Tax Evasion and the Minimum Wage:
Evidence from Hungary

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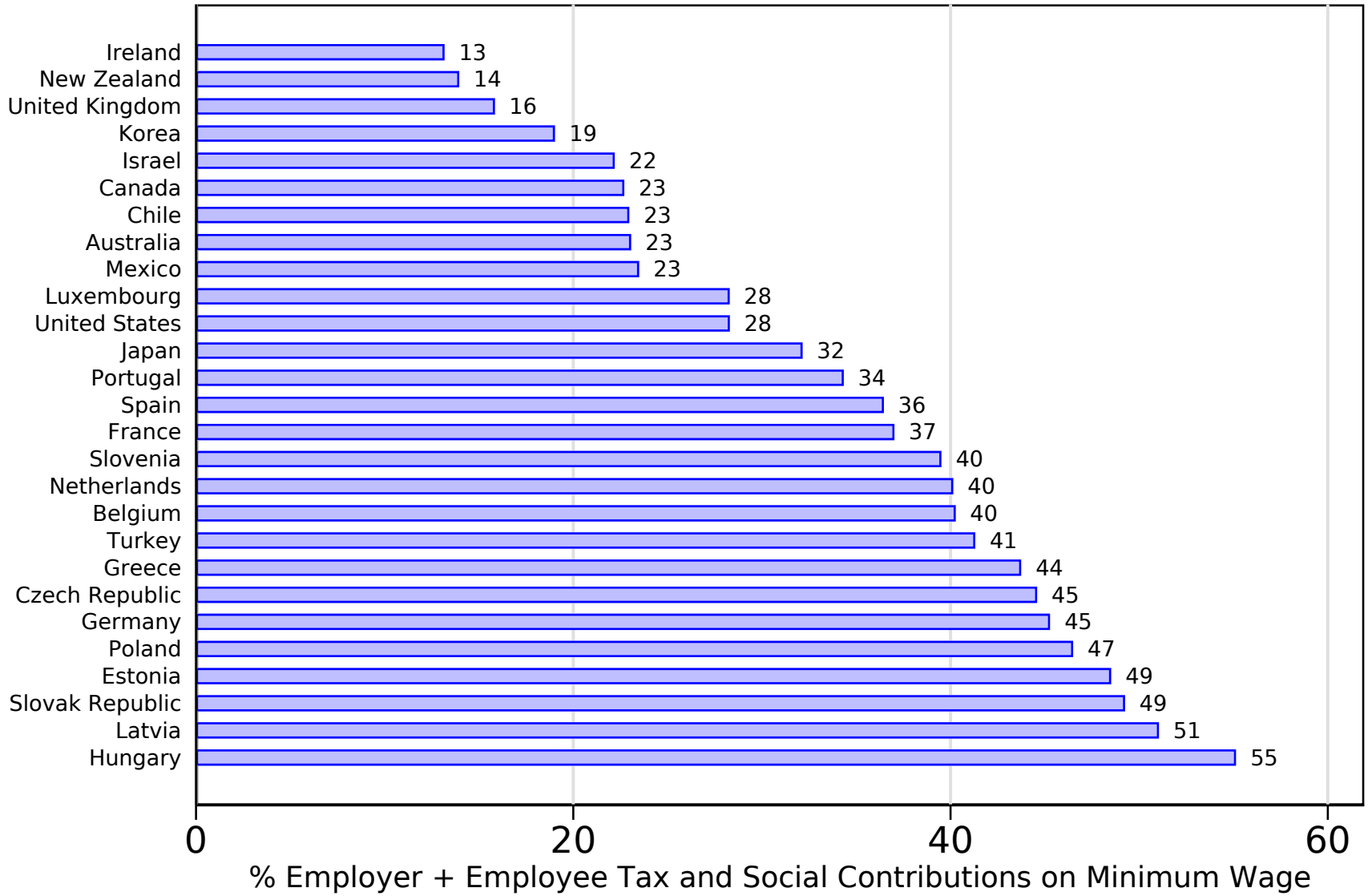
Research Question

Can tax evasion around the minimum wage be a rationale for substantial taxation of minimum wage earners?

Optimal Tax Literature Says Don't Tax Minimum Wage

Lee and Saez (2012) *"In a model with extensive labor supply responses only, a binding minimum wage associated with a positive tax rate on minimum wage earnings is second-best Pareto inefficient."*

But Minimum Wage Taxed in Most Developed Countries



Source: OECD FOCUS on Minimum wages after the crisis: Making them pay (May 2015)

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- Exploit detailed administrative data: track employment, earnings, worker and firm characteristics
- Examine impact of reform on reported earnings and formal employment
- Develop of a model of tax evasion around the minimum wage

Contributions

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1. Quasi-experimental evidence on reporting and informality responses to audit threats
   - Incentives: Allingham and Sandmo (1972)
   - Causal impact of enforcement strategies: Slemrod (2019)
   - Random audits: Bergolo et al. (2019), Kleven et al. (2011)
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2. New evidence on tax evasion at the minimum wage
   - Elek, Köllő, Reizer and Szabó (2012), Reizer (2011), Tonin (2011)
3. Discuss theory of minimum wage taxation in the presence of underreporting
   - Lee and Saez (2012)

Background

Hungarian Double Minimum Wage Reform

- Between September 2006 and December 2010, employers had to pay social security contributions based on the double of minimum wage
- They could request exemptions for lower wages through a separate form
- Increased threat of audit for companies below this threshold
- (Higher minimum wage for skilled jobs introduced in 2006)

Data and Sample

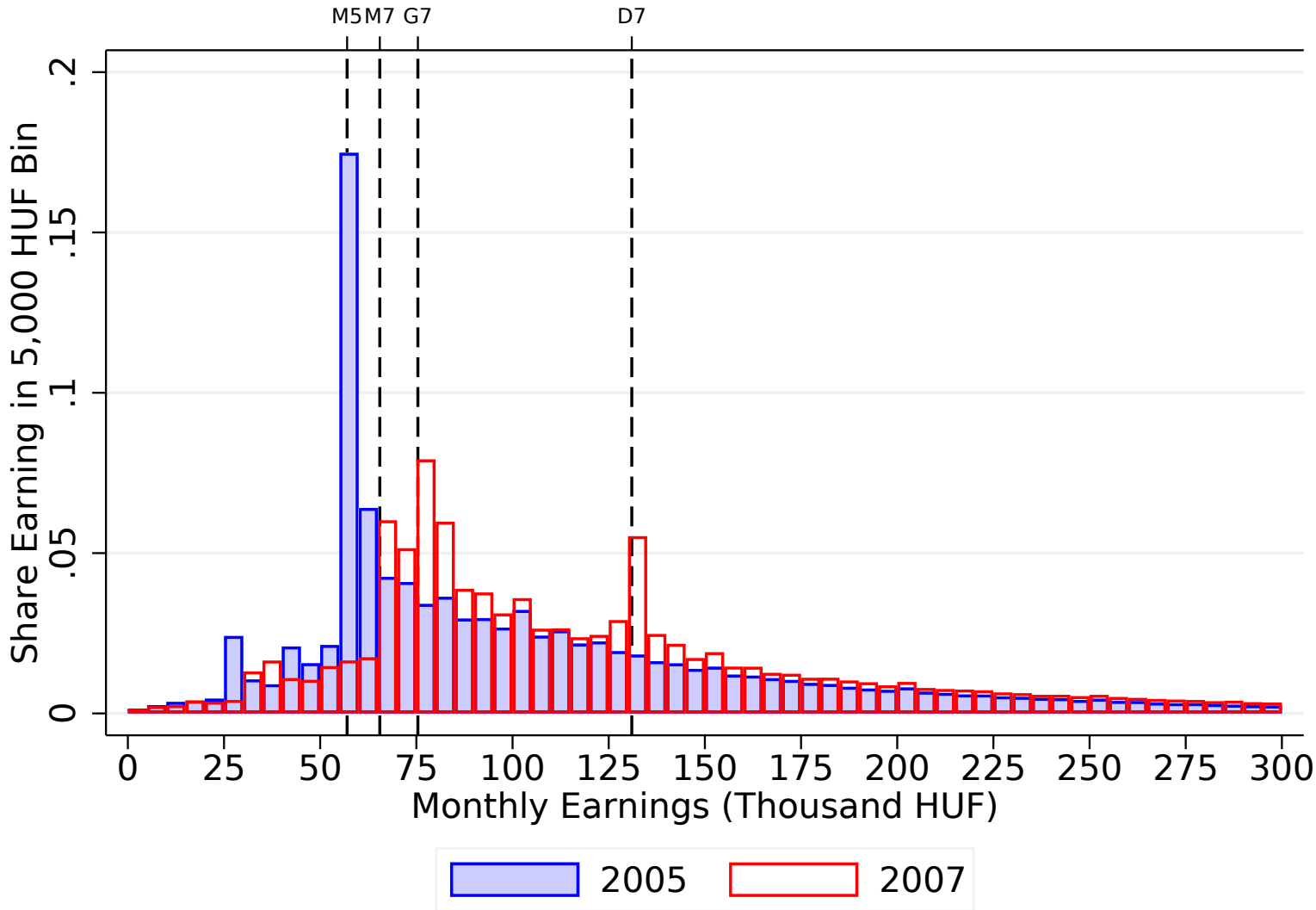
- Use administrative data from Hungary
- Covers 2003-2011
- 50% sample of 2003 population aged 5-74
- Links employment, tax, pension, health, labor, etc.
- Use data for a representative month (March)

- Restrict to sample aged 18-65
- Drop cases where an individual has more than one job
- Separate private sector employees, public sector employees, and self-employed

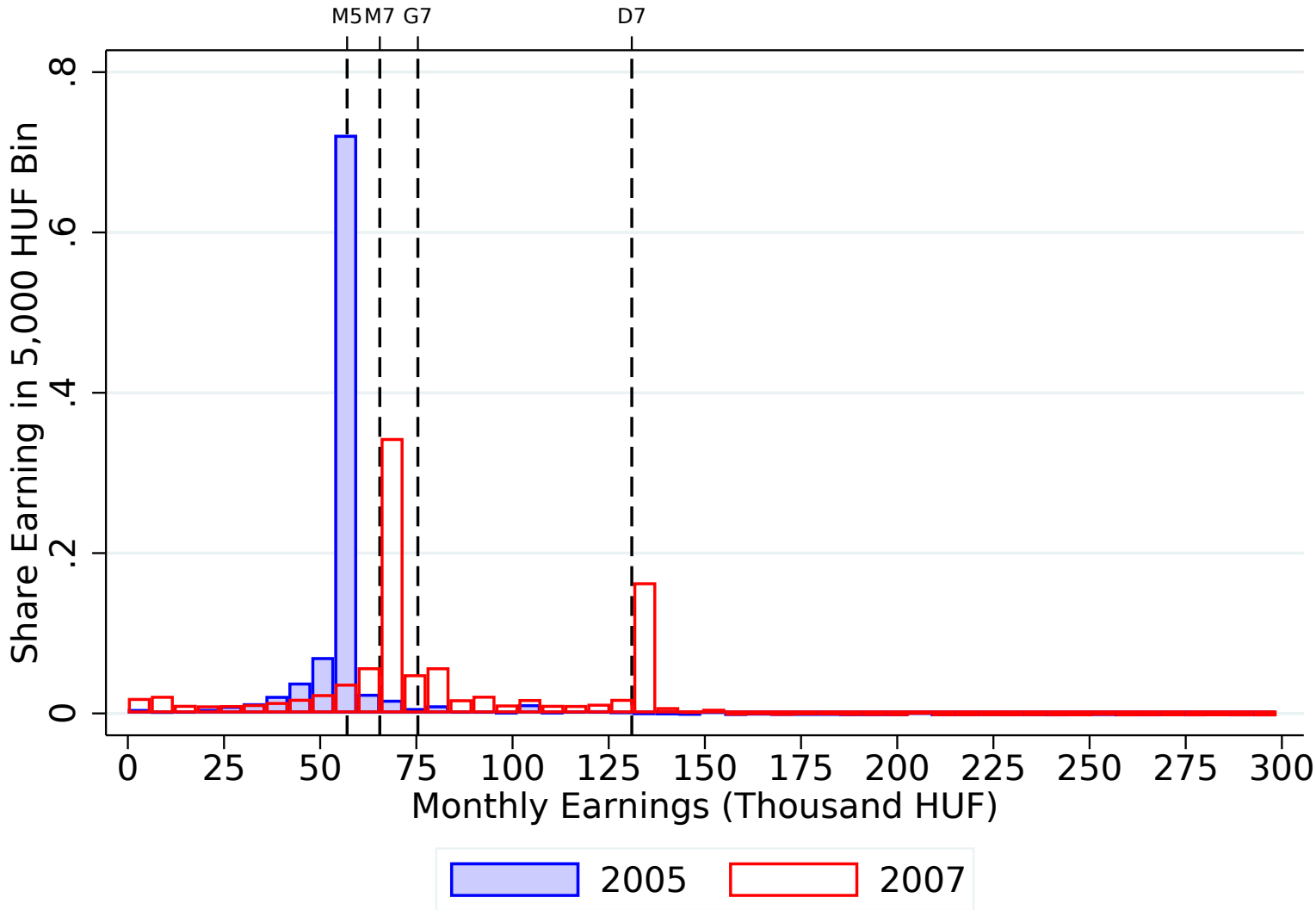
Summary Statistics Individuals Summary Statistics Firms

Evidence on Tax Evasion and Reporting Response

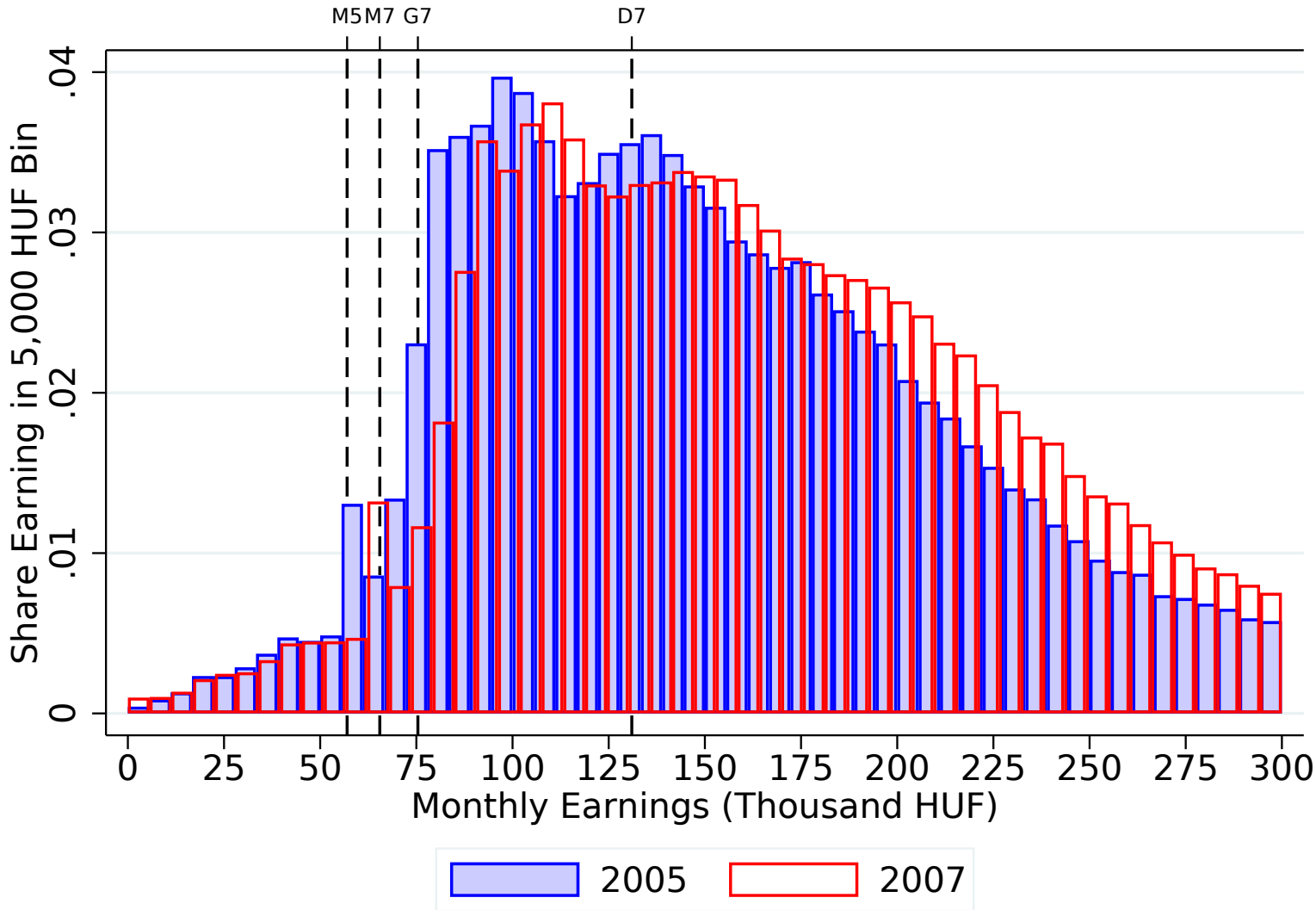
Evidence of Bunching: Private Sector Employees



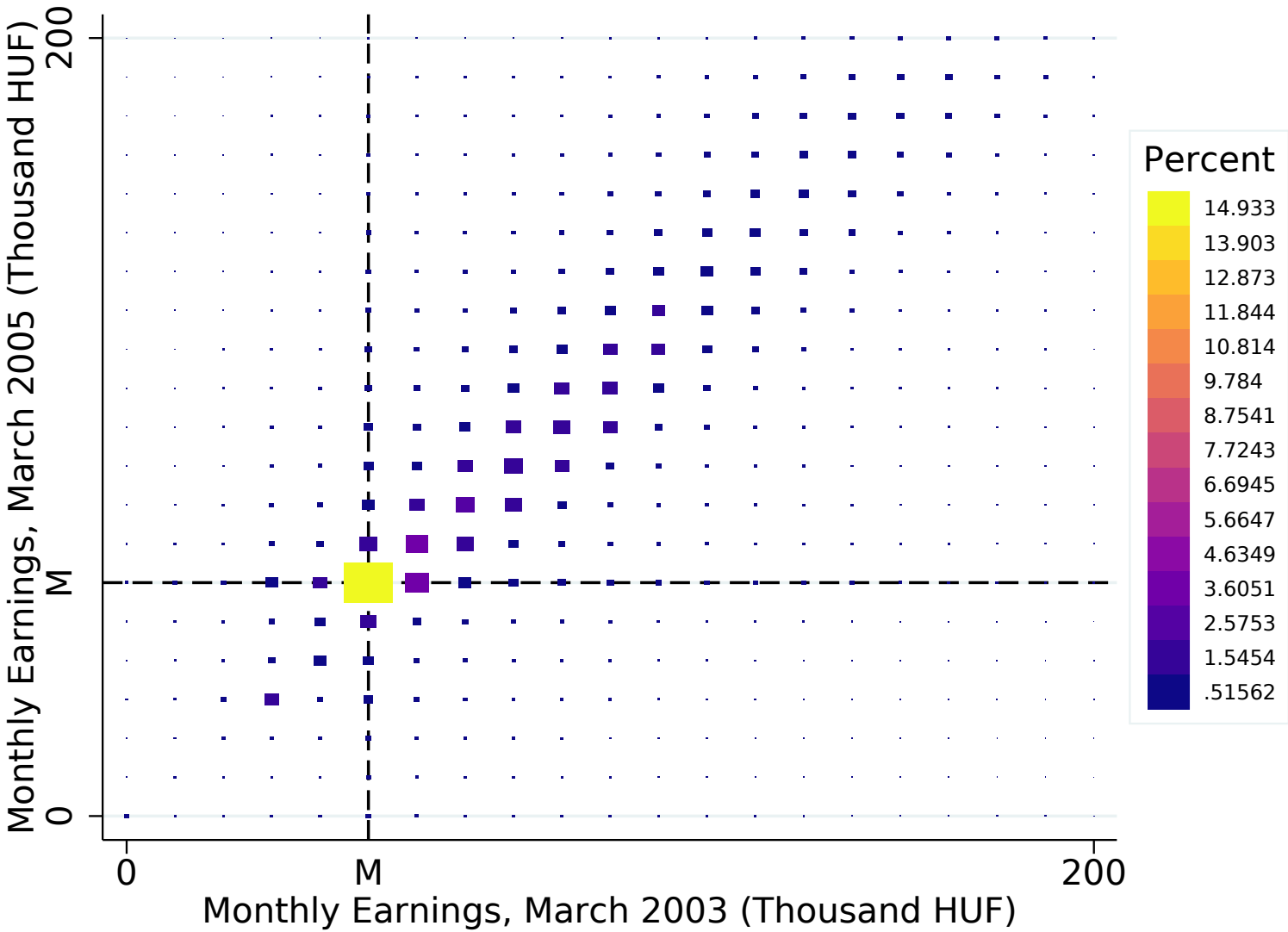
Evidence of Bunching: Self-Employed



Evidence of Bunching: Public Sector Employees



Transitions: Private Sector Employees 2003 → 2005



Note: M stands for the minimum wage.

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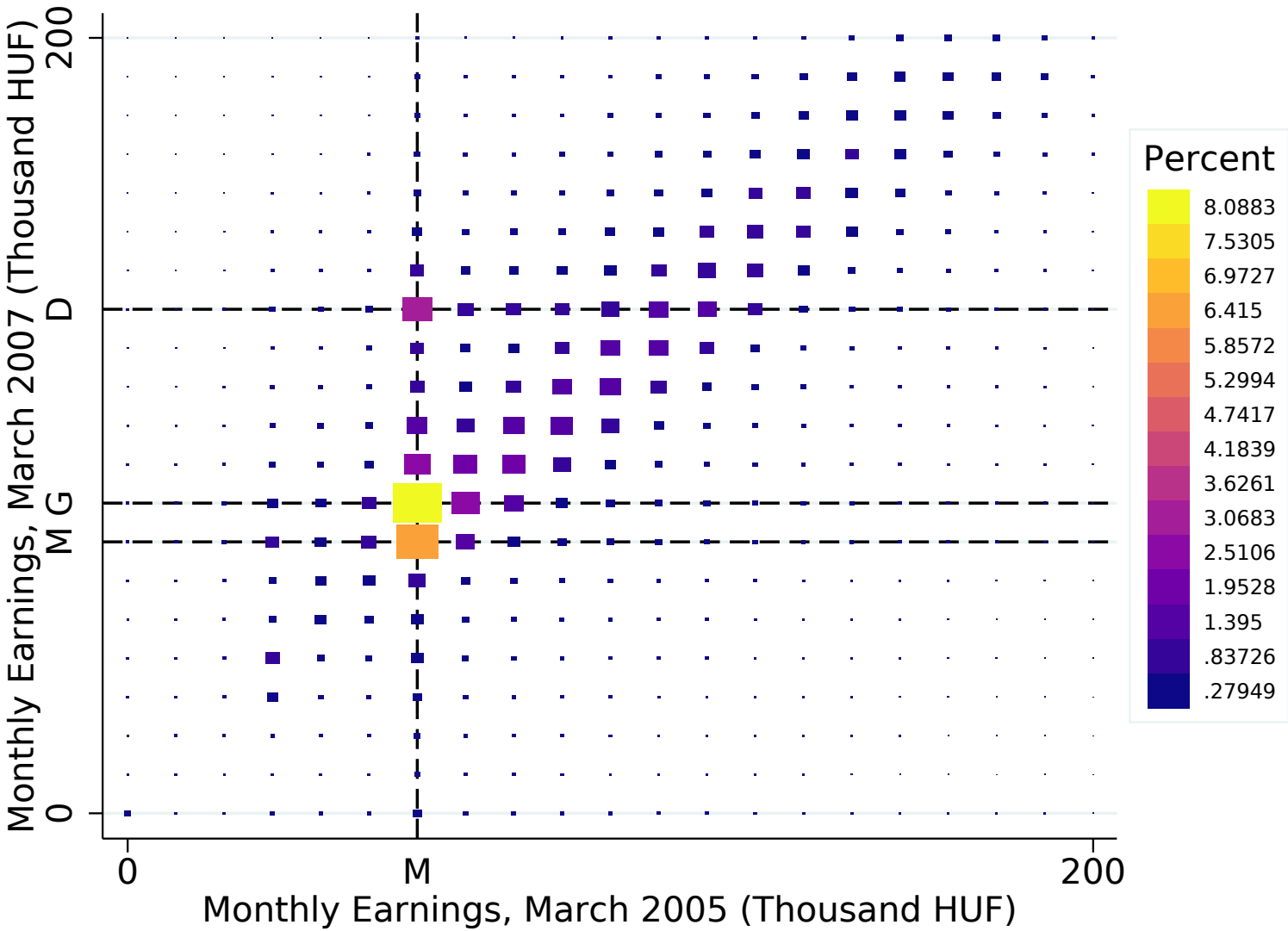

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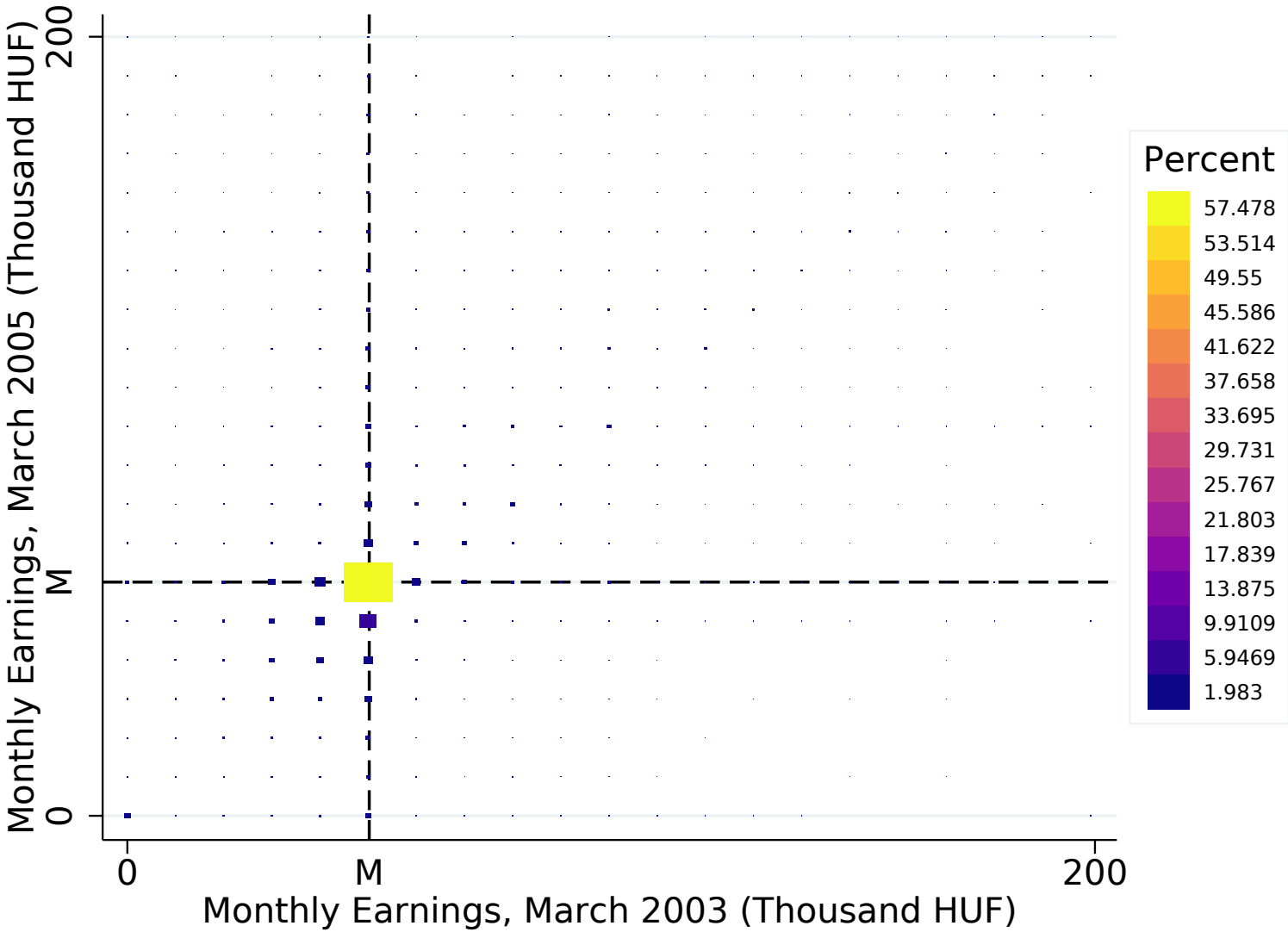

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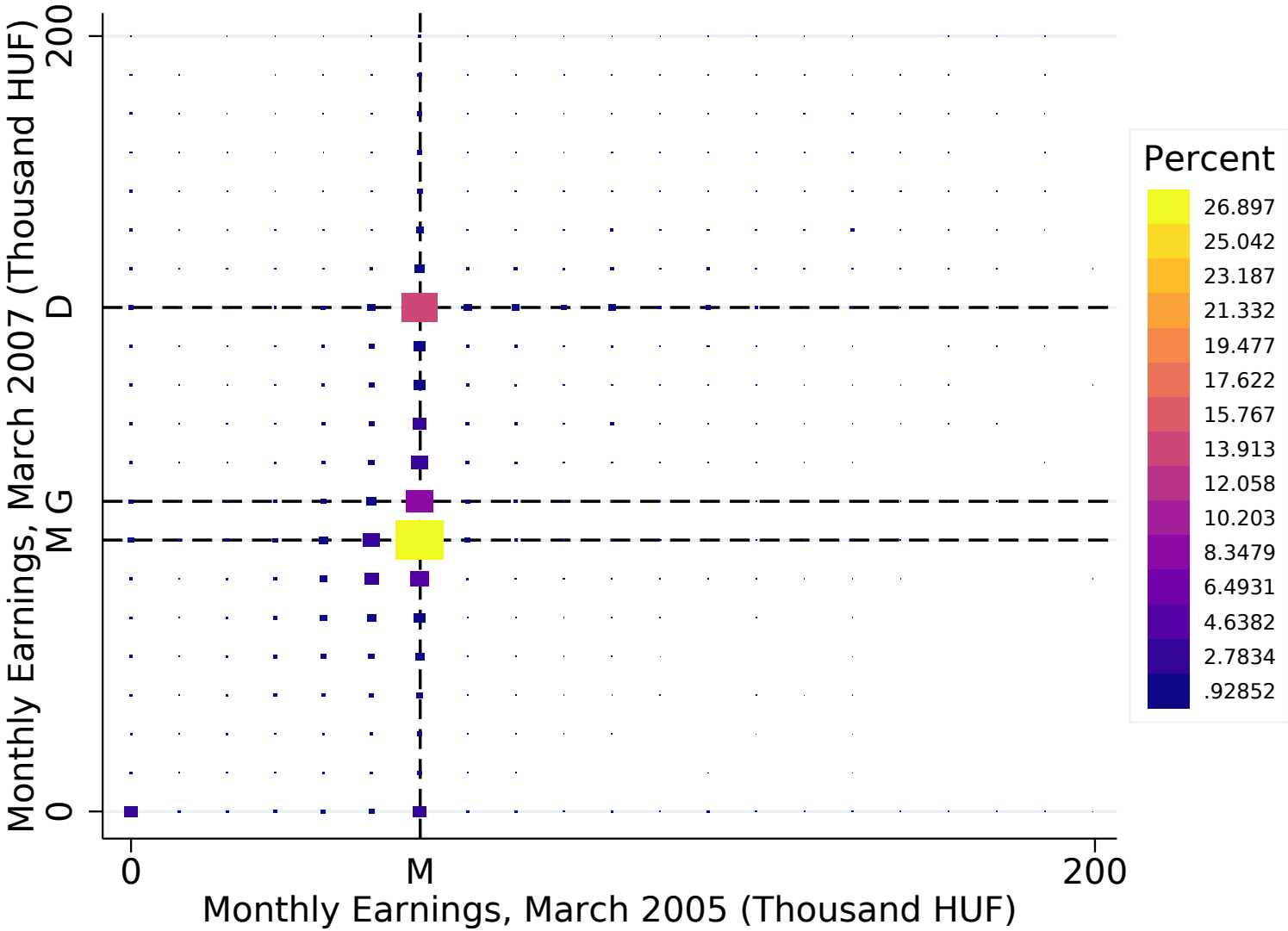

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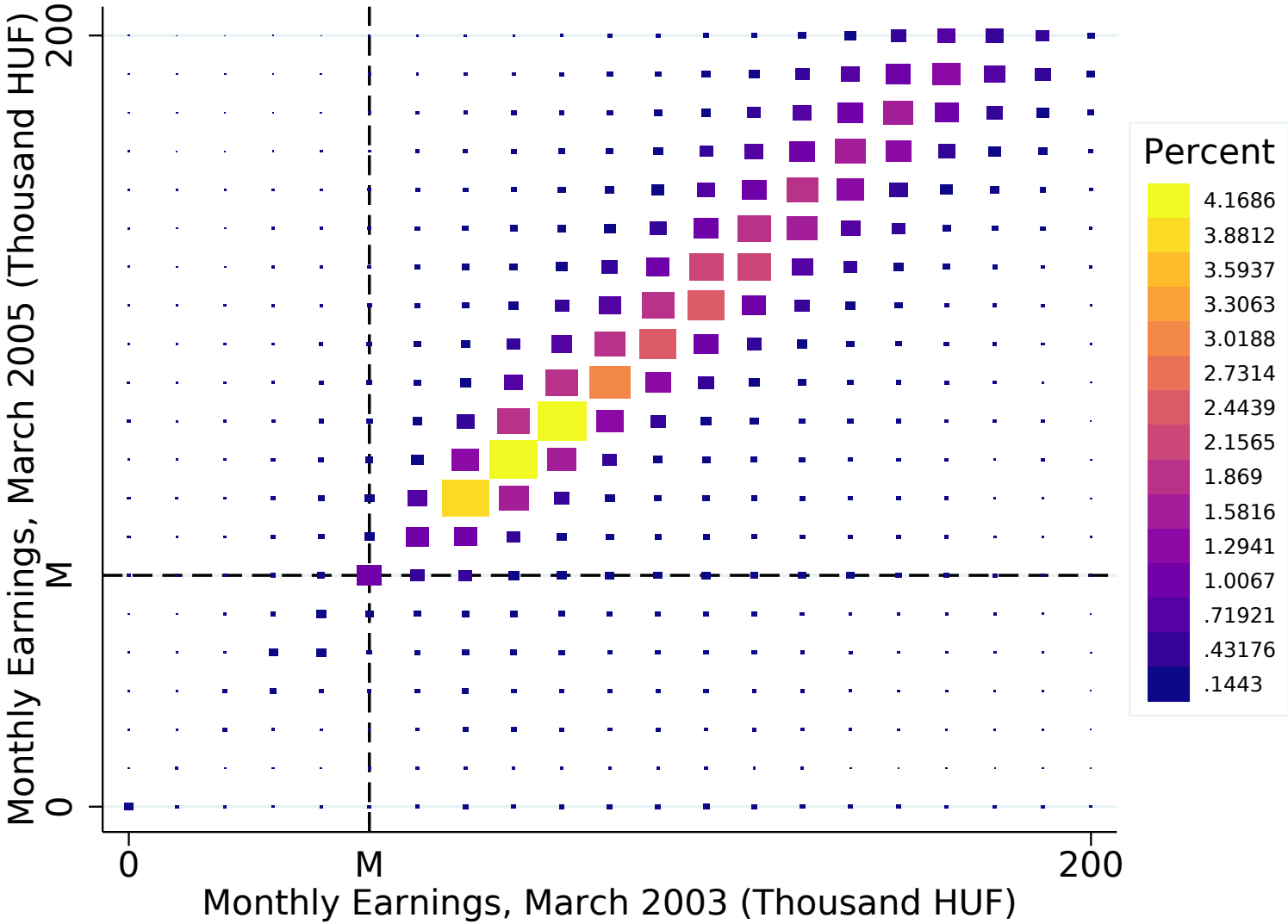

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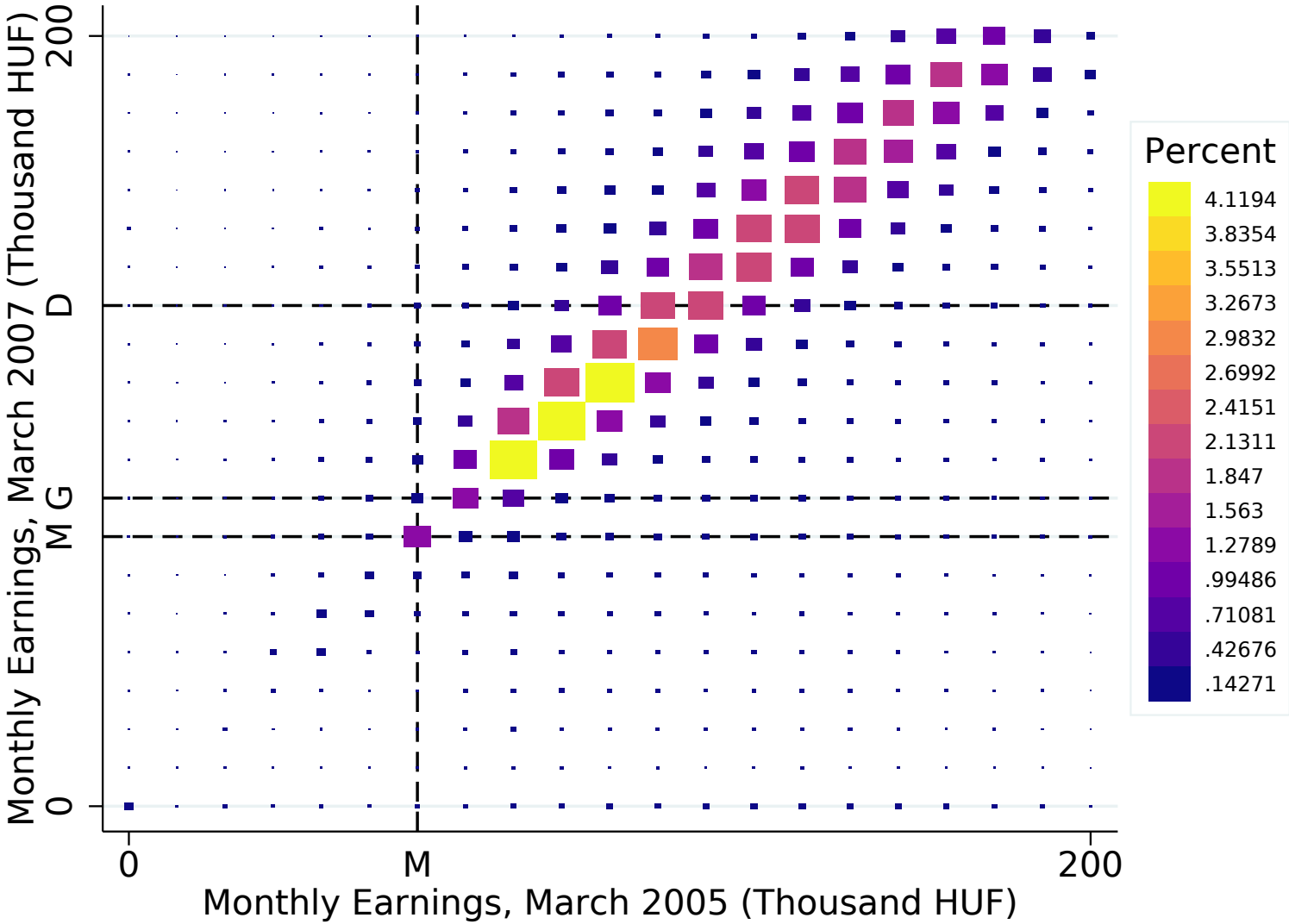

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Summary of Main Results

	Private Employee	Self-Employed	Public Employee
MW 2005	18.26%	68.53%	1.13%
DMW 2005	2.11%	0.32%	2.57%
MW 2007	5.77%	30.89%	1.14%
GMW 2007	6.41%	3.51%	0.75%
DMW 2007	5.14%	16.28%	2.51%
% MW 2005 $\rightarrow$ DMW 2007	10.26%	19.16%	2.04%
N 2005	1,099,336	117,991	299,819
N 2007	1,150,817	134,268	286,386

Note: MW (GMW, DMW) earners are defined as earning between the MW (GMW, DMW) plus 5,000 HUF.

Regression Framework

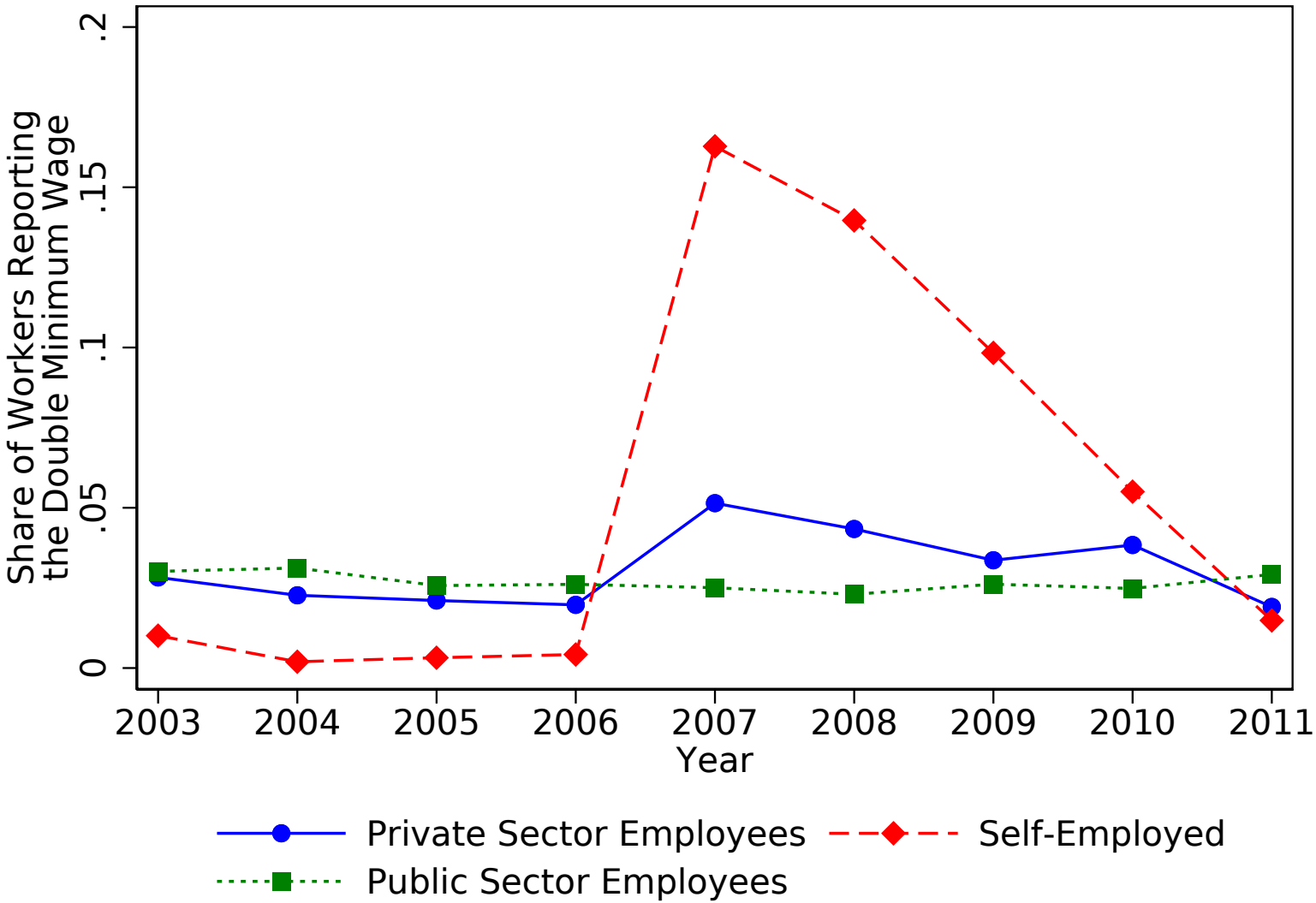
Event study:

$$DMW_{it} = \beta_0 + \sum_{t=2003}^{2011} \beta_{1t} PE_{it} + \sum_{t=2003}^{2011} \beta_{2t} SE_{it} + \alpha_E + \tau_t + \varepsilon_{it} \quad (1)$$

where

- i indexes workers
- PE_{it} is an indicator for private sector employee
- SE_{it} is an indicator for self-employed
- α_E are sector fixed effects (public sector employee vs private sector employee vs self-employed)
- τ_t are year fixed effects

Event Study Estimates: Reporting Response



Event Study Estimates: Reporting Response

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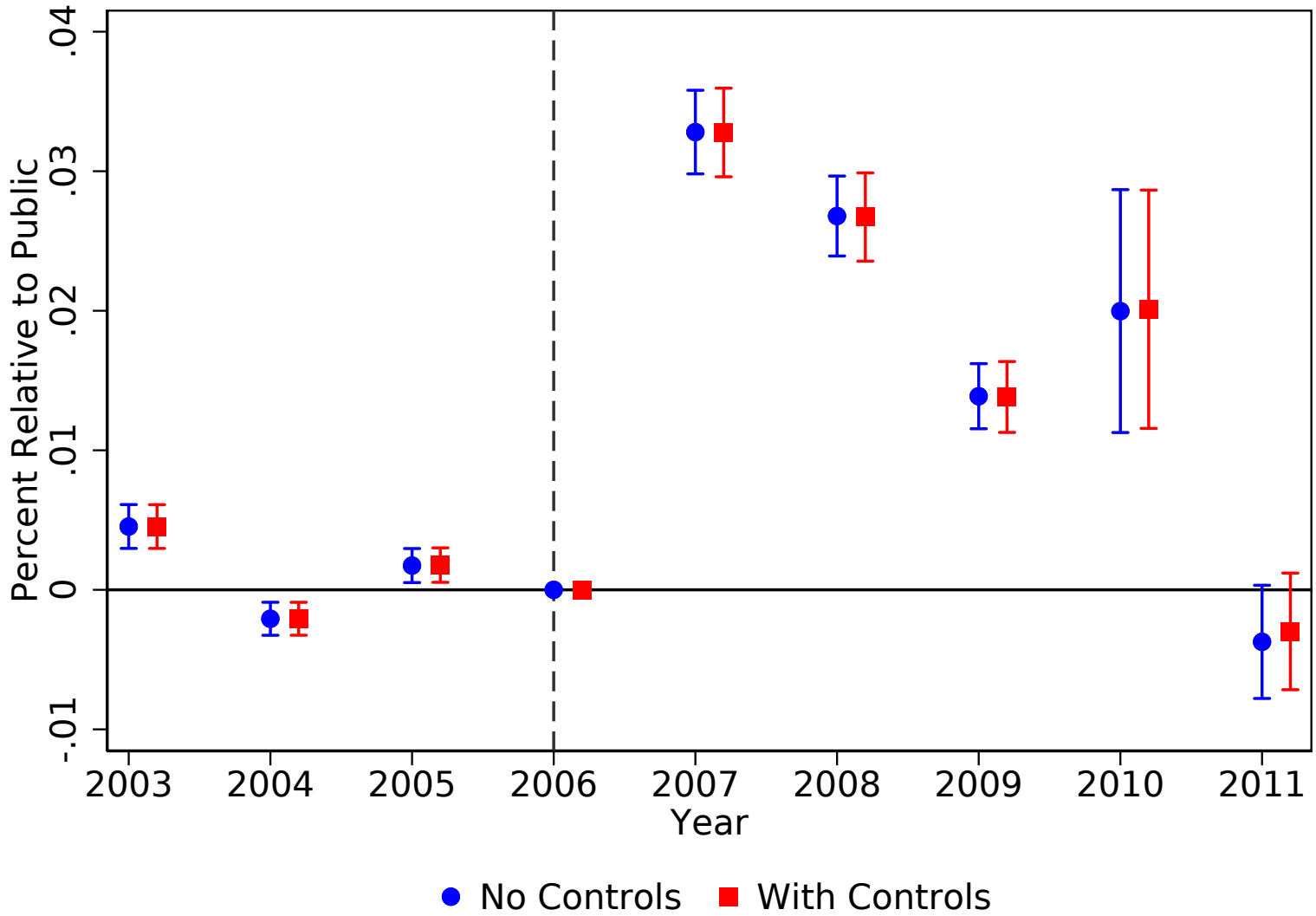

▸ Pooled Version

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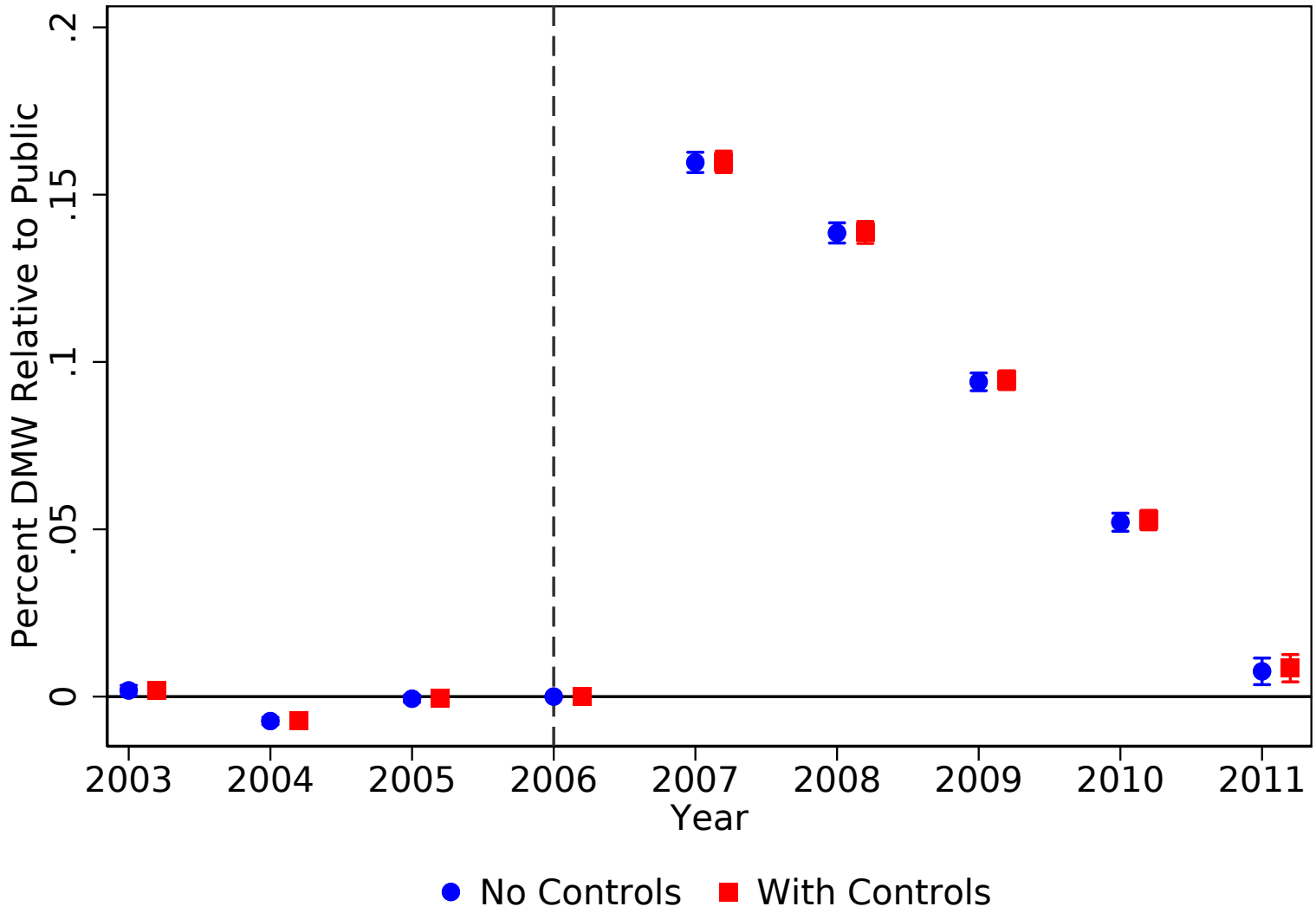

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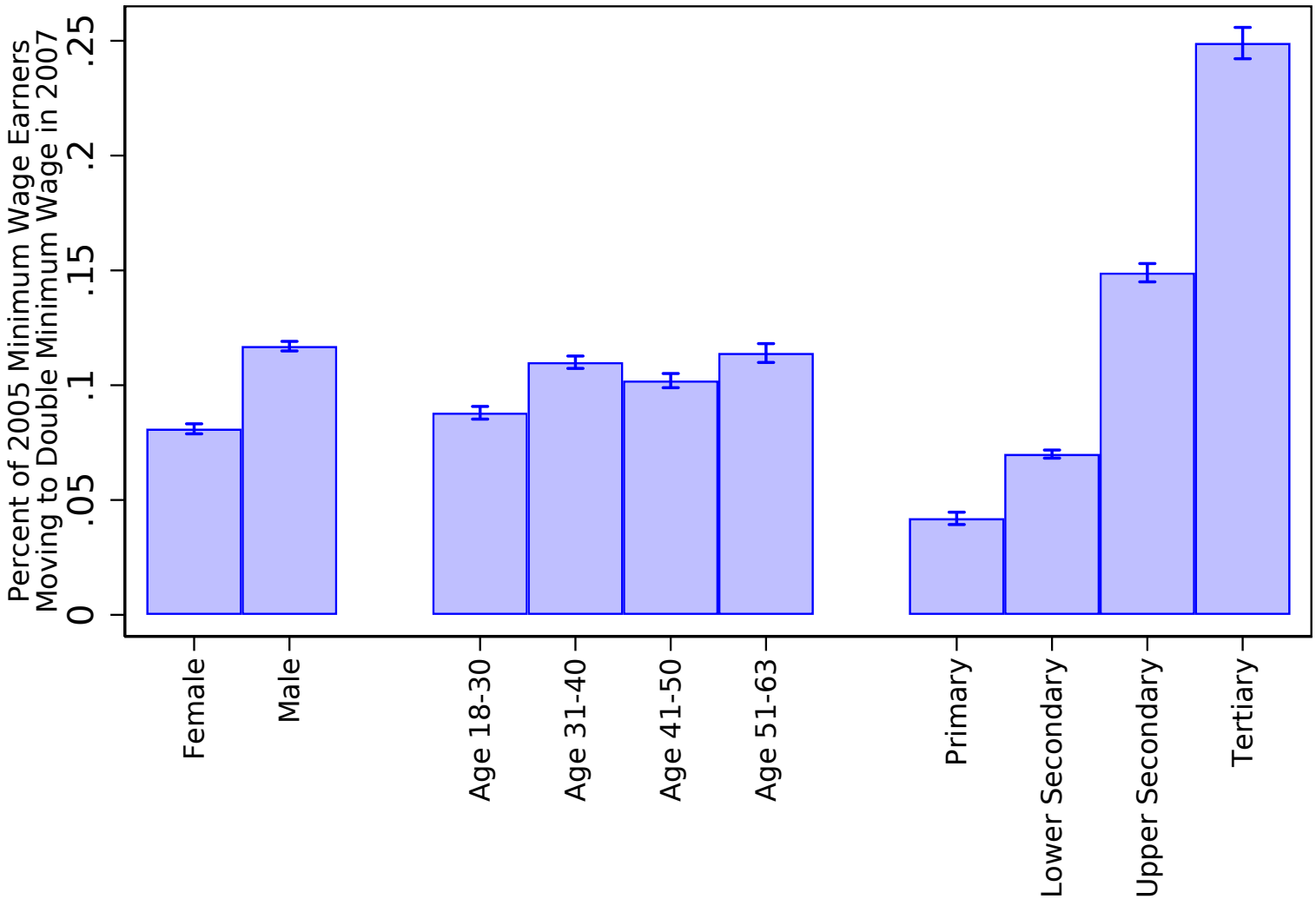
Heterogeneity: Worker Characteristics

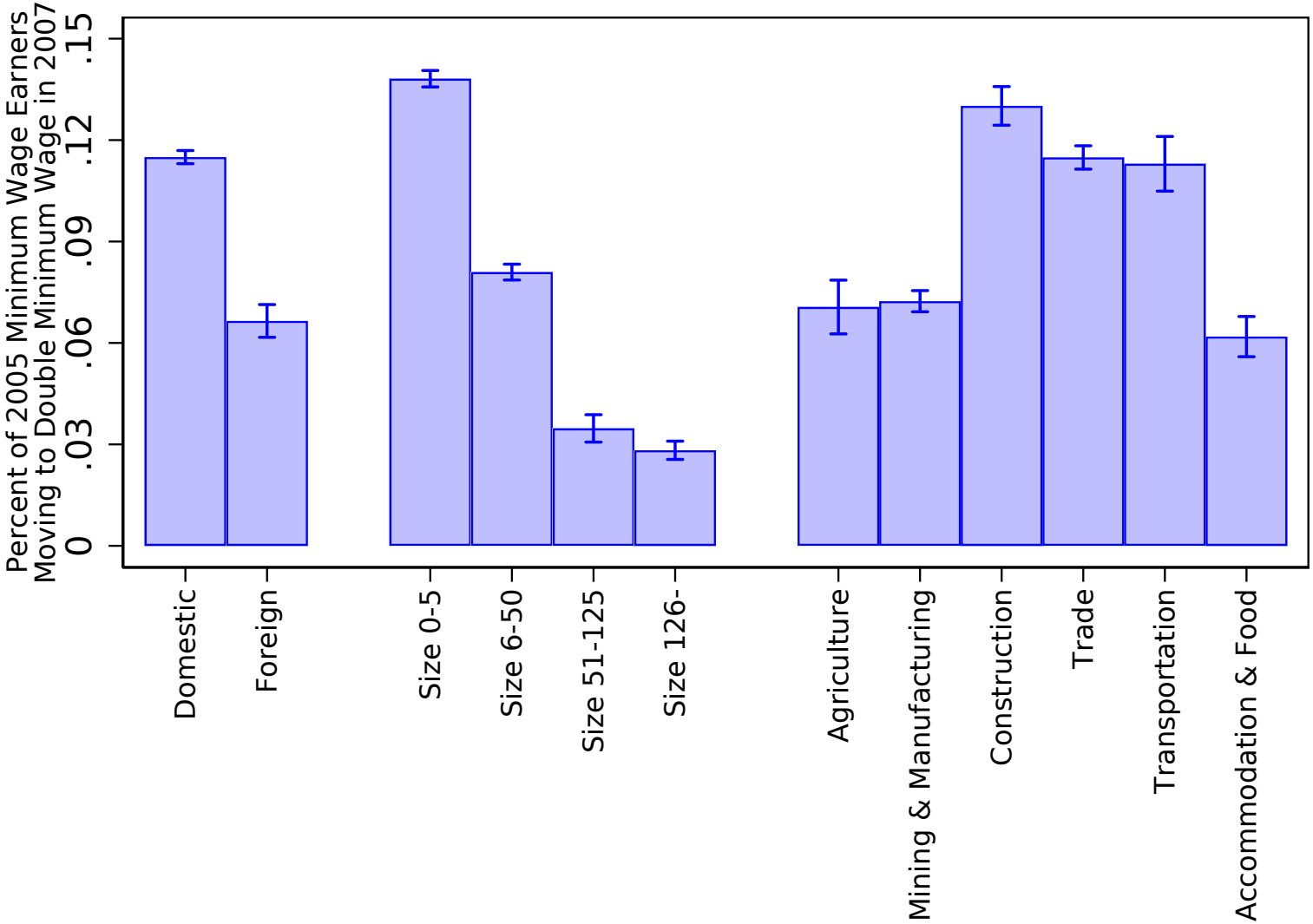
Private Employees



▸ By Gender ▸ By Age ▸ By Education

Heterogeneity: Firm Characteristics

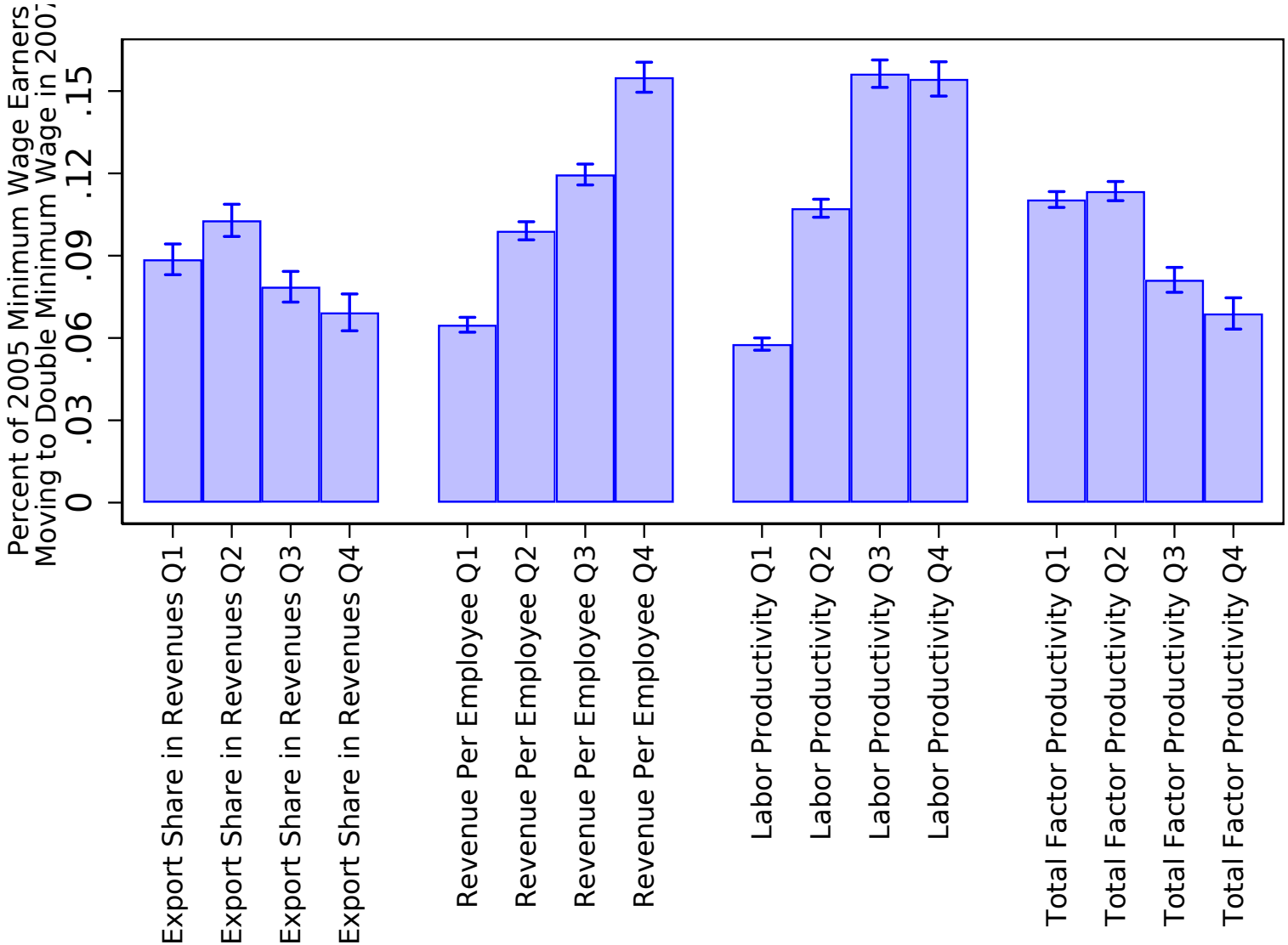
Private Employees



▸ By Ownership ▸ By Size ▸ By Industry

Heterogeneity: Firm Quality

Private Employees



▸ By Export ▸ By Revenue ▸ By Labor Productivity ▸ By TFP

Evidence on Formal Employment Response

Regression Framework

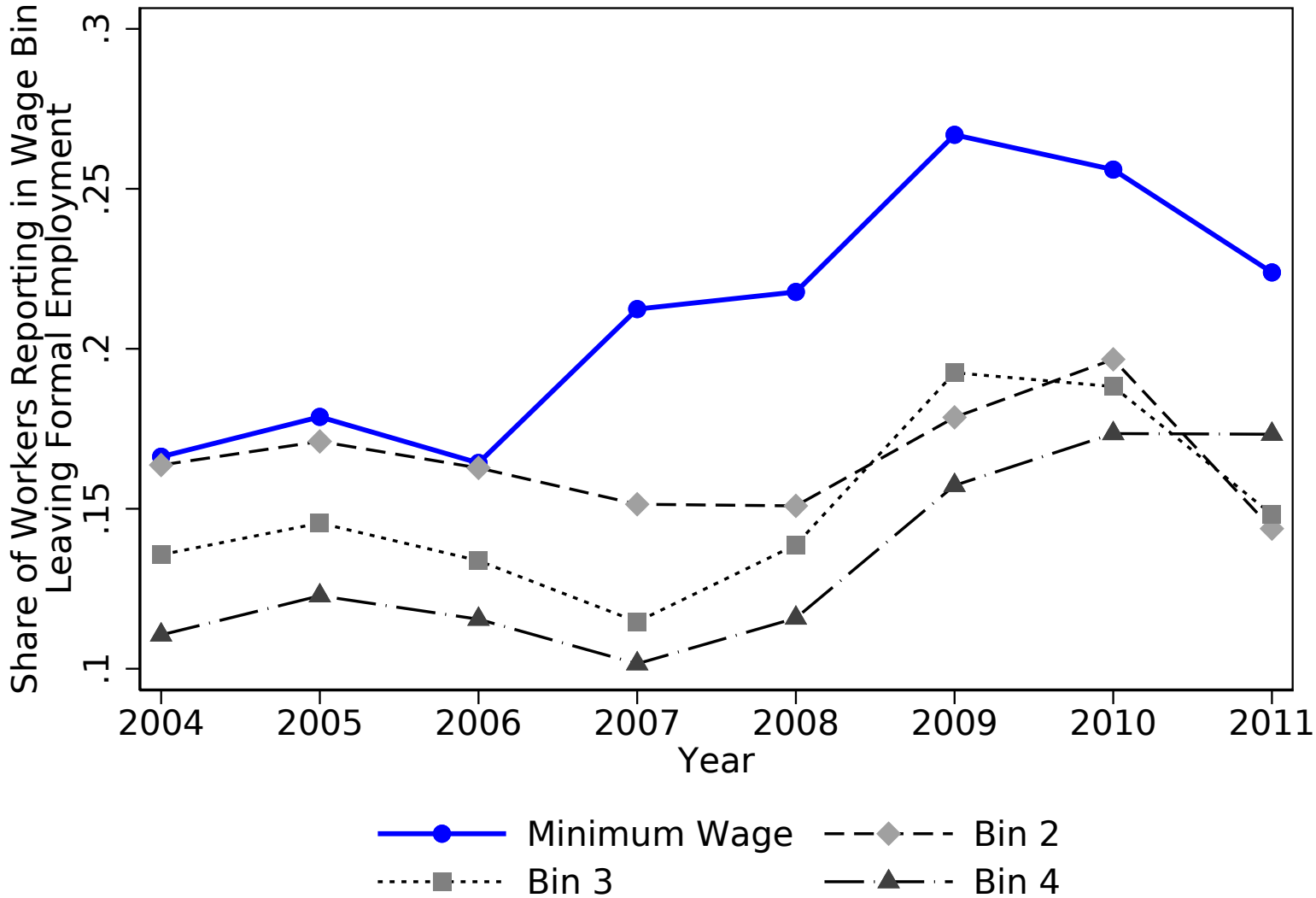
Event study:

$$Exit_{it} = \beta_0 + \sum_{t=2004}^{2011} \beta_t MW_{it} + \alpha_B + \tau_t + \varepsilon_{it} \tag{2}$$

where

- i indexes workers
- MW_{it} is an indicator for being in the minimum wage bin (vs in the control wage bin)
- α_B are wage bin fixed effects (minimum wage vs control wage bin)
- τ_t are year fixed effects

Raw Trends: Private Sector Employees



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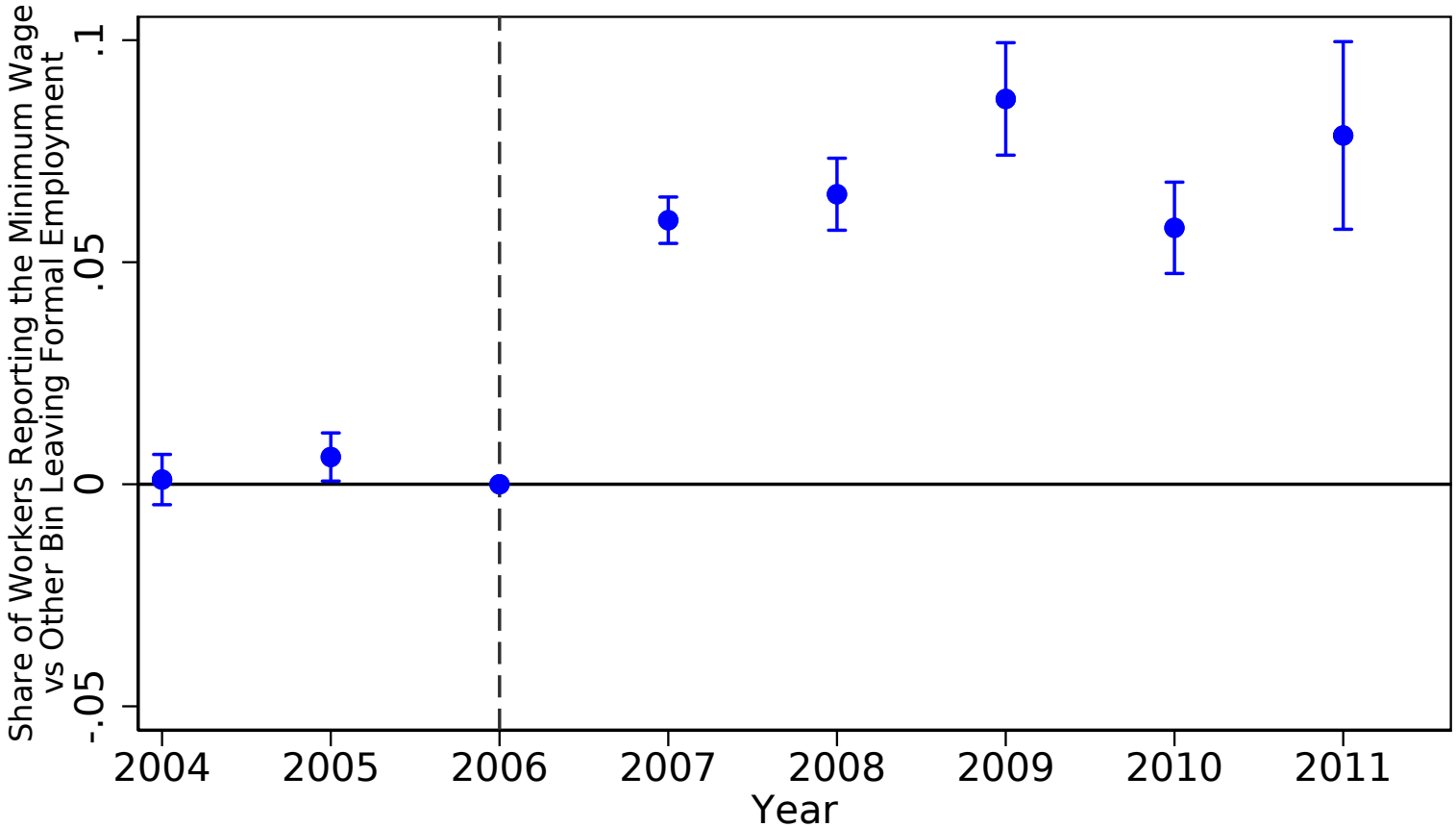

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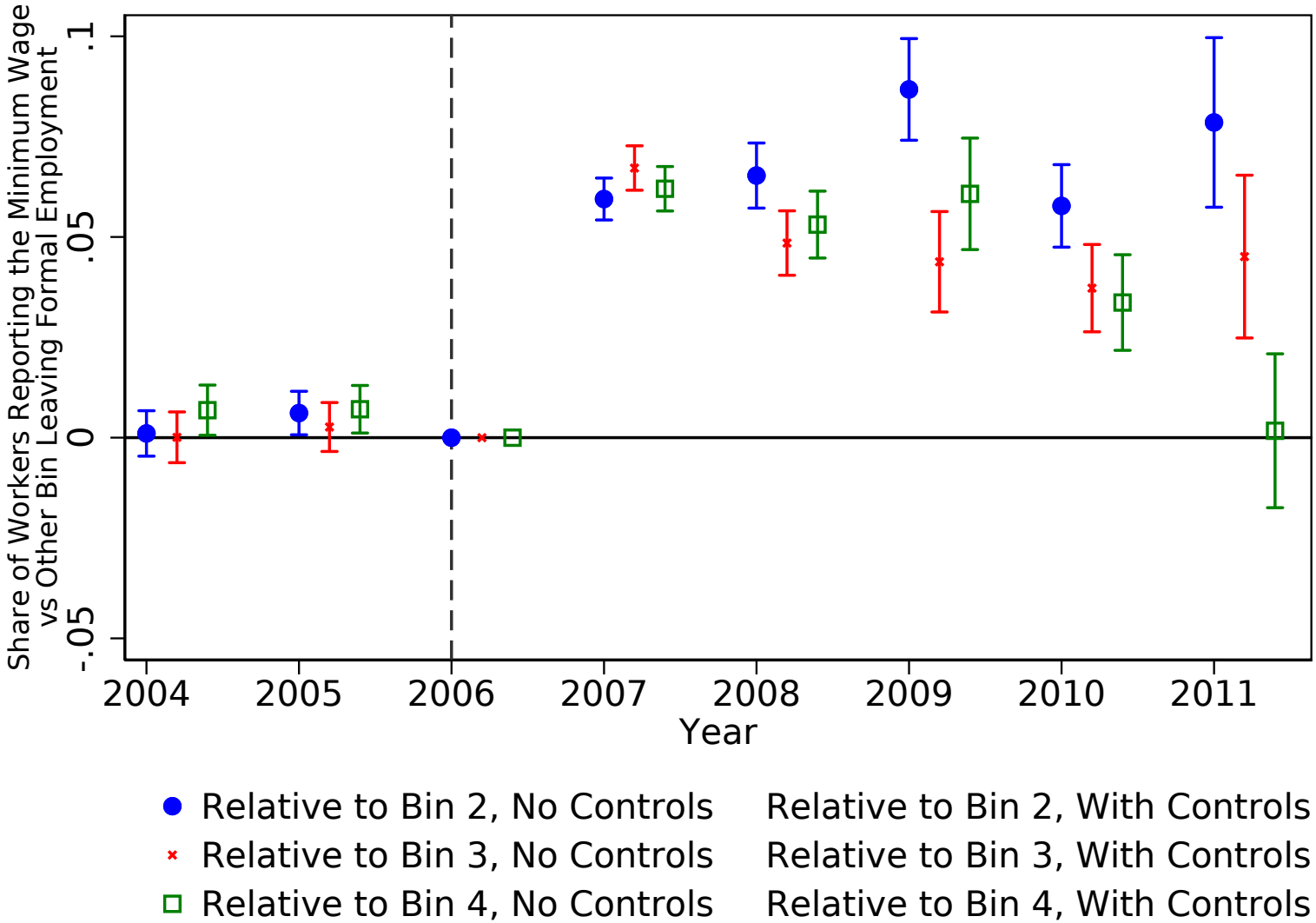

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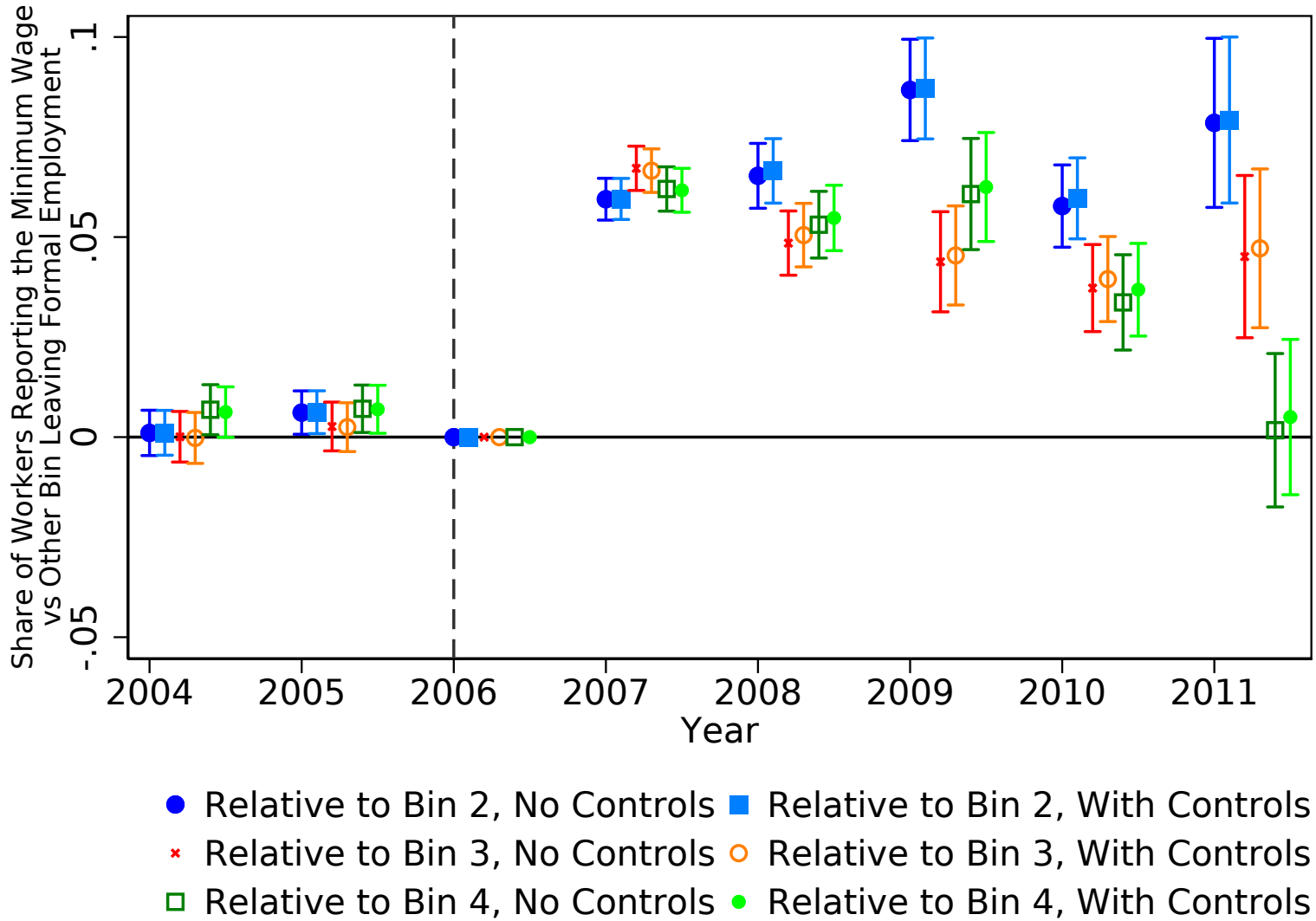

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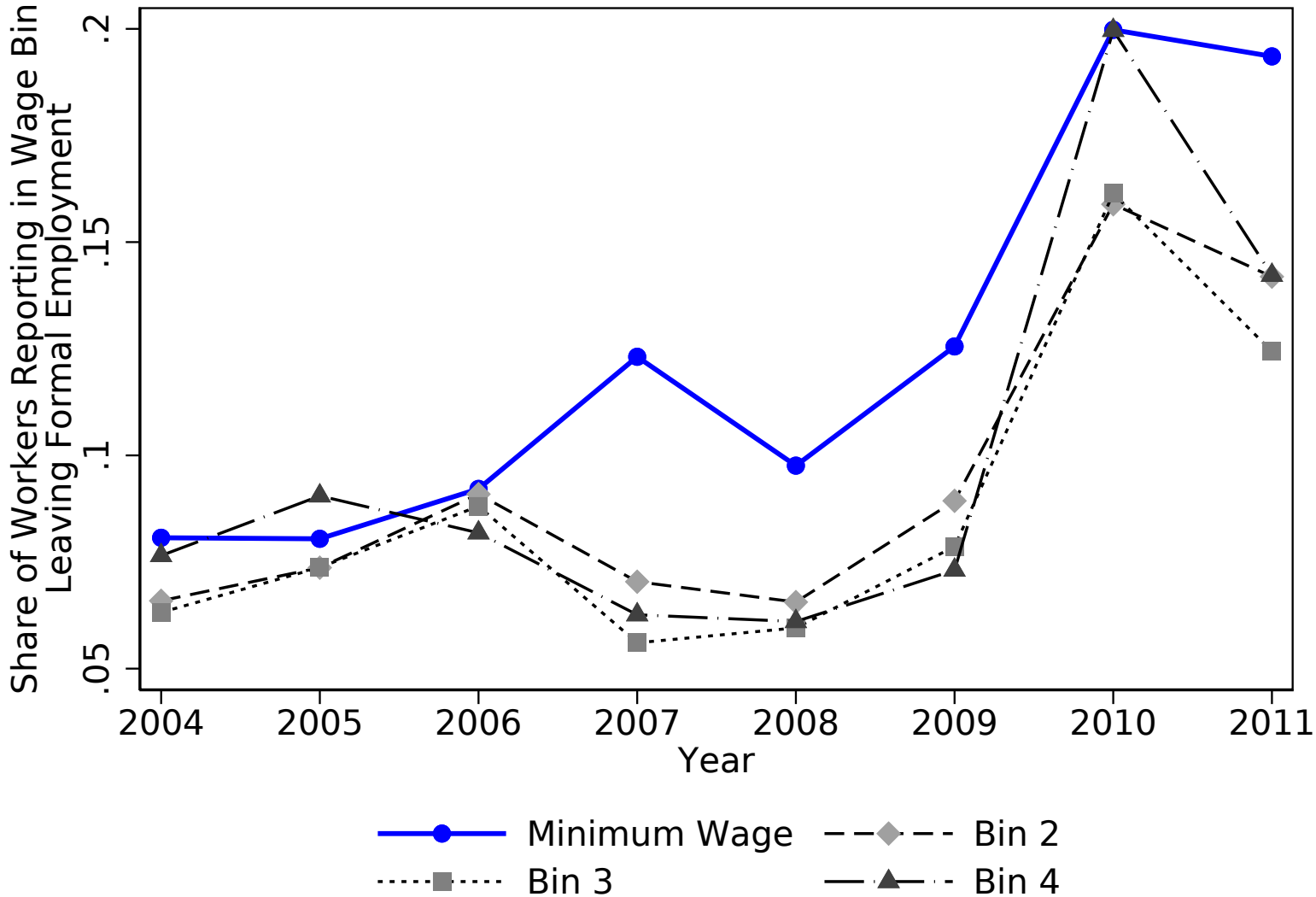

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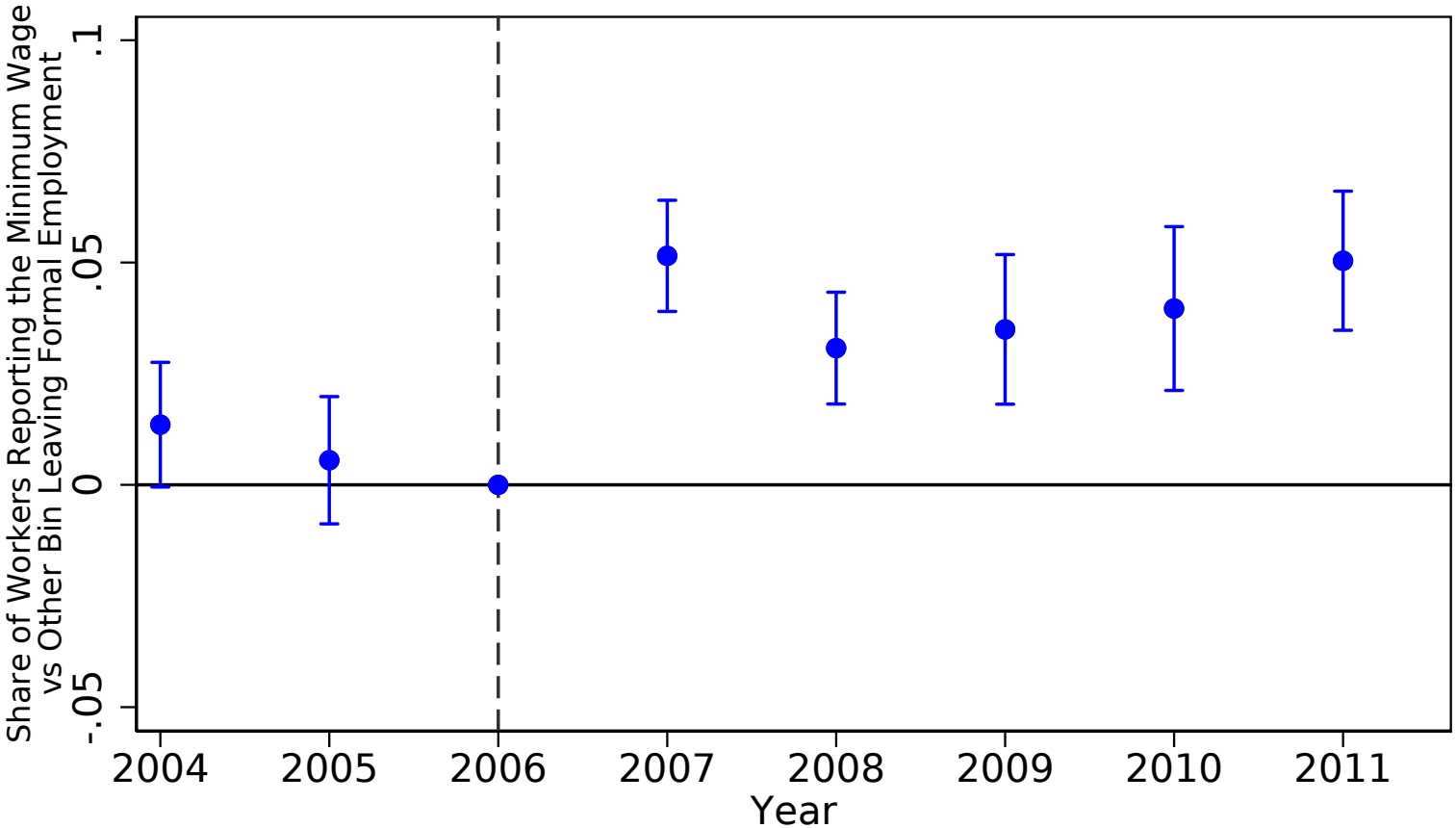

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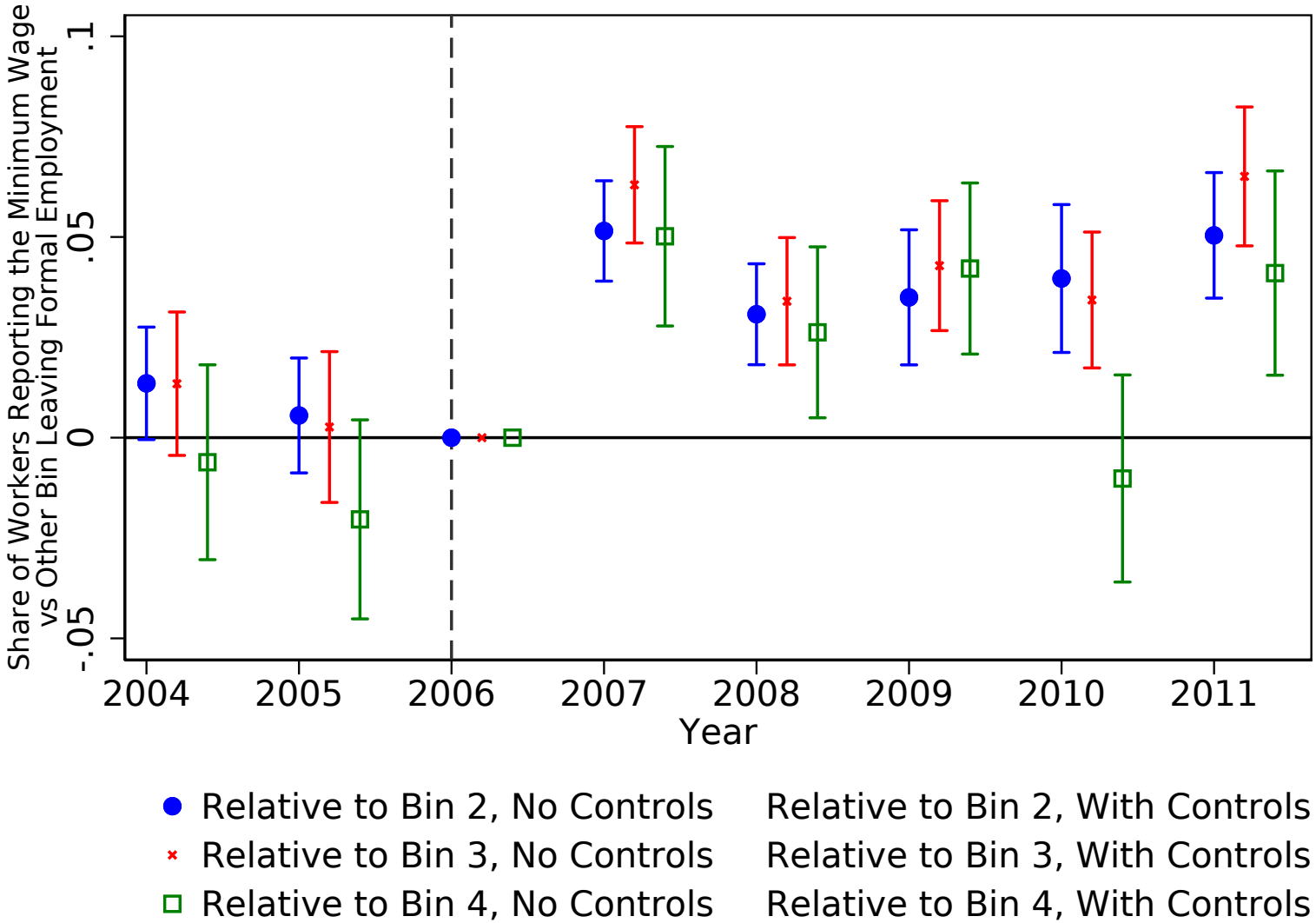

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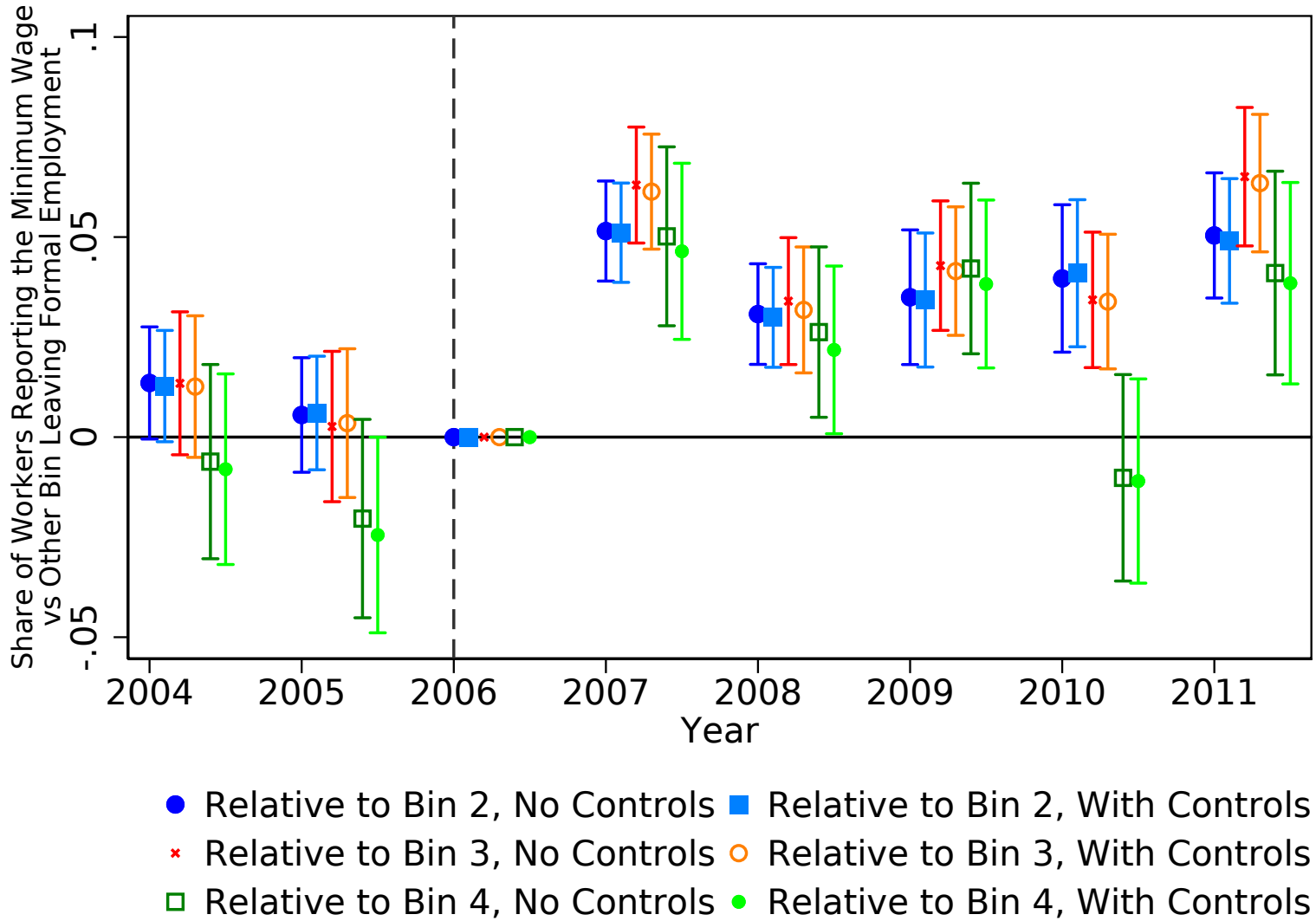

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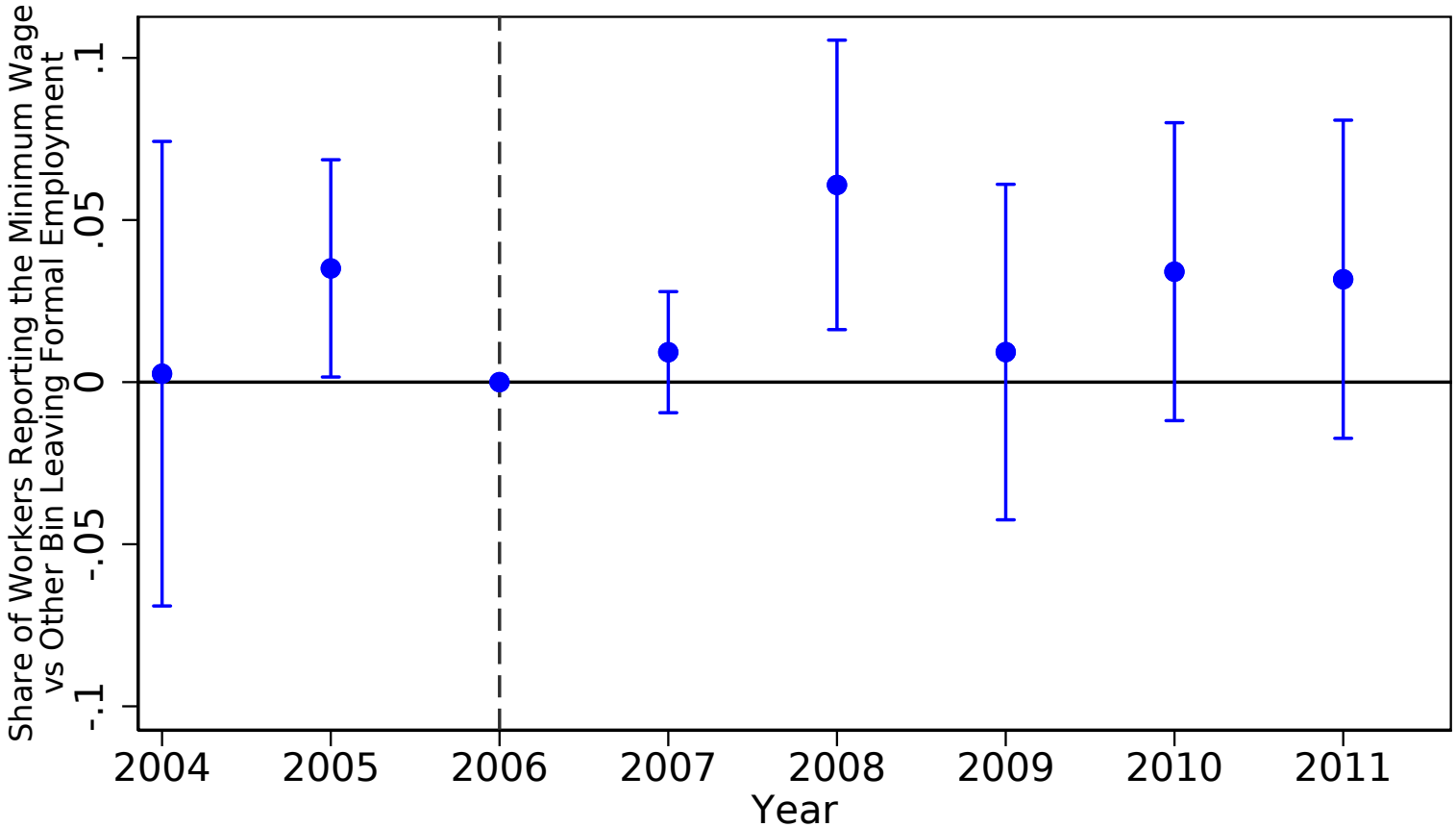

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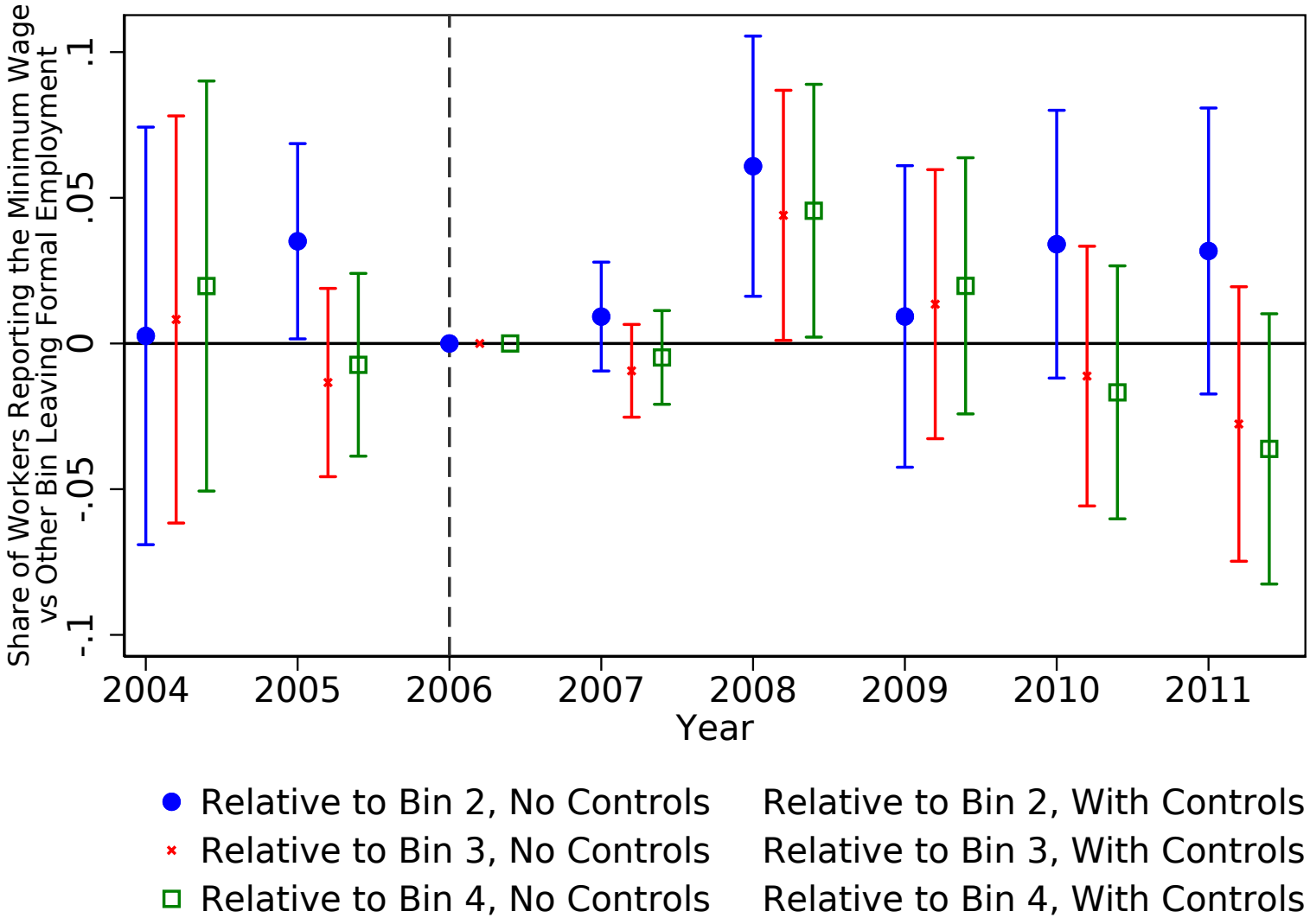

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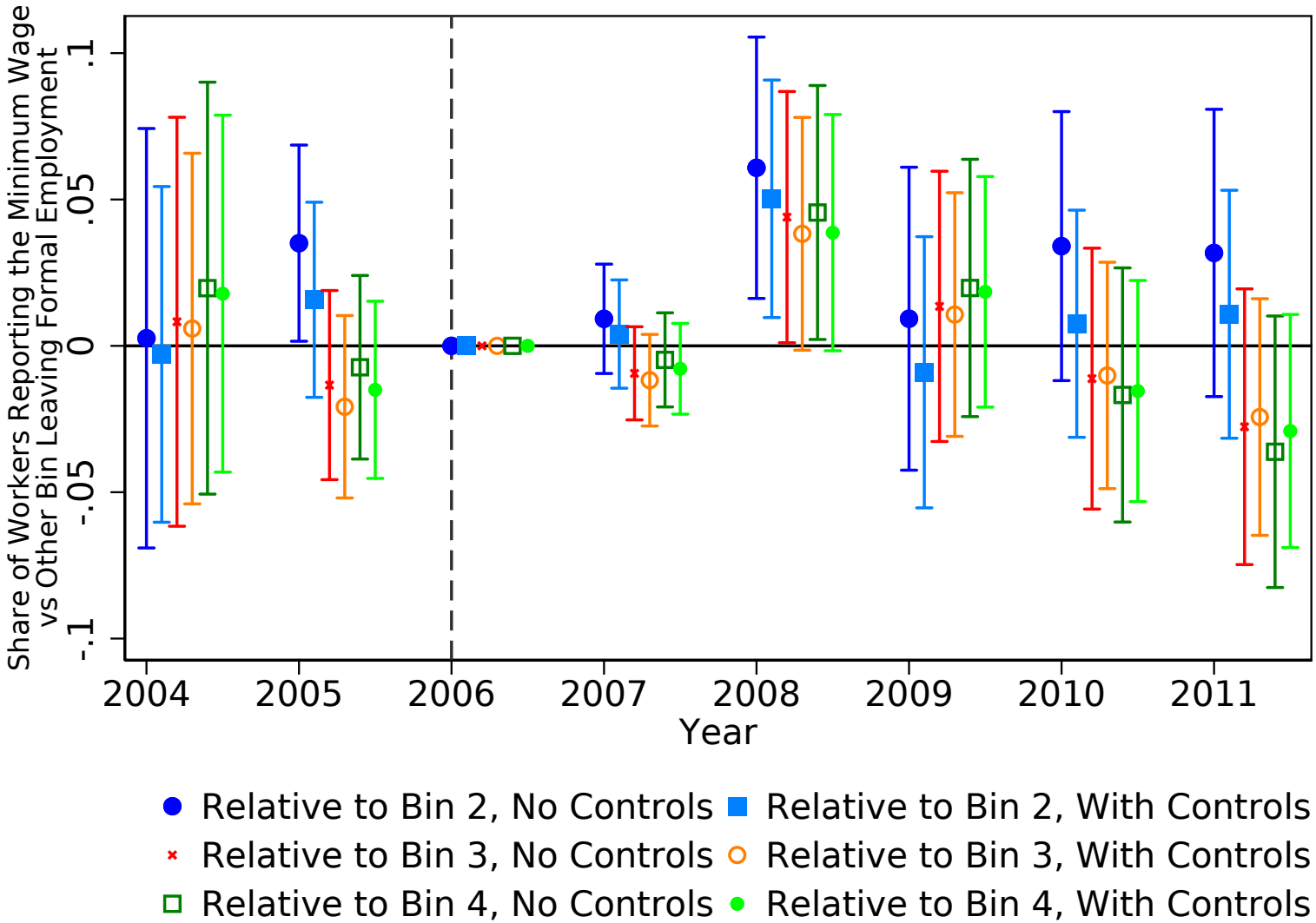

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Heterogeneity: Worker Characteristics

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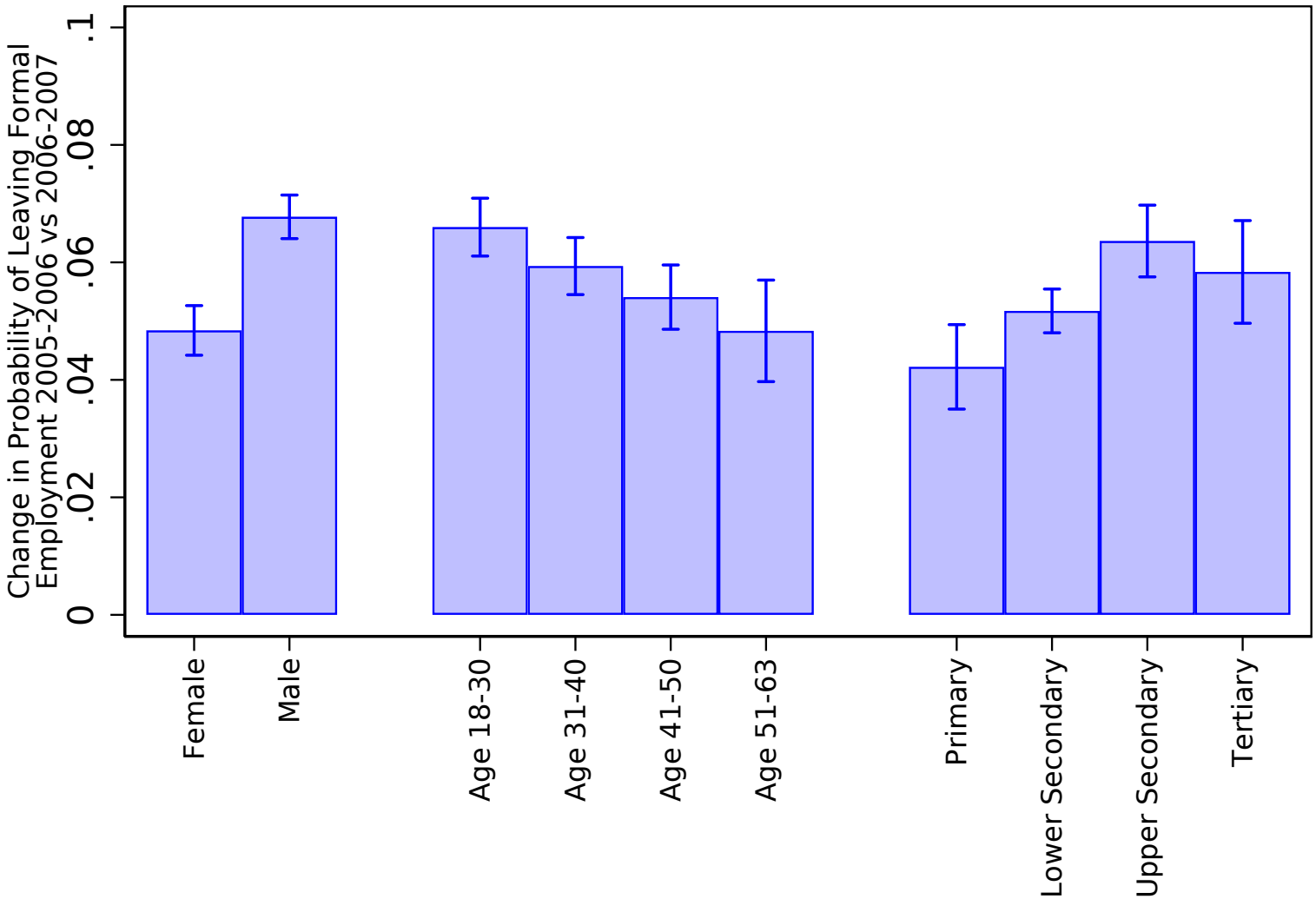

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Heterogeneity: Firm Characteristics

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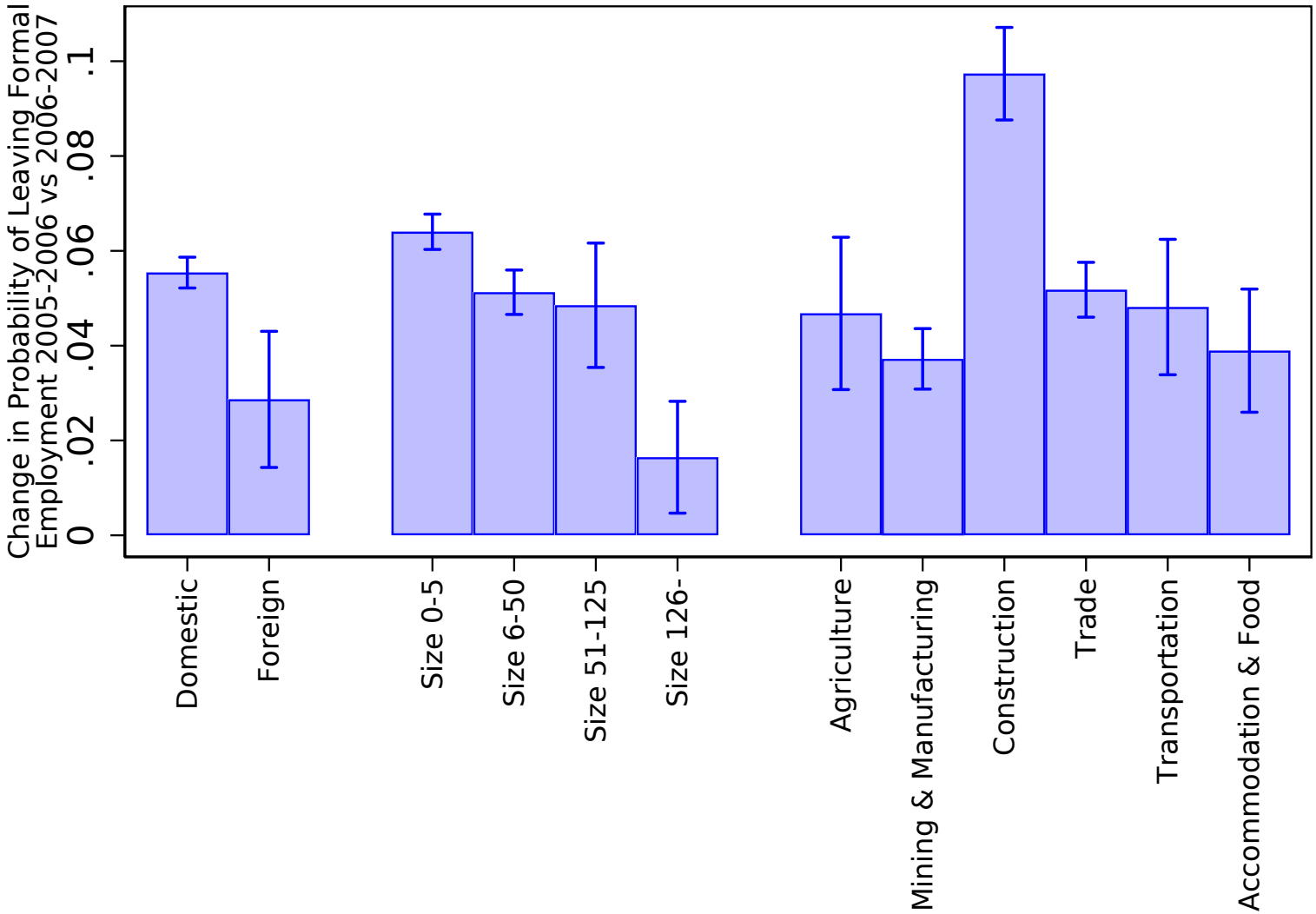

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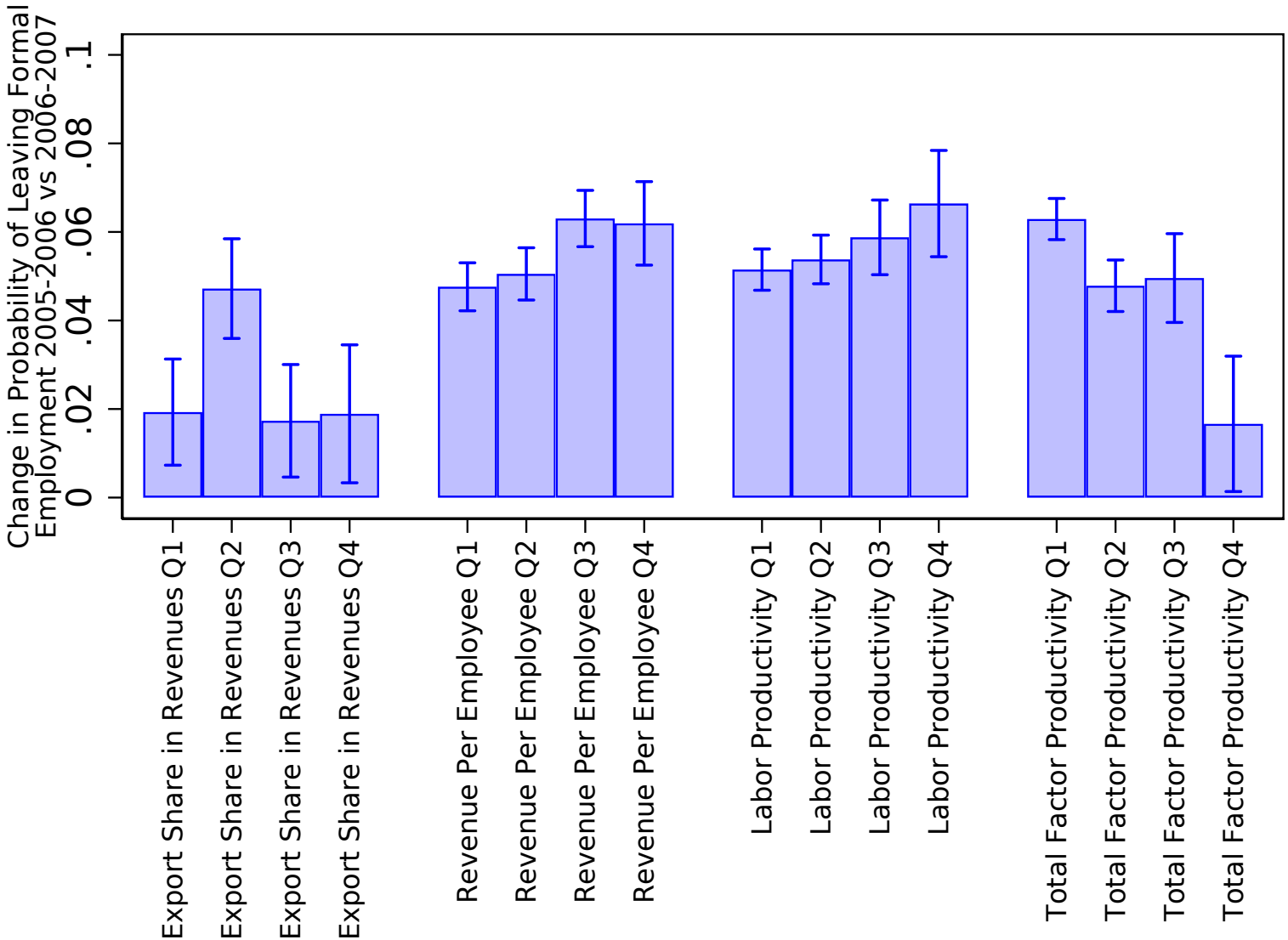

▸ By Export ▸ By Revenue ▸ By Labor Productivity ▸ By TFP

Model

Simple Model

- Initial income tax rate τ_0 (assume optimal without evasion)
- Initial gross minimum wage W^{m0} and net minimum wage $W^{m,net} = W^{m0}(1 - \tau_0)$

Simple Model

- Follow Butcher, Dickens and Manning (2012) and Tonin (2011)
- Consider a case where monopsonistic employers set wages
- Employers differ in their marginal products of labor (productivity is denoted by A) and they compete over a fixed supply of workers L
- Optimal wage:

$$W_i^* = \frac{\varepsilon}{1+\varepsilon} A_i < A_i, \tag{3}$$

  where ε is the wage elasticity of labour supply to the firm
- Introduction of a minimum wage W^{m0} has three implications:

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  3. Firms with $A_i > W^{m0} > W_i^*$ will pay the minimum wage, creating a spike at the minimum wage. (Mass B)

Simple Model

- Consider a reform that raises the tax rate to $\tau_1 > \tau_0$ and leaves the net minimum wage unchanged, resulting in a new gross minimum wage of $W^{m1} = \frac{W^{m,net}}{1-\tau_1} > W^{m0}$
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- Loss of tax revenue due to mass βB leaving the labor market:

$$L = \tau_0 W^{m0} \times \beta B \tag{4}$$

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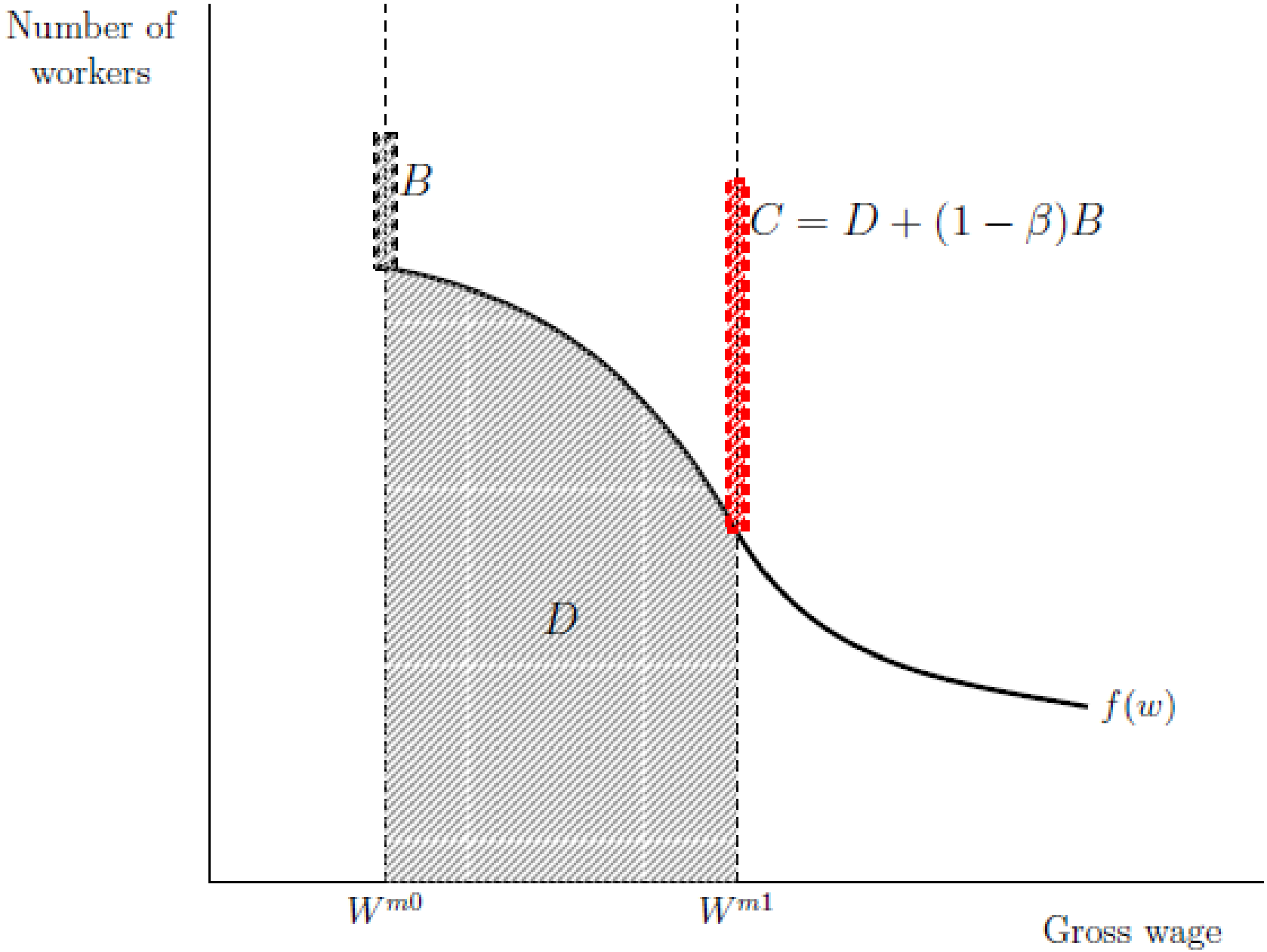
- Gain of tax revenue due to higher tax rate:

$$G = \tau_1 W^{m0} \times (1-\beta)B + \int_{W^{m0}}^{W^{top}} (\tau_1 - \tau_0) w f(w) dw, \tag{5}$$

where W^{top} is the highest gross wage to which the analyzed


Number of workers
B
$C = D + (1 - \beta)B$
D
$f(w)$
W^{m0}
W^{m1}
Gross wage

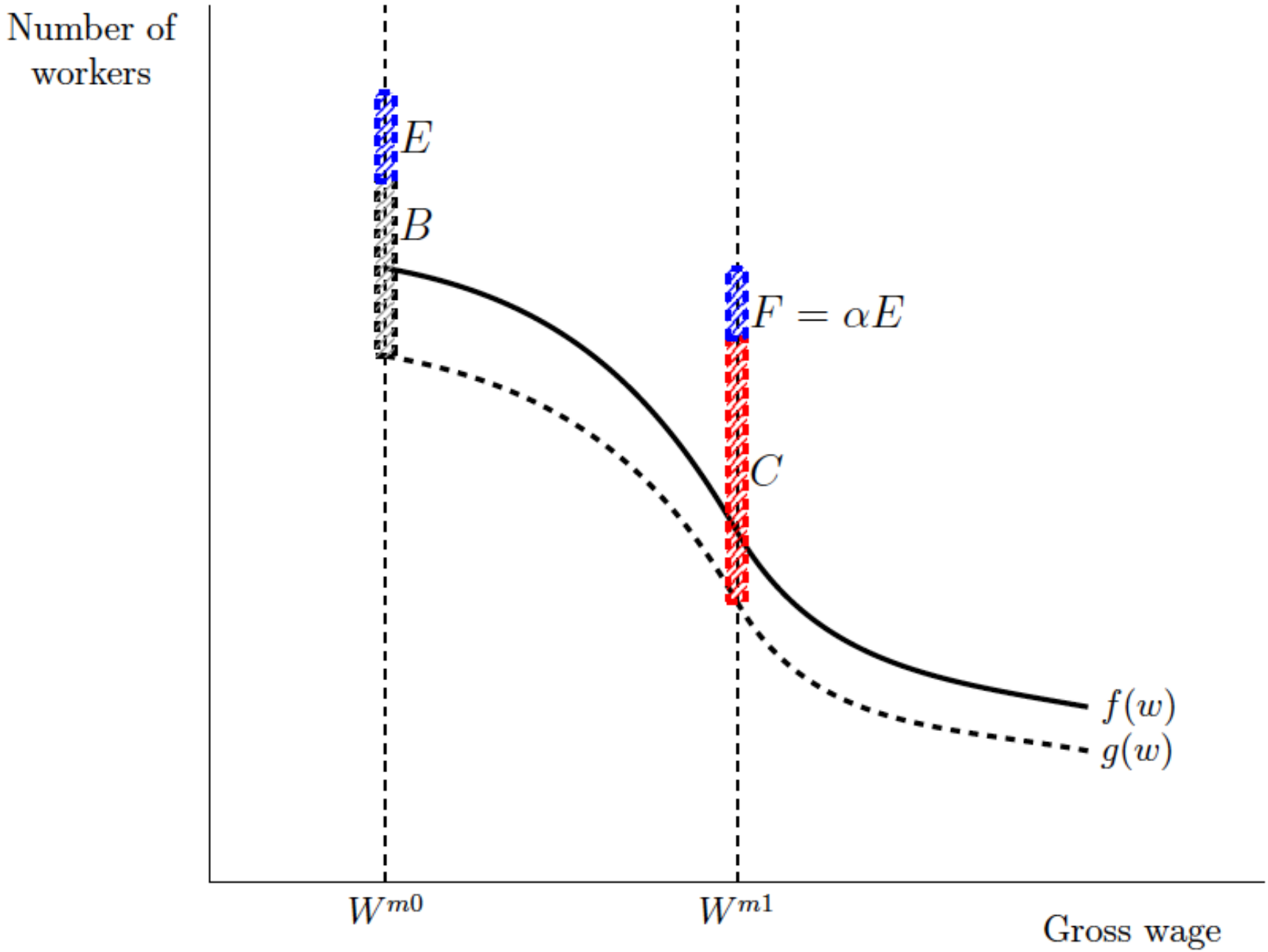
Simple Model

- Assume that there is tax evasion: $f(w)$ is the true wage distribution, $g(w)$ is the observed/reported wage distribution
- Since the minimum wage is binding, tax evaders also bunch at W^{m0}
- When increasing the tax, the government realizes an additional net gain (NG) as a result of the tax increase:

$$\begin{aligned} NG &= F \times \tau_1 W^{m1} - E \times \tau_0 W^{m0} = \\ &= E \times (\alpha\tau_1 W^{m1} - \tau_0 W^{m0}). \end{aligned} \tag{6}$$

- NG is positive if:

$$\frac{W^{m1}}{W^{m0}} = \frac{1-\tau_0}{1-\tau_1} > \frac{\tau_0}{\alpha\tau_1}. \tag{7}$$


Number of workers
E
B
F = αE
C
f(w)
g(w)
W^{m0}
W^{m1}
Gross wage

Discussion

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- Large reporting response to increase in audit threat
- But also increase in probability of leaving formal employment
- Implies important trade off for tax policy
- In the presence of evasion in the form of underreporting at the minimum wage
  - may want to tax the minimum wage

Summary Statistics

	Priv Sector Emp Mean	Self-emp Mean	Public Sector Emp Mean
Age	38.89	41.93	42.17
Share Male	0.56	0.65	0.27
Monthly Earnings (HUF)	155,165	72,932	191,774
Education Level			
Primary	0.14		0.14
Lower Secondary	0.48		0.12
Upper Secondary	0.27		0.33
Tertiary	0.11		0.41
Person-Year Observations	10,221,529	960,638	2,496,331
Unique Individuals	2,119,527	273,879	506,534

Data and Sample

Summary Statistics of Firm Indicators

	Weighted by Firm Size		
	Mean	Std. Dev.	Median
Observed Firm Size	1,417	4,471	43
Foreign Ownership	0.29	0.45	0
Export Share of Revenue	0.3	0.38	0.05
Annual Revenue per Employee (HUF)	28,929	201,476	11,764
Annual Labor Productivity (HUF)	6,270	37,666	3,024
Total Factor Productivity	0.86	1.04	0.86

Data and Sample

Pooled Regression: Reporting Response

	(1)	(2)
Post × Private Sector Employee	0.022***	0.022***
	[0.002]	[0.002]
Post × Self-Employed	0.114***	0.115***
	[0.001]	[0.001]
Controls		×
N	12,333,359	12,276,191

Robust standard errors clustered at the firm level in brackets
*** p<0.01, ** p<0.05, * p<0.1

◂ Back

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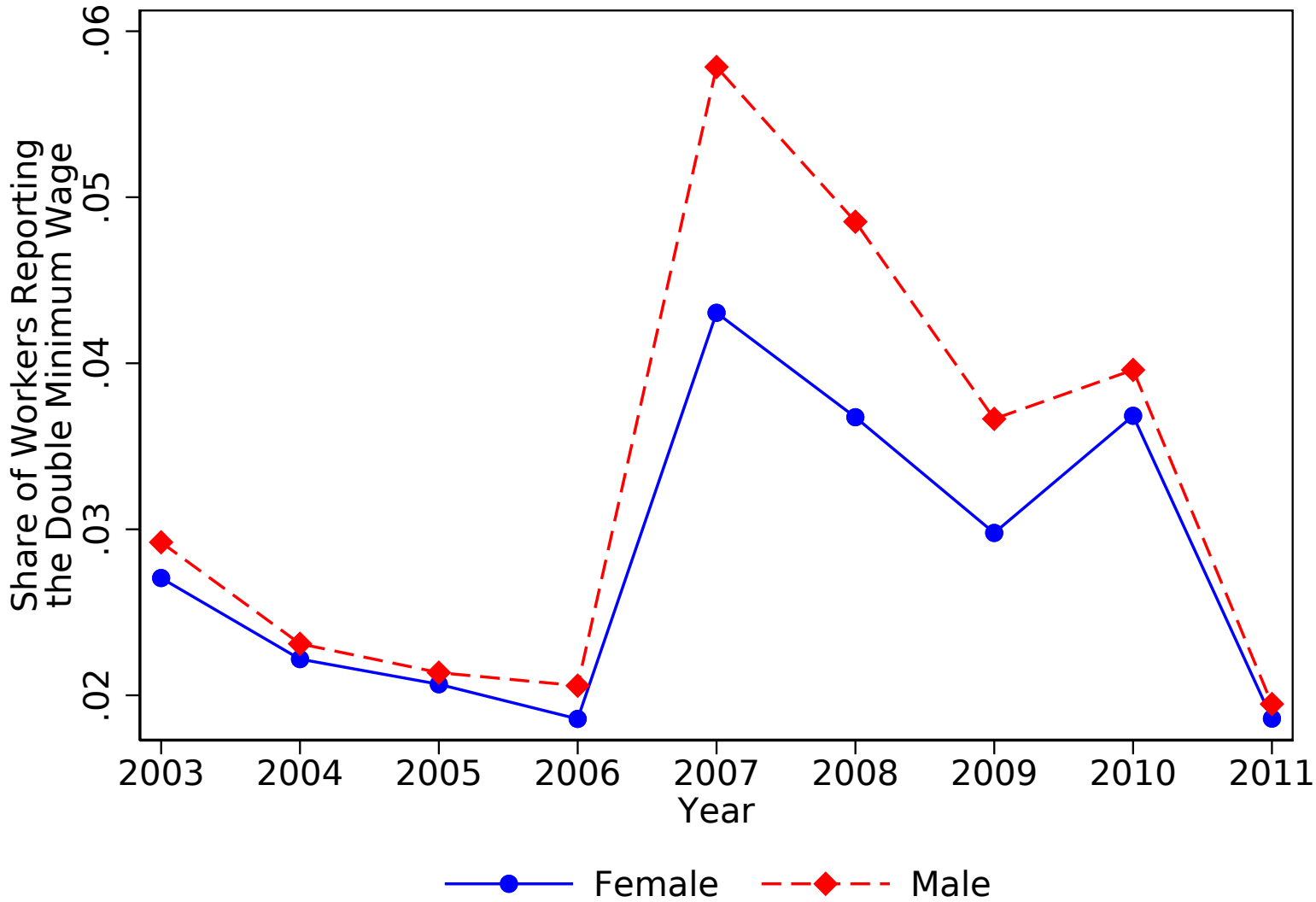
◂ Back

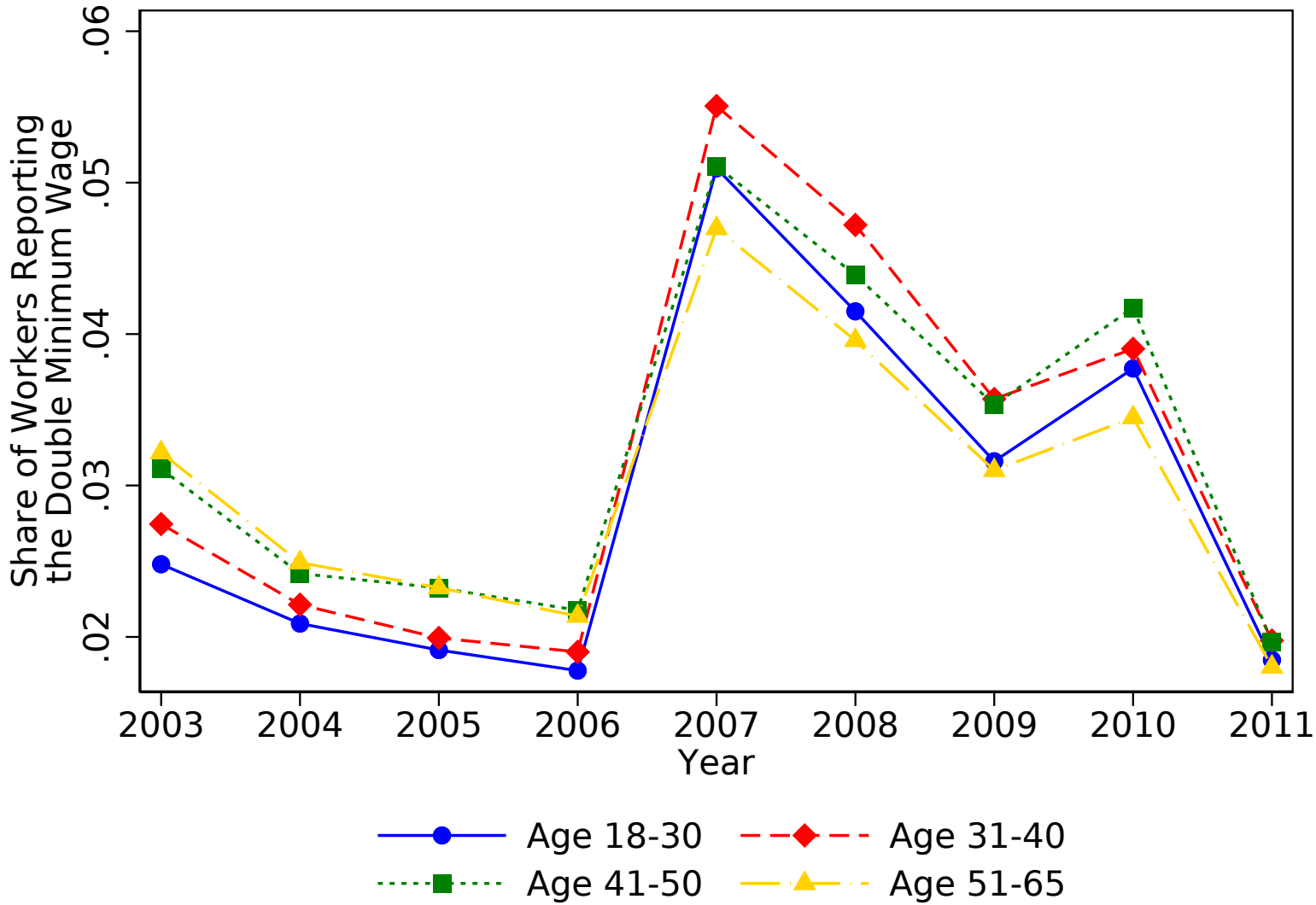
Heterogeneity: By Gender

Private Employees



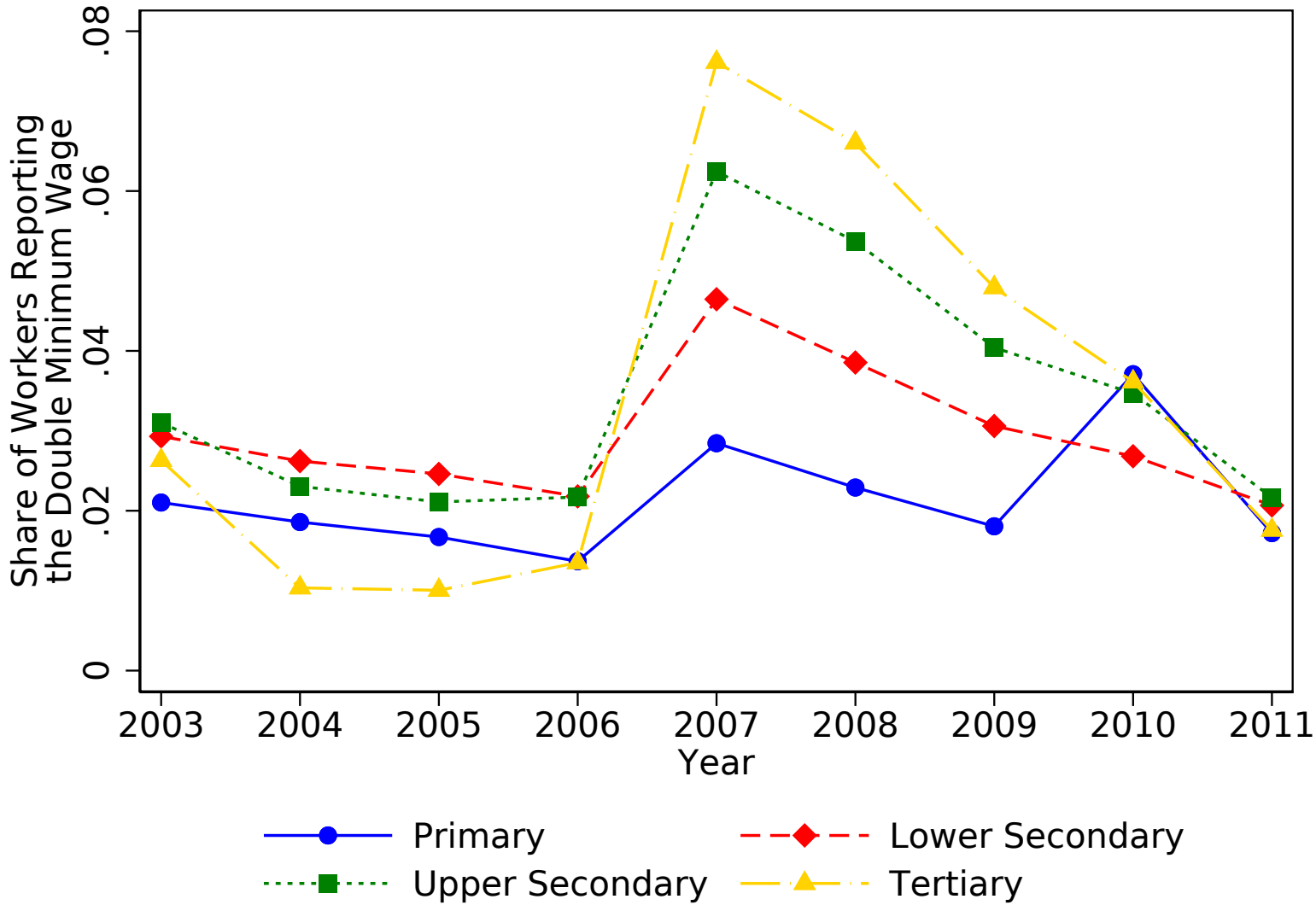
Heterogeneity: By Age

Private Employees



Heterogeneity: By Education

Private Employees



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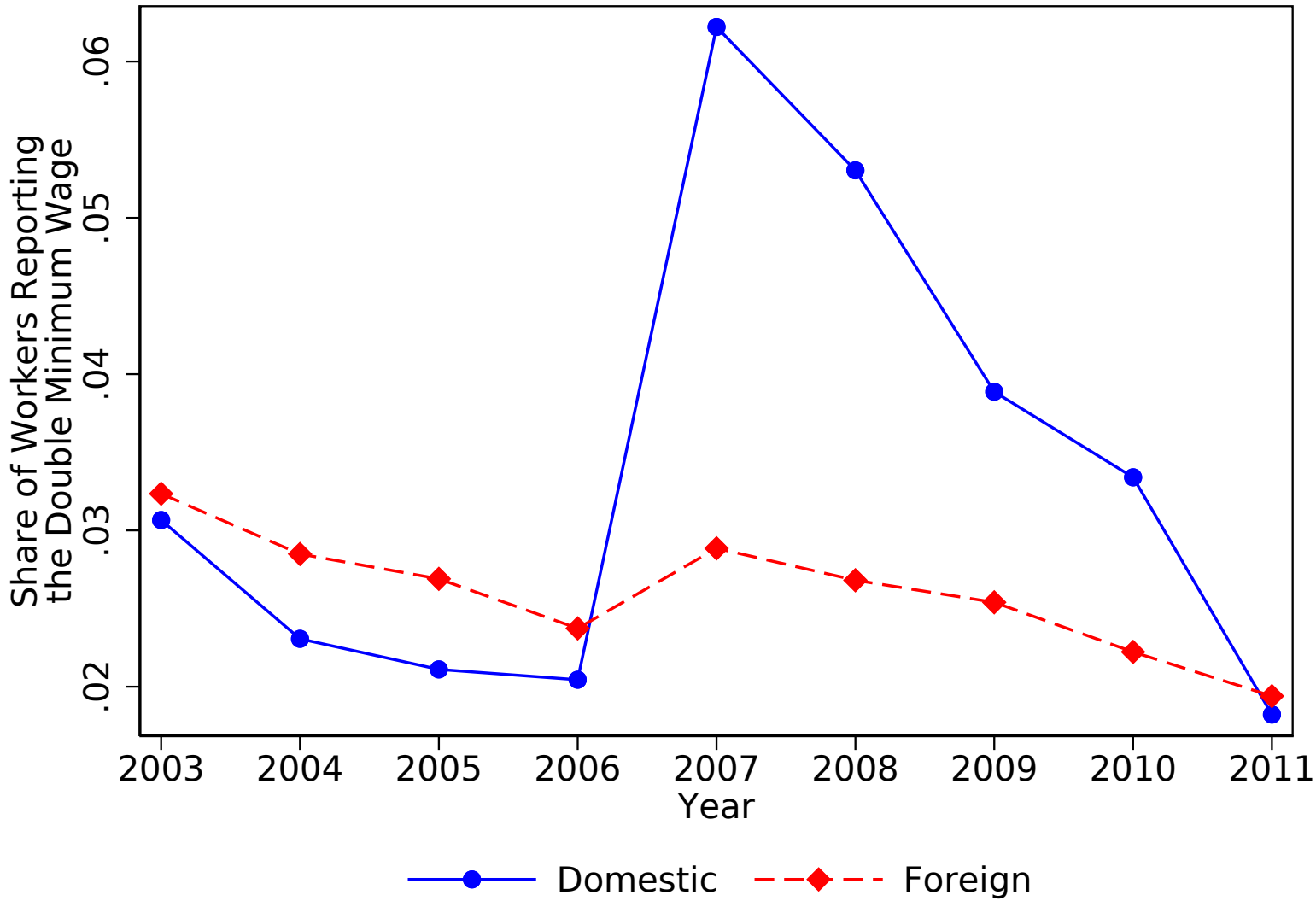
Heterogeneity: By Ownership

Private Employees



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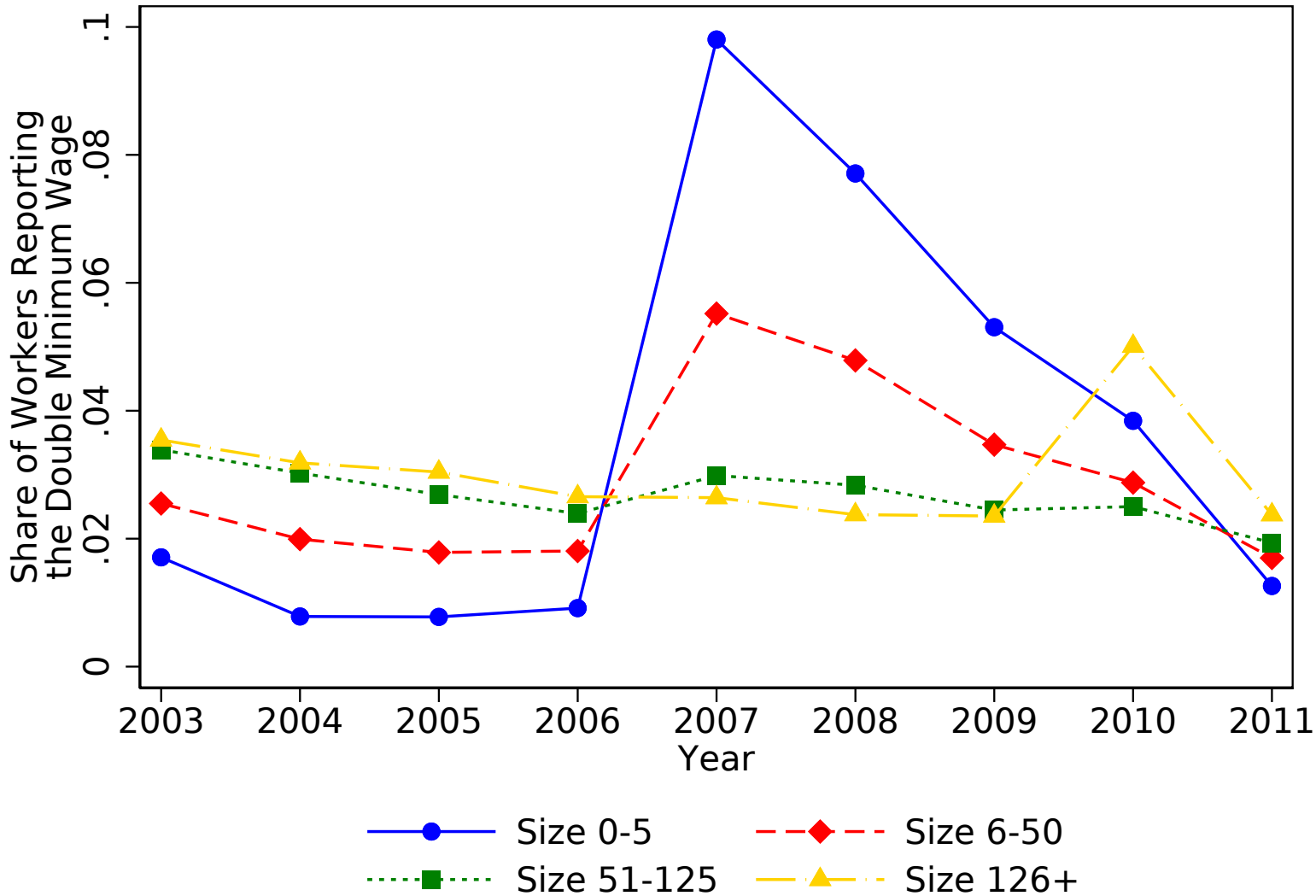
Heterogeneity: By Size

Private Employees



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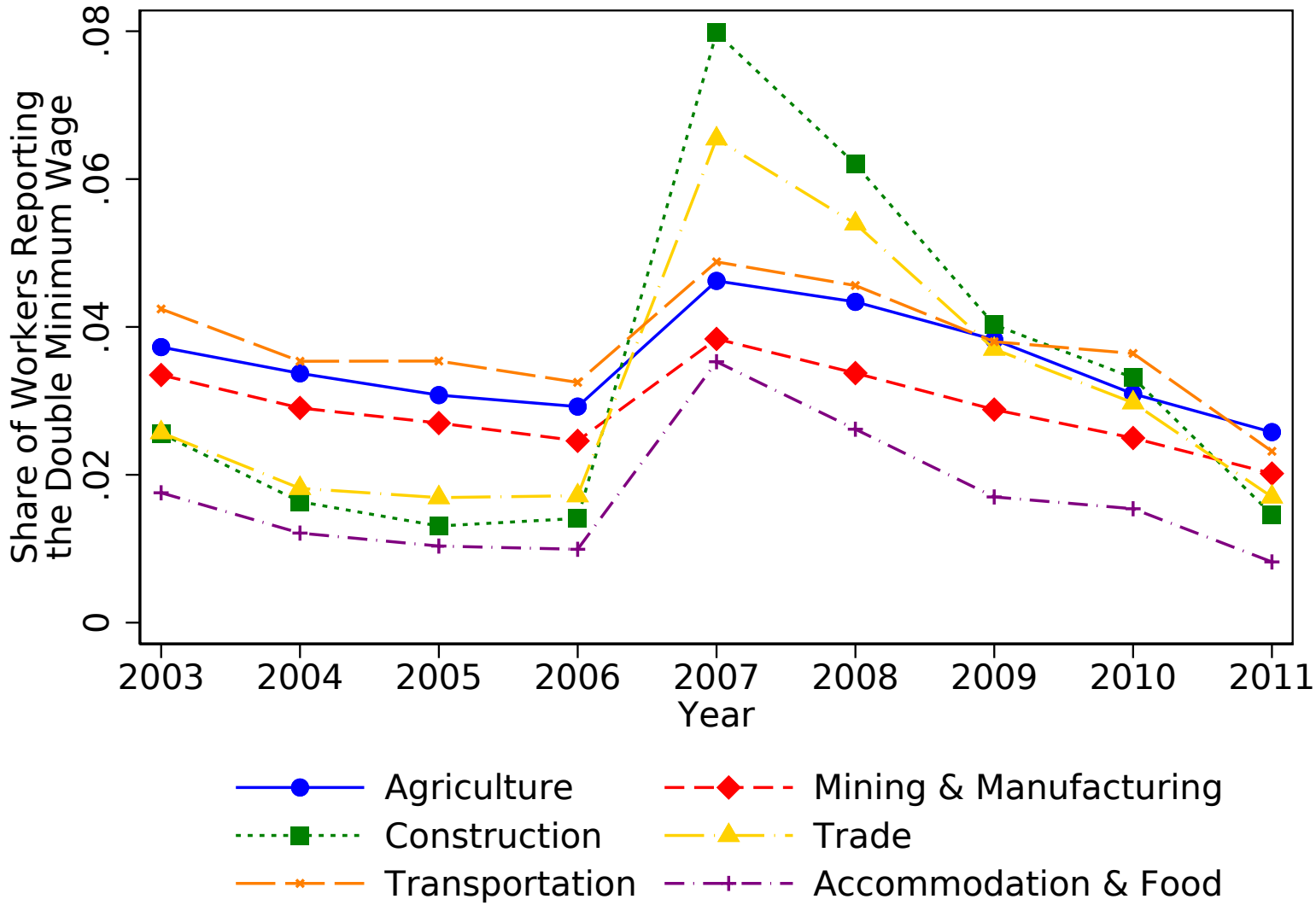
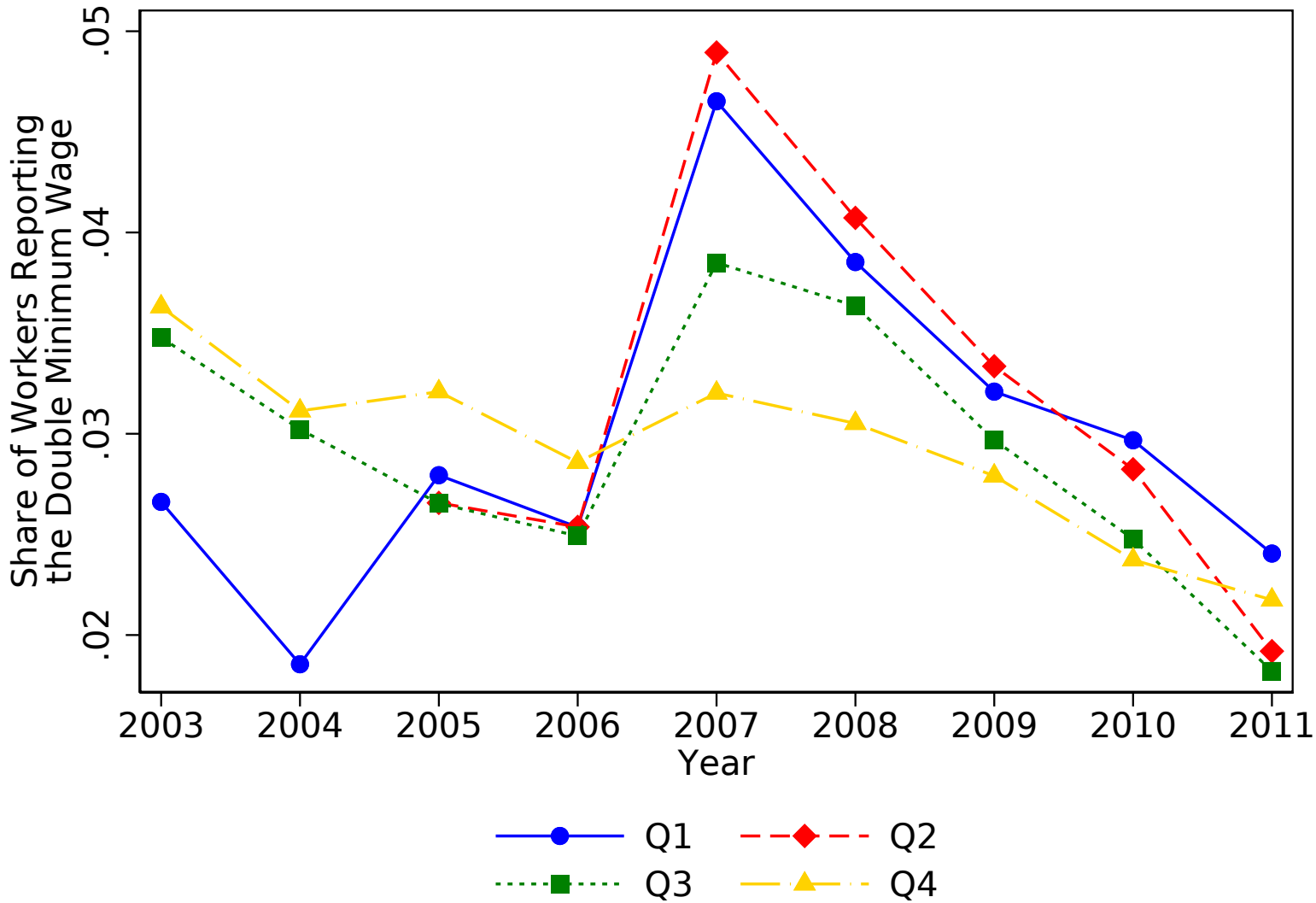
Heterogeneity: By Industry

Private Employees



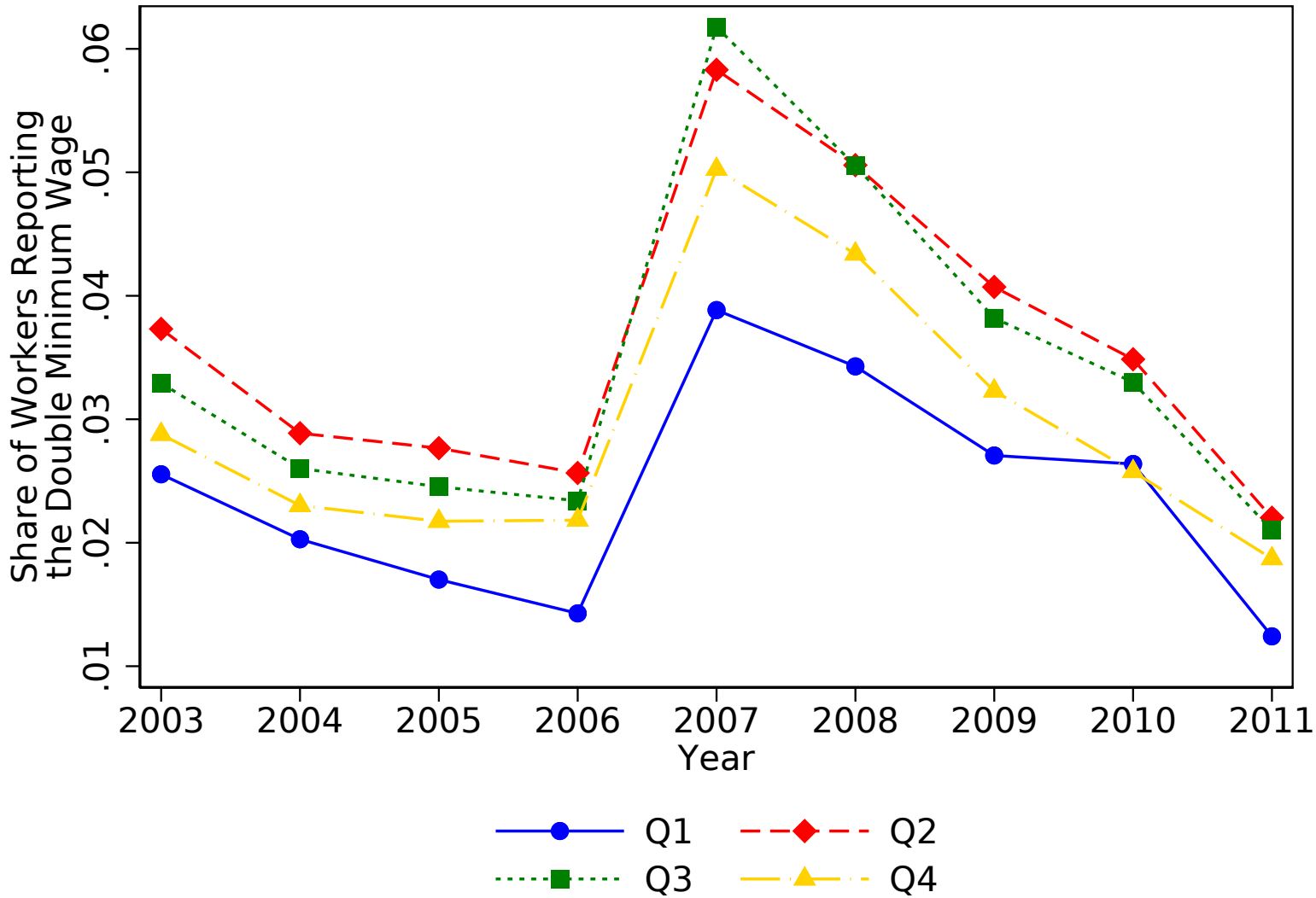
Heterogeneity: By Export Share in Revenues

Private Employees



Heterogeneity: By Revenue Per Employee

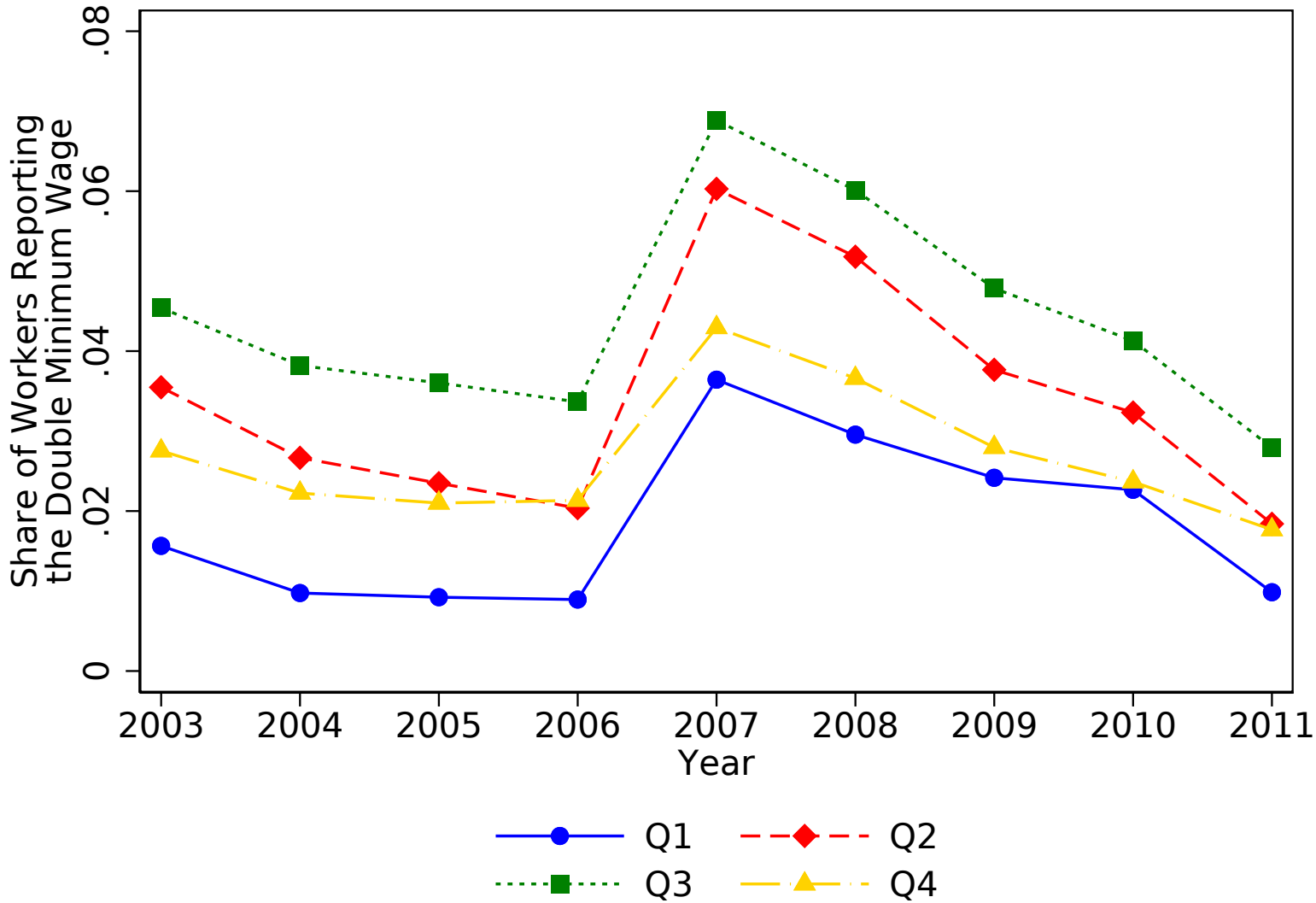
Private Employees



Back

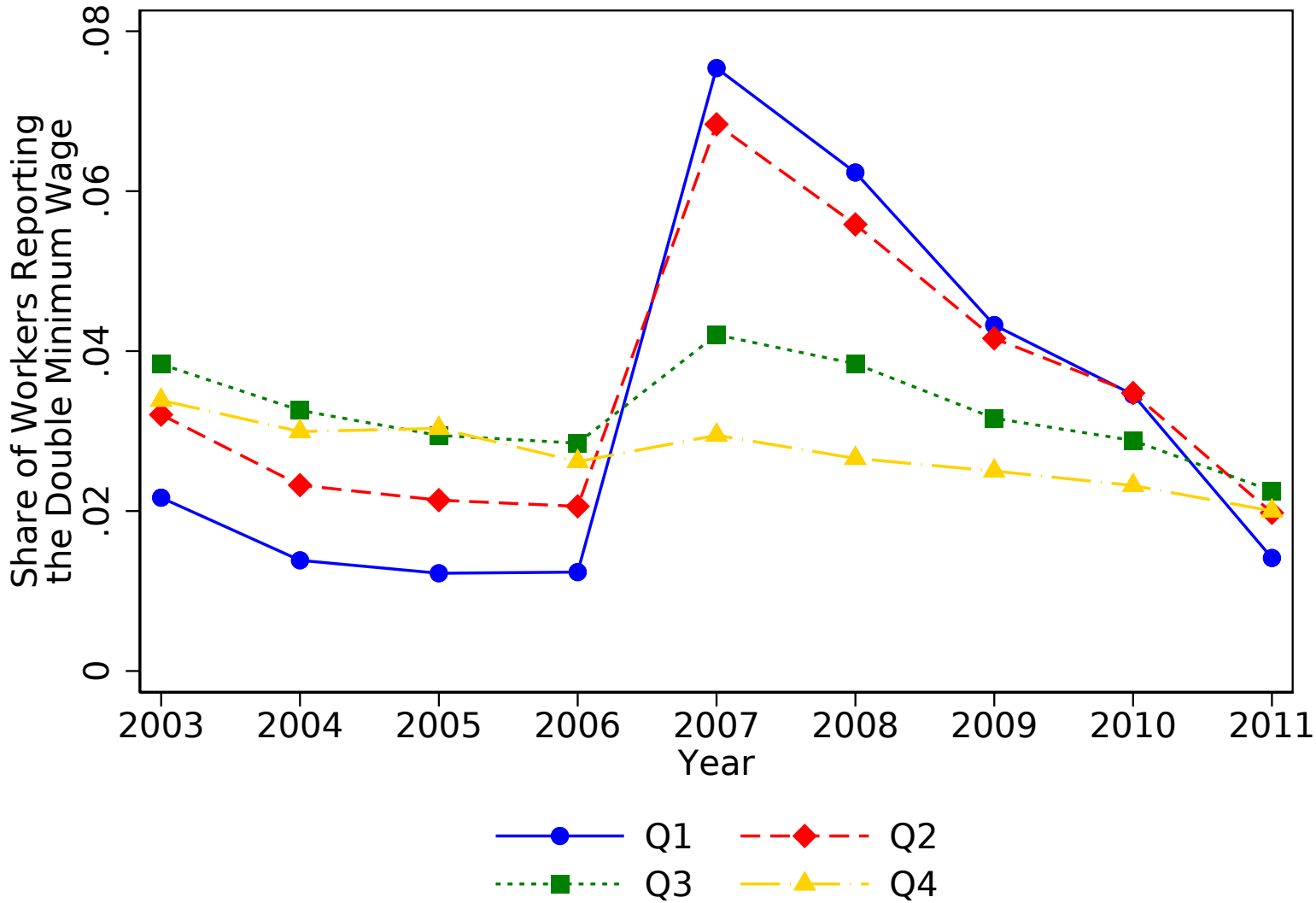
Heterogeneity: By Labor Productivity

Private Employees



Heterogeneity: By Total Factor Productivity

Private Employees



Regression Estimates: Private Sector Employees

Reference bin:	(1) Bin 2	(2) Bin 2	(3) Bin 3	(4) Bin 3	(5) Bin 4	(6) Bin 4
Post × Min. W.	0.048*** [0.002]	0.048*** [0.002]	0.037*** [0.002]	0.038*** [0.002]	0.049*** [0.005]	0.050*** [0.005]
Controls		×		×		×
N	2,044,434	2,031,259	2,042,056	2,029,208	1,886,220	1,874,220

◂ Back

Regression Estimates: Self-Employed

Reference bin:	(1) Bin 2	(2) Bin 2	(3) Bin 3	(4) Bin 3	(5) Bin 4	(6) Bin 4
Post × Min. W.	0.021*** [0.003]	0.021*** [0.003]	0.018*** [0.004]	0.017*** [0.004]	0.021*** [0.005]	0.020*** [0.005]
Controls		×		×		×
N	479,548	476,796	488,175	485,364	457,234	454,569

◂ Back

Regression Estimates: Public Sector Employees

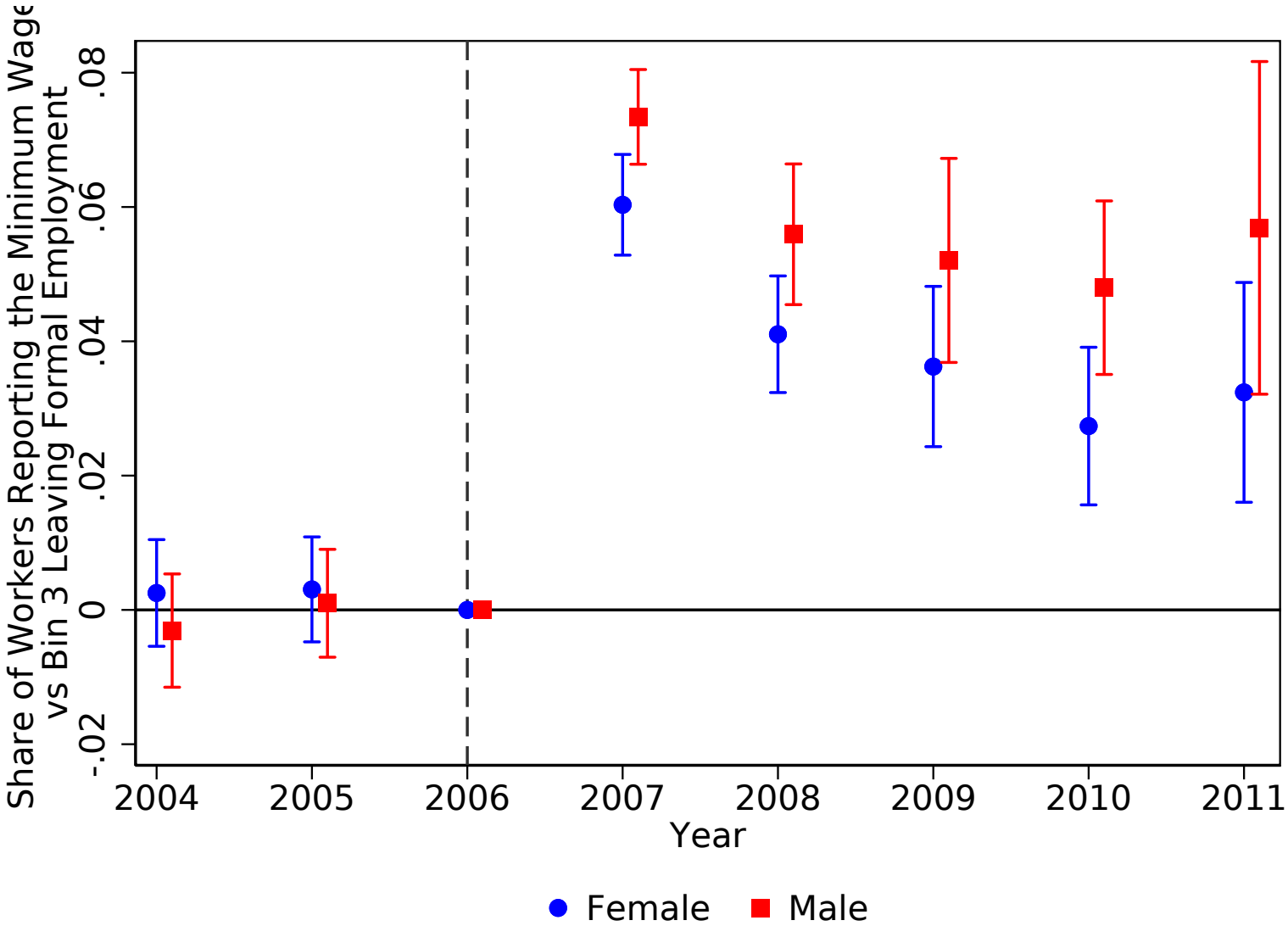
Reference bin:	(1) Bin 2	(2) Bin 2	(3) Bin 3	(4) Bin 3	(5) Bin 4	(6) Bin 4
Post × Min. W.	0.013 [0.011]	0.010 [0.009]	0.019** [0.009]	0.018** [0.009]	0.020** [0.009]	0.018** [0.009]
Controls		×		×		×
N	90,499	90,136	175,770	175,233	194,230	193,722

Robust standard errors, clustered at the firm level in brackets
*** p<0.01, ** p<0.05, * p<0.1

◂ Back

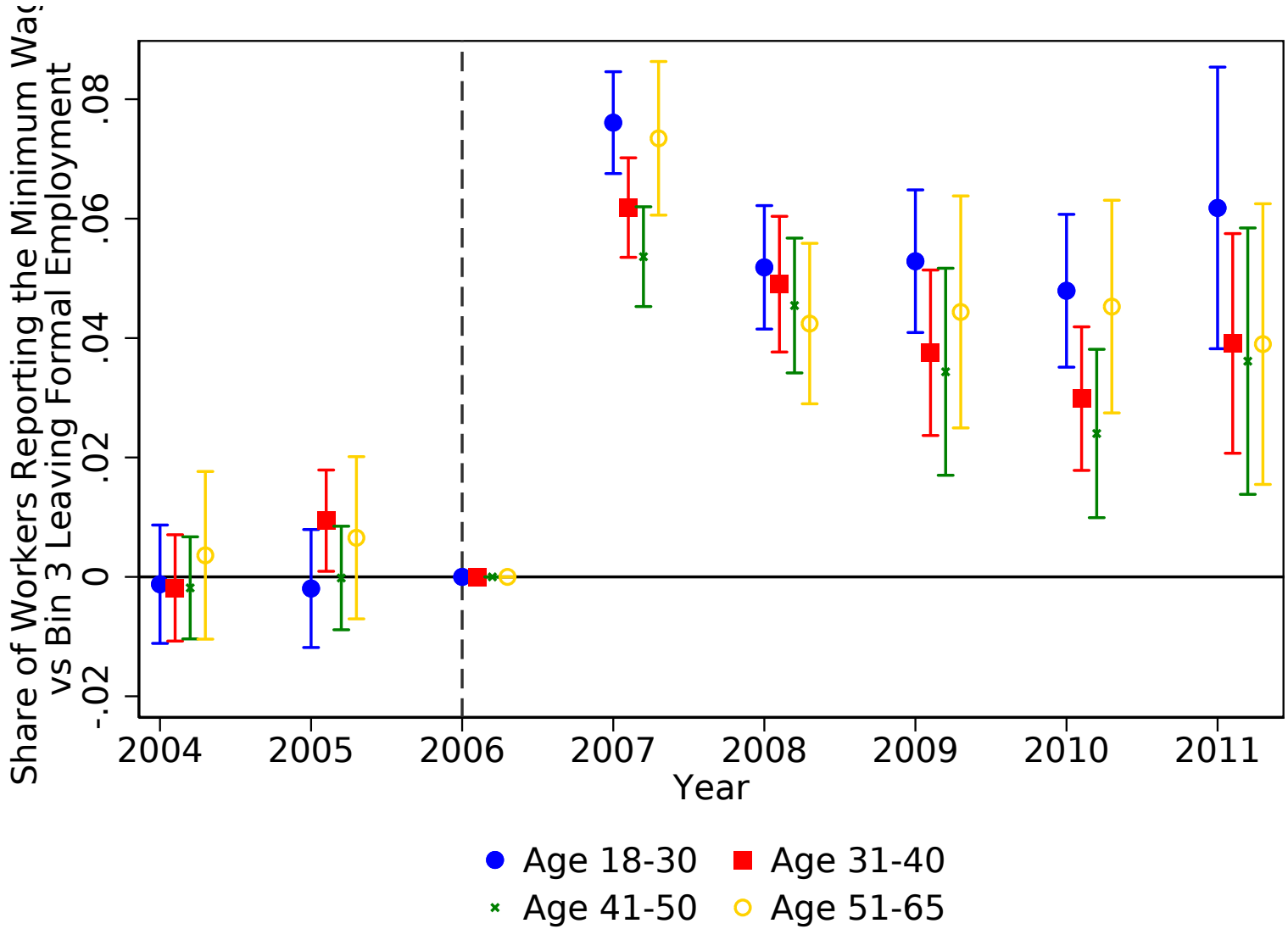
Heterogeneity: By Gender

Private Employees



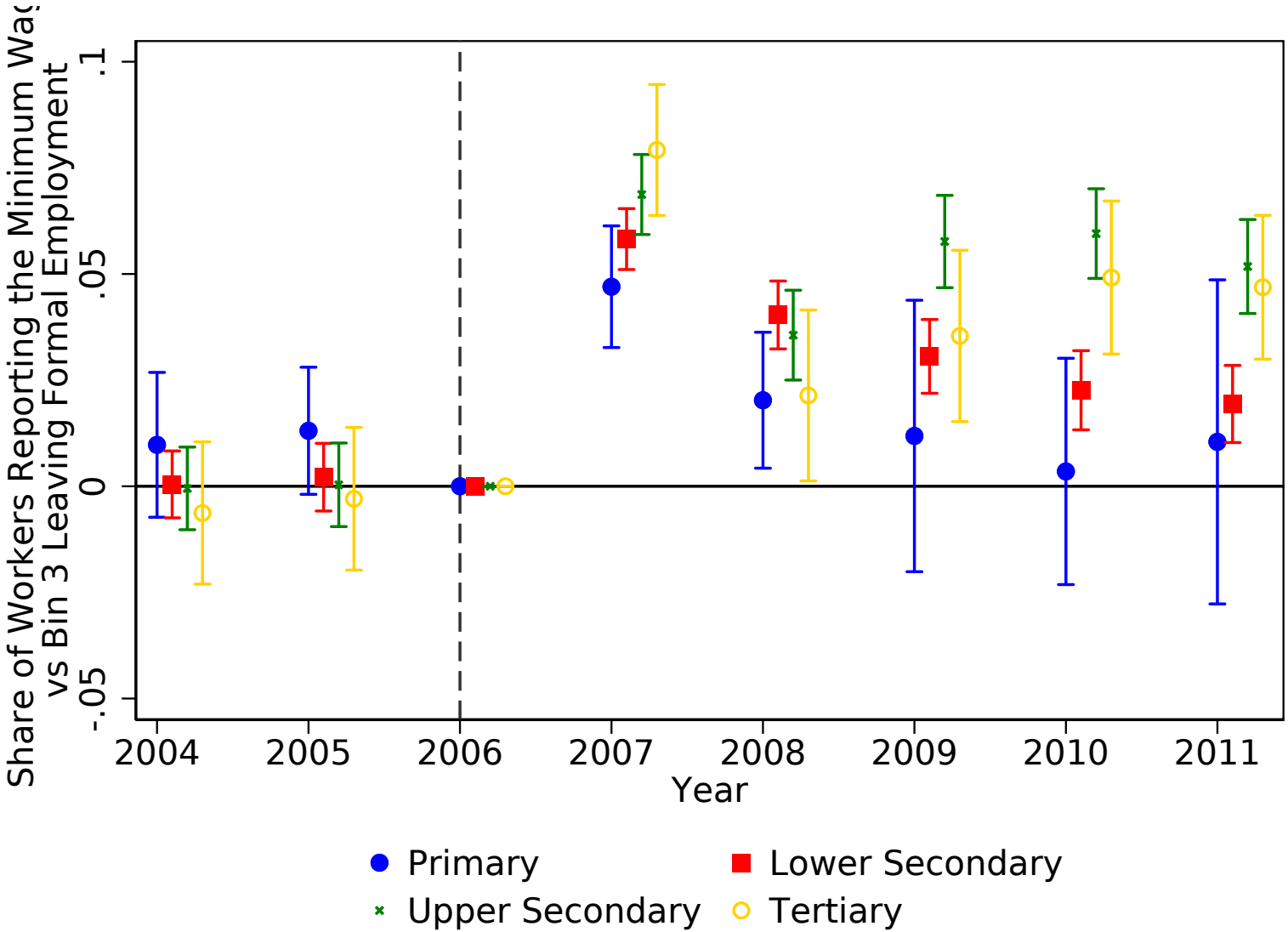
Heterogeneity: By Age

Private Employees



Heterogeneity: By Education

Private Employees



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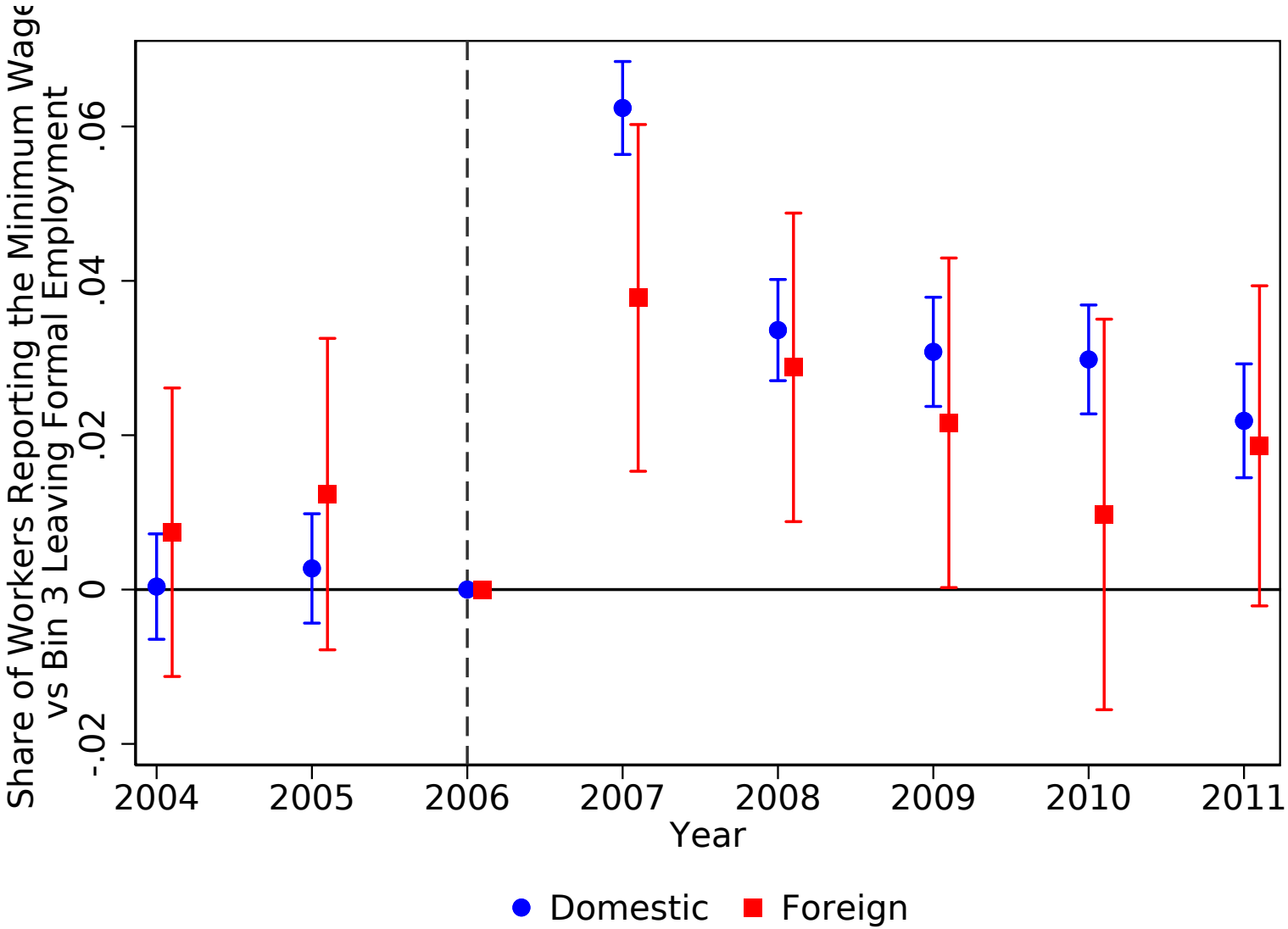
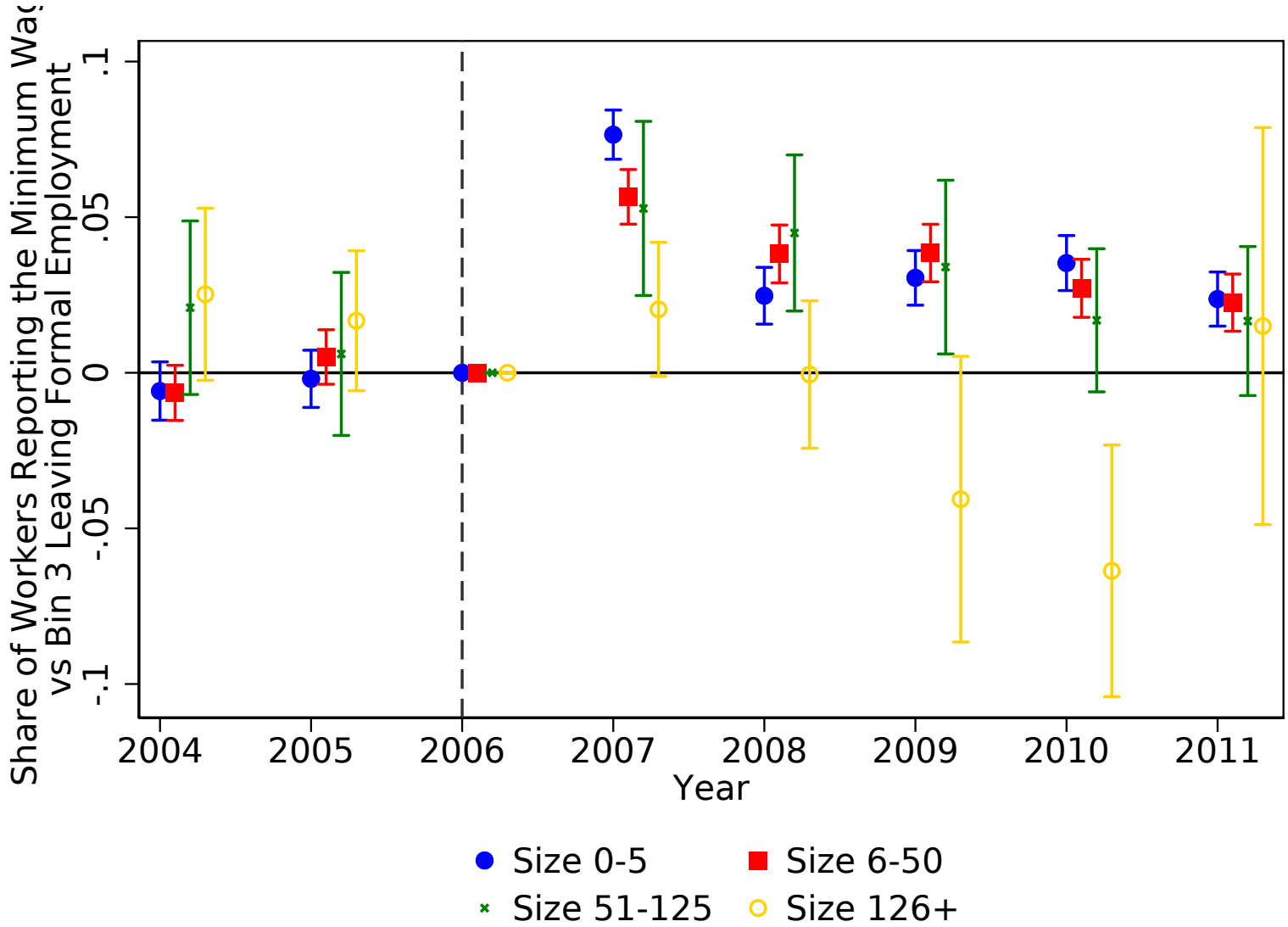
Heterogeneity: By Ownership

Private Employees



Heterogeneity: By Size

Private Employees



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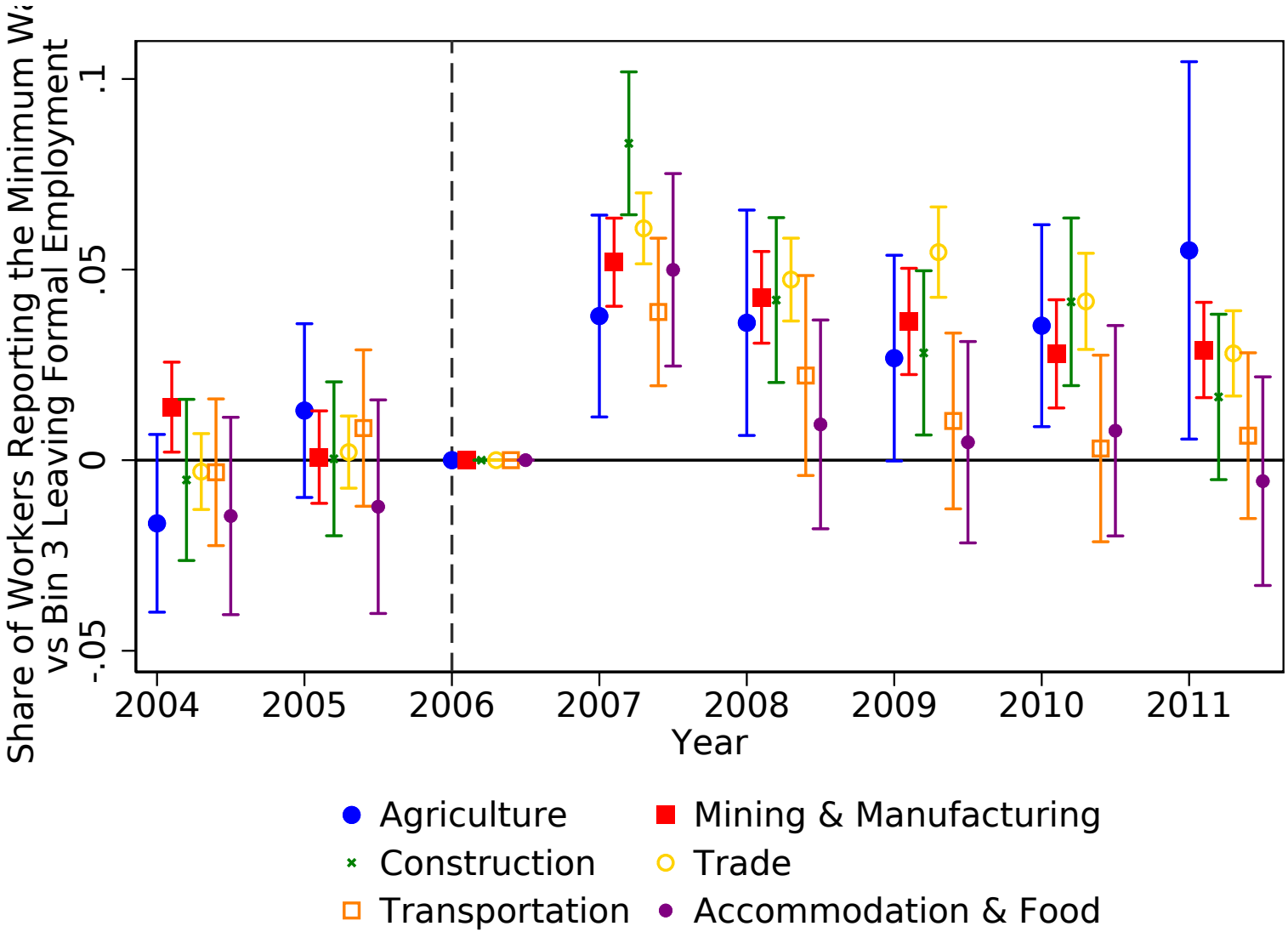
Heterogeneity: By Industry

Private Employees



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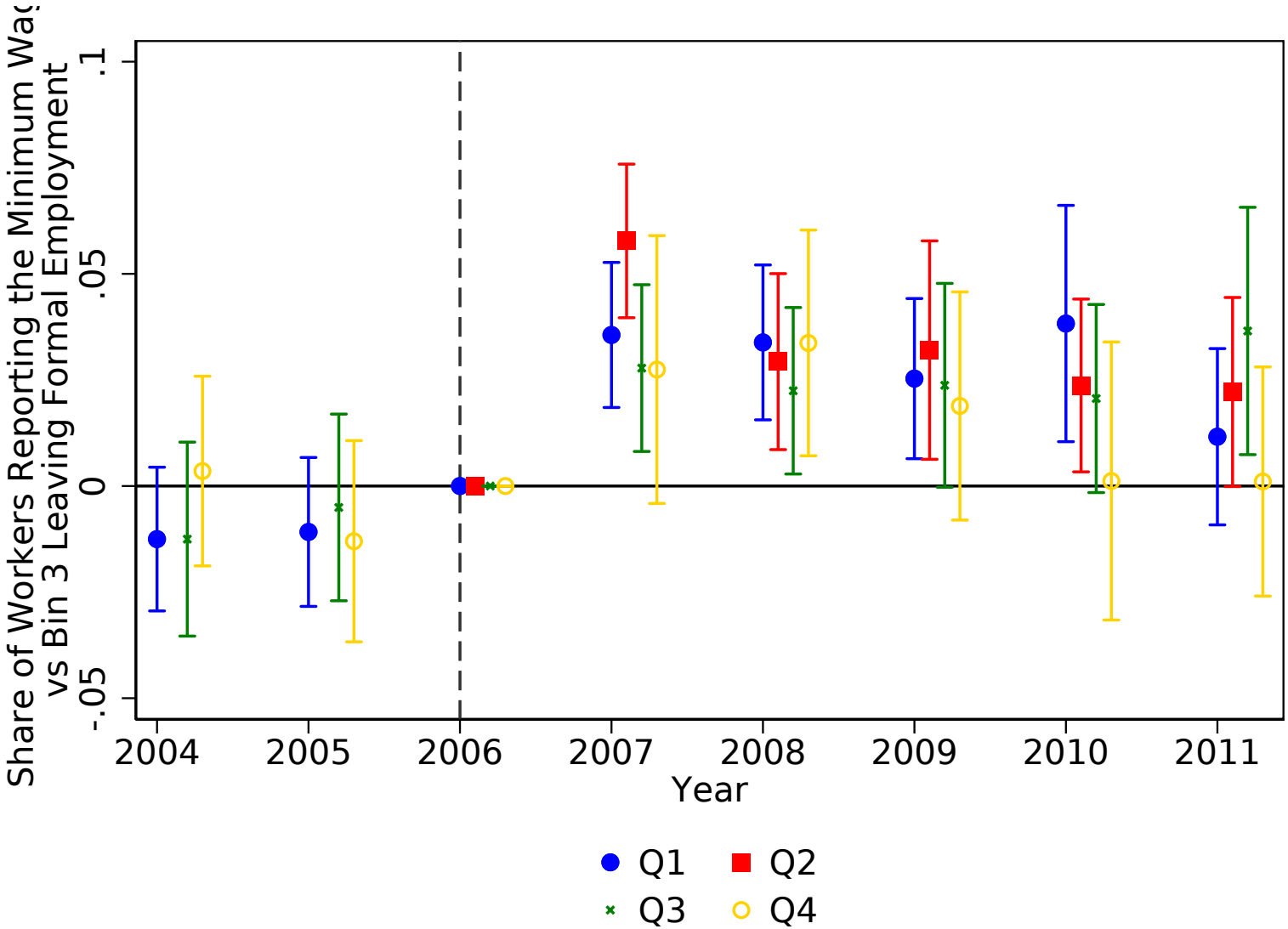
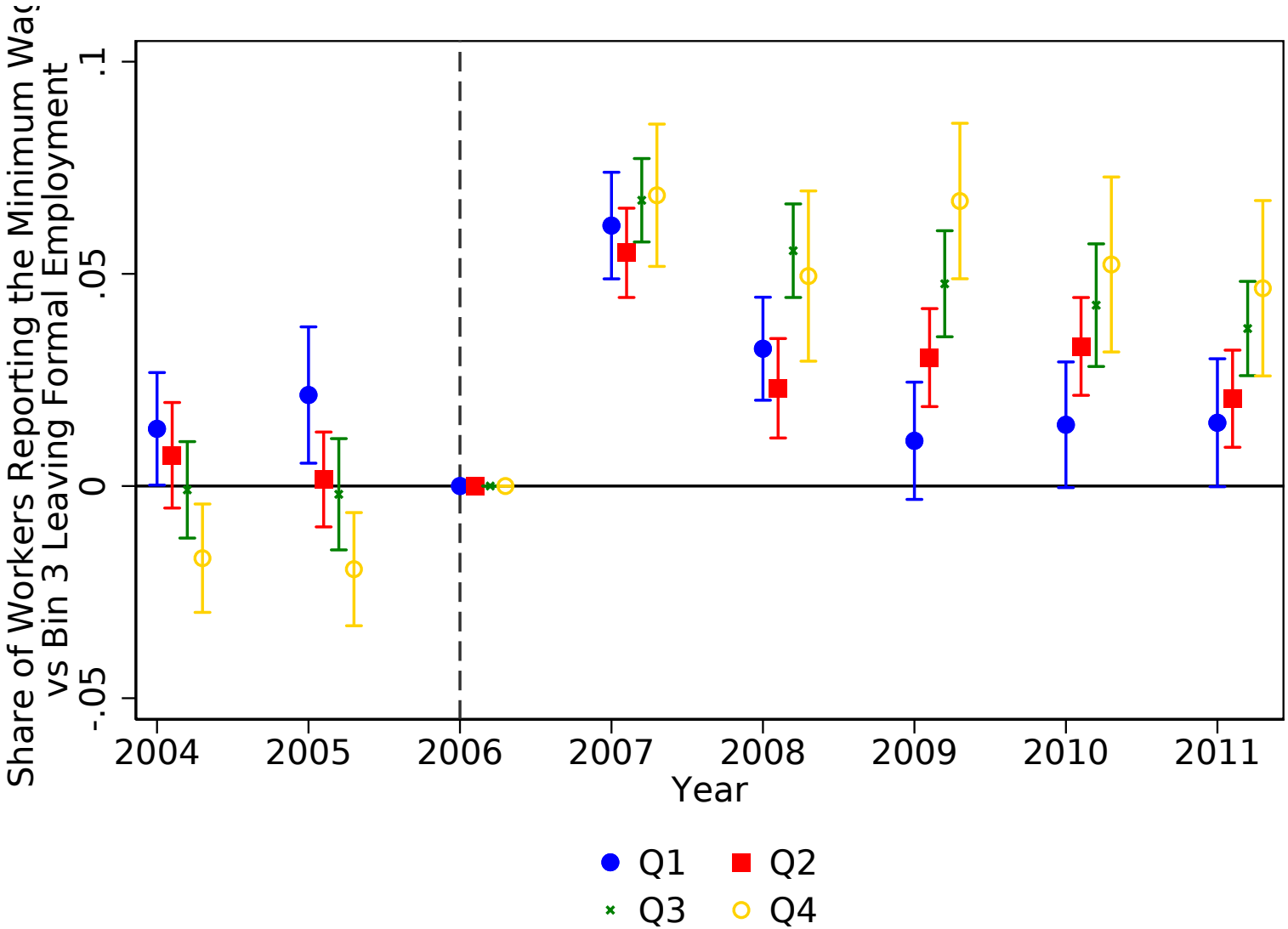
Heterogeneity: By Export Share in Revenues

Private Employees



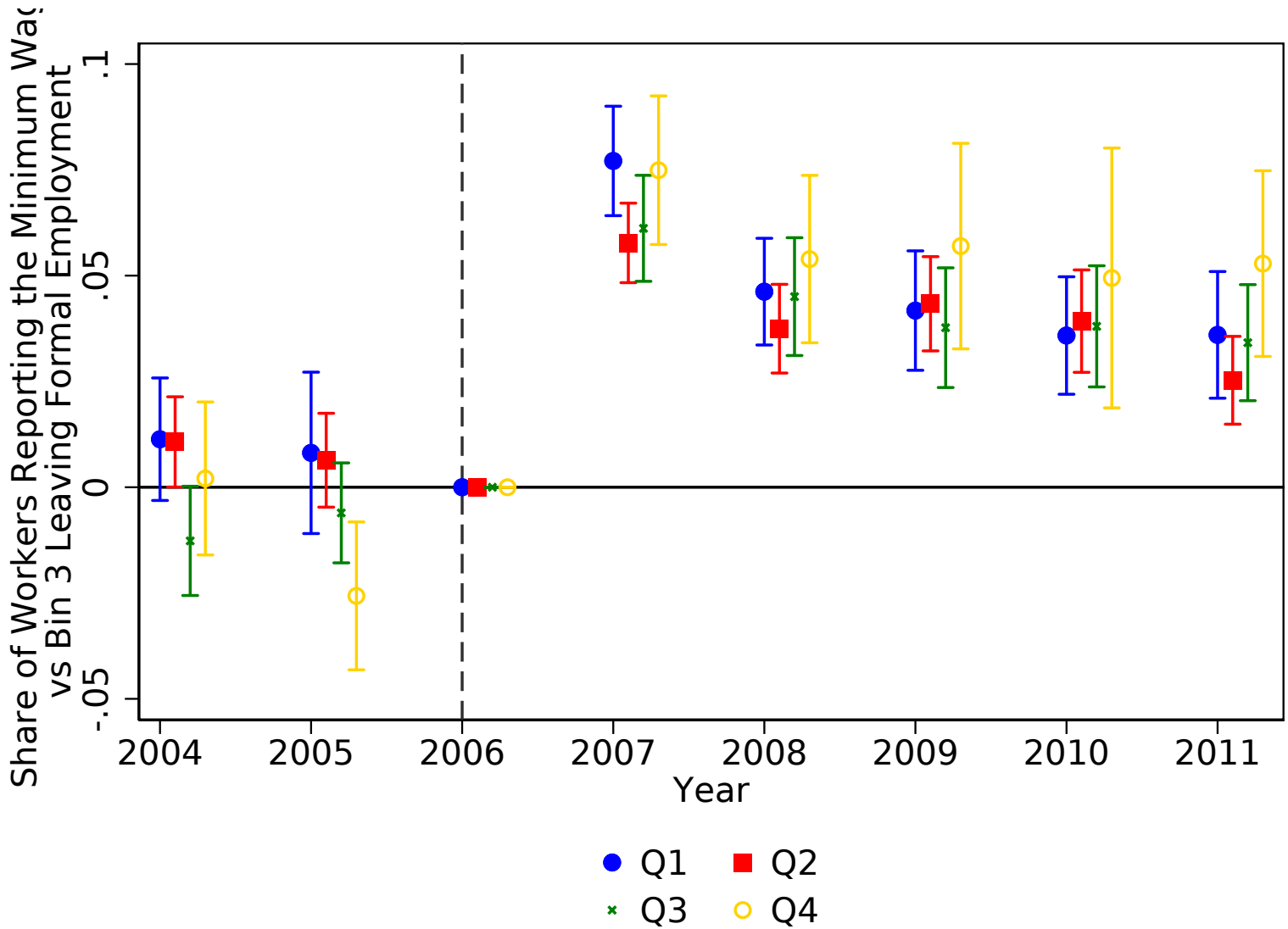
Heterogeneity: By Revenue Per Employee

Private Employees



Heterogeneity: By Labor Productivity

Private Employees



Heterogeneity: By Total Factor Productivity

Private Employees