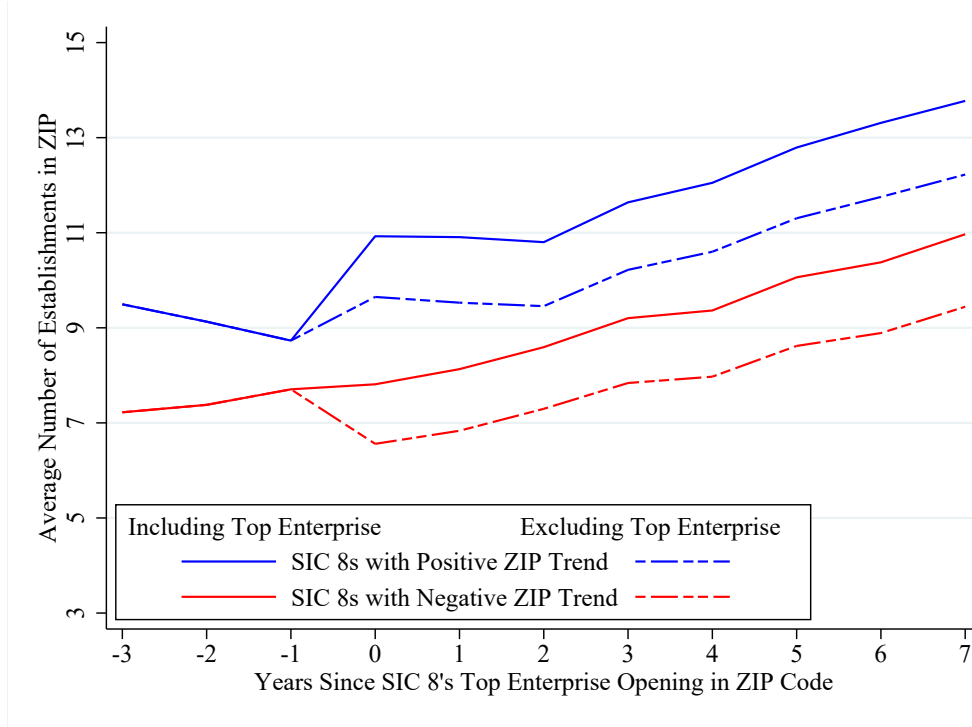
2.6 Other Results

The results in this section expand on select figures in the main text.

2.6.1 Effect of Top Enterprises on Number of Establishments

Figure (129) expands on Figures (13) and (14) in the main text by looking at the number of establishments in industry-ZIP code pairs over time in response to the arrival of an industry's top enterprise into that ZIP code. The red line displays the weighted average number of establishments in the years before and after an opening of an industry's top enterprise across industries with diverging trends; the blue lines display the same number average across industries with positive trends at the national and local levels. When a top enterprise opens in an industry with positive local trends, there is on average no exit of existing establishments, while there is close to one-to-one exit of existing establishments in industries with diverging trends. Over time, however, for both sets of industries the number of establishments both including and excluding establishments belonging to the top enterprise increases following an opening. Because these lines are weighted by employment in a geography-industry-year grouping, which is highly correlated with the number of establishments, the results of this figure should be interpreted with caution.

Figure 129: Number of Establishments When Top Enterprise Enters



2.6.2 Replicating Figures (8) and (9) with Top 3 Enterprises

Here, we replicate Figures (8) and (9) in the main text using the top 3 enterprises (as measured by sales in 2014) in each industry as opposed to just the top enterprise. That is, we look at geography-industry pairs where at least one of these enterprises is present in at least one year. Within this subset of pairs, we drop geography-industry-year groupings where there are no enterprises in that group remaining after dropping the top three enterprises in that industry. We then calculate, for each grouping, the HHI both including and excluding the top 3 enterprises. Figure (130) shows that when averaged across SIC 8 industries with diverging trends, removing the top 3 enterprises makes the increase in the national trend much less pronounced, but increases concentration at the local level. In contrast, Figure (131) shows that across industries with increasing trends at the national and local levels, excluding the top 3 enterprises brings down concentration at both levels. These observations are consistent with Figures (8) and (9) in the main text.

3 Geography and Industrial Classification

In this section, we explore how the overall findings in the main text respond to changing, in order, the level of geography at which we define a market, and the level of industrial

Figure 130: The role of the top three enterprises in national and local concentration trends in diverging industries

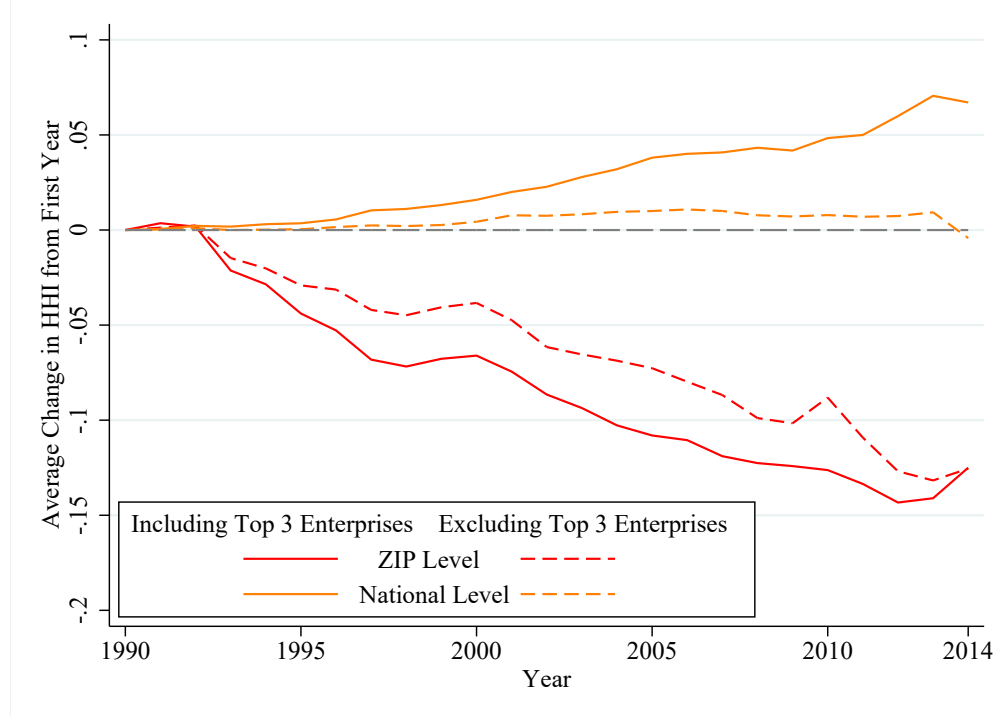
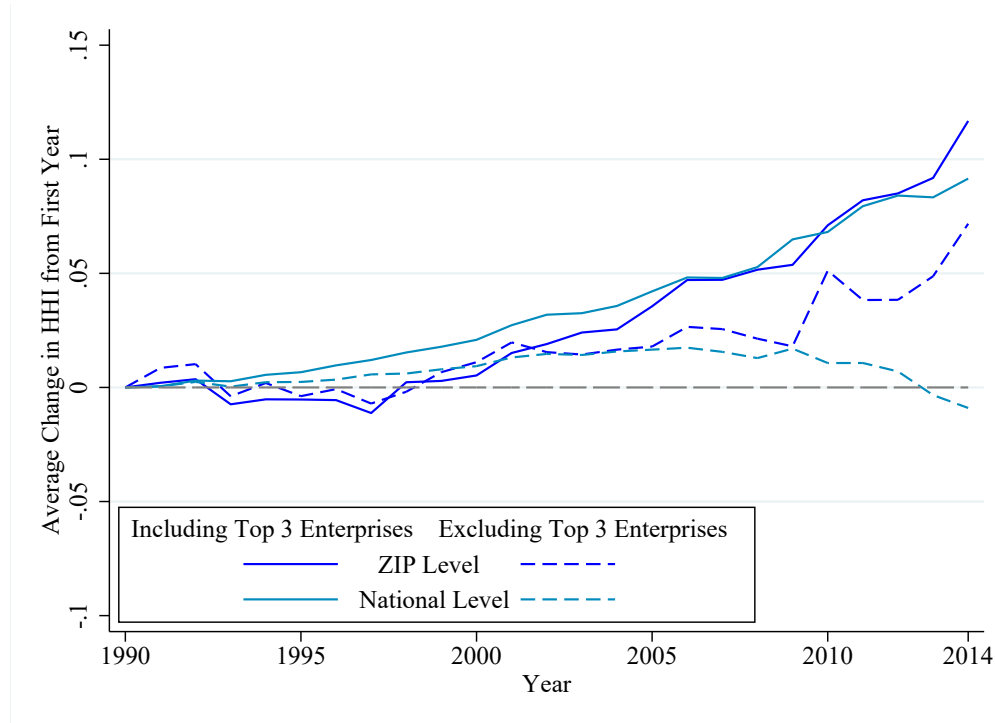


Figure 131: The role of the top three enterprises in national and local concentration trends in concentrating industries



classification at which we define a market. We only vary the levels of industrial and geographic aggregations separately. That is, whenever possible we try to keep either our level of industrial aggregation at the SIC 8 level, or the level of geographic aggregation at the ZIP code level. The results show that the broad thrusts of our findings still hold, though to slightly lesser extents than when defining an industry-geography pair as a grouping of an SIC 8 code and a ZIP code. Hence, these results further highlight the importance of defining markets locally.

3.1 Results for Other Geographic Measures

As shown in Figure (1) in the main text, while the decline in concentration is most pronounced at the ZIP code level, concentration is also declining over time at the County and Core-Based Statistical Area (CBSA) levels.¹³ This section shows that diverging trends are still prevalent at these two geographic levels.

Figure 132: CBSA Level: Diverging division-level national and local concentration trends

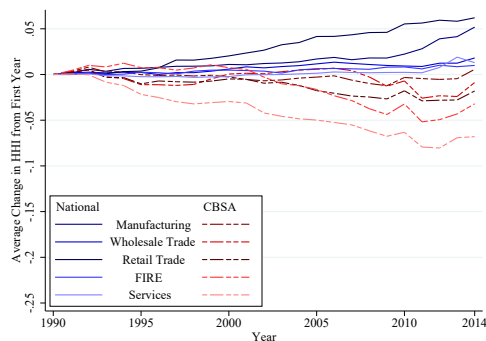
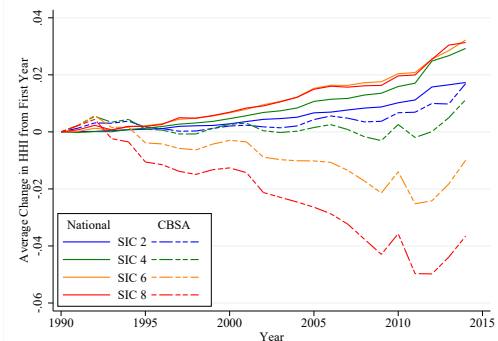


Figure 133: CBSA Level: Diverging economy-wide trends in sales concentration



¹³A CBSA is defined as either a Metropolitan or Micropolitan Statistical Area and is a collection of counties. Although CBSA boundaries can change over time as new counties are added to or removed from them, for all years here we classify counties into CBSAs based on 2014 CBSA definitions. When reproducing these figures at the CBSA level, we drop any observations located in counties outside of CBSAs.

Figure 134: County Level: Diverging division-level national and local concentration trends

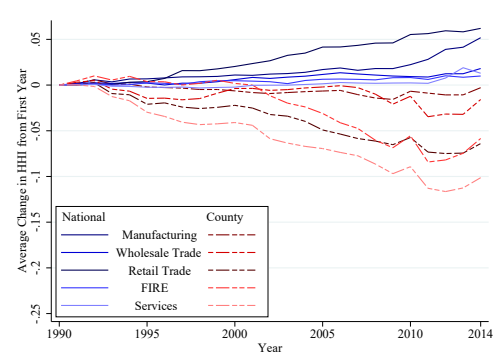
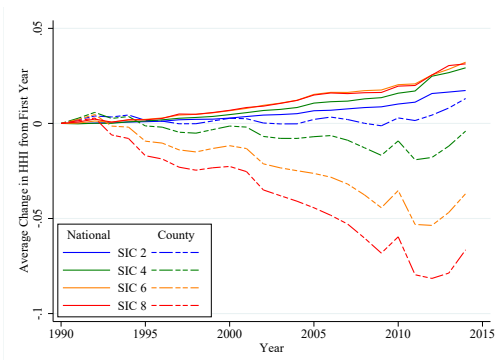


Figure 135: County Level: Diverging economy-wide trends in sales concentration



3.2 SIC 4 Level Results

The two figures below show that diverging trends are still prevalent at the SIC 4 level.

Figure 136: SIC 4 Level: Diverging economy-wide national and local concentration trends

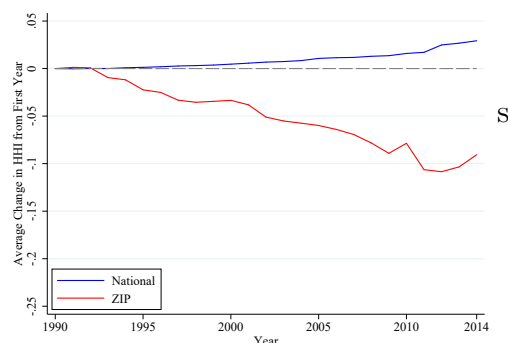
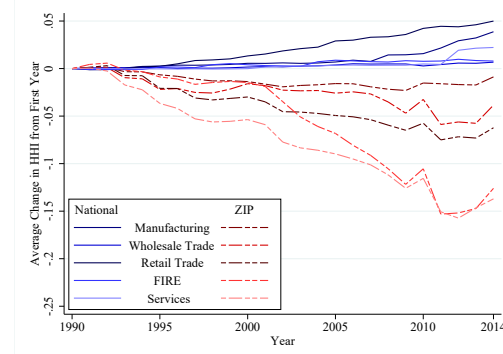


Figure 137: SIC 4 Level: Diverging division-level national and local concentration trends



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- [1] **Barnatchez, Keith, Leland D. Crane, and Ryan A. Decker.** 2017. "An Assessment of the National Establishment Time Series (NETS) Database." Finance and Economics Discussion Series 2017-110.
- [2] **Choi, Taelim, John C. Robertson, and Anil Rupasingha.** 2013. "High-Growth Firms in Georgia." Federal Reserve Bank of Atlanta Working Paper 2013-20.
- [3] **Neumark, David, Brandon Wall, and Junfu Zhang.** 2006. "Employment Dynamics and Business Relocation: New Evidence from the National Establishment Time Series." NBER Working Paper 11647.
- [4] **Neumark, David, Brandon Wall, and Junfu Zhang.** 2011. "Do Small Businesses Create More Jobs? New Evidence for the United States from the National Establishment Time Series." *The Review of Economics and Statistics* 93 (1): 16-29.
- [5] **Walls & Associates.** 2014. "National Establishment Time-Series (NETS) Database."