Enlisting Workers in Monitoring Firms: Payroll Tax Compliance in Mexico

Todd Kumler, Columbia University

Eric Verhoogen, Columbia University

Judith Frías, Instituto Mexicano del Seguro Social

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Introduction

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- Mexico, like many developing countries, has low tax revenues and a large informal sector:
  - Lowest tax revenue/GDP share in the OECD: 15-20% over study period.
  - Informal economy estimated at 40+% of GDP (Schneider and Enste, 2000).
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  - Mexican social security agency (IMSS) supposed to cover all private-sector workers; in fact covers 53%.
- Non-compliance of firms with tax regulations is a key element of general weakness of state capacity in many developing countries.

Introduction (cont.)

- One well-appreciated dimension of non-compliance: failure to register.
  - Generates a variety of distortions: limited access to credit, limits on employment growth (Gordon and Li, 2009; Levy, 2008).
  - Several governments have implemented policies to reduce registration costs, induce firms to register (Fajnzylber et al., 2011; Bruhn, 2011; Kaplan et al., forthcoming).
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  - Recent papers have examined effect of formalization on firm-level outcomes (McKenzie and Sakho, 2010; de Mel, McKenzie and Woodruff, 2012)
- In this paper, we focus on an arguably under-appreciated form of non-compliance: under-reporting of wages by registered firms, to evade payroll taxes.

Introduction (cont.)

- Why under-appreciated?
  - Third-party reporting has been found to be quite accurate in developed countries (Saez, 2010; Kleven, Knudsen, Kreiner, Pedersen and Saez, 2011).
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  - Difficult to study. Data requirements formidable.
- Strategy:
  - Compare (male) wage distribution in IMSS administrative records to wage distribution for similar workers in household survey who report receiving IMSS coverage.
  - Use 1997 pension reform as source of exogenous variation in incentive of employees to ensure accurate reporting by their employers.

Introduction (cont.)

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- Disclaimer:
  - This is not an endorsement of personal retirement accounts *per se*. Incentives to monitor could be given in a traditional pension system as well.
- For time reasons I am not discussing related literature, including a motivating theory model by Kleven, Kreiner and Saez (2009). Please see paper.

Institutional background

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- Health care, child care, disability, worker's compensation changed little over study period.

Institutional background (cont.)

- Contributions:
  - Employers: 18-23% of wage, for most workers.
  - Employees: 2-5% of wage, for most workers.
    [See figures.]
- Observations:
  - Changes over time relatively modest.
  - Changes affect all age groups similarly; should be differenced out in D-in-D estimation.

Fig. 1: Employer contribution schedule

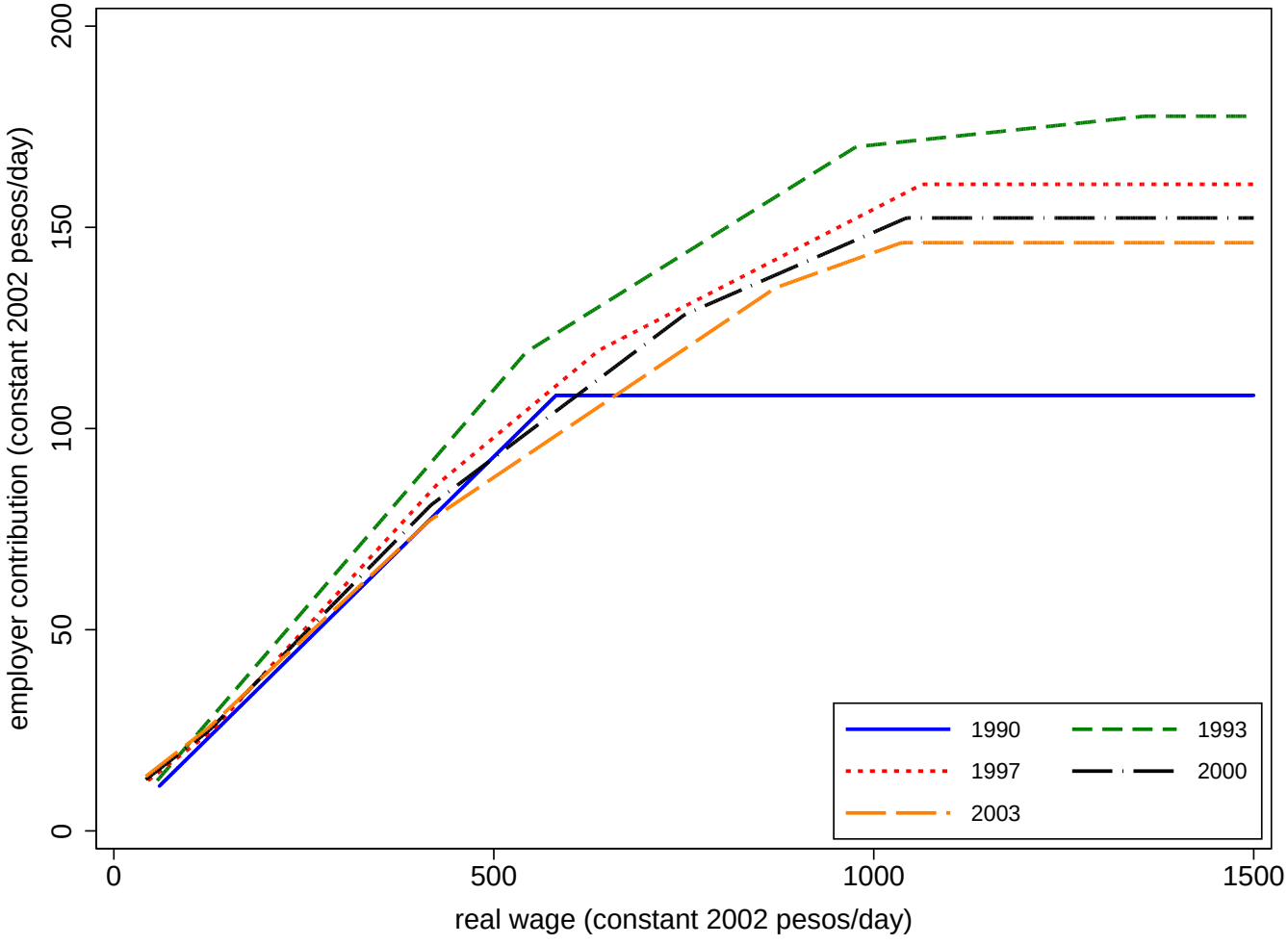
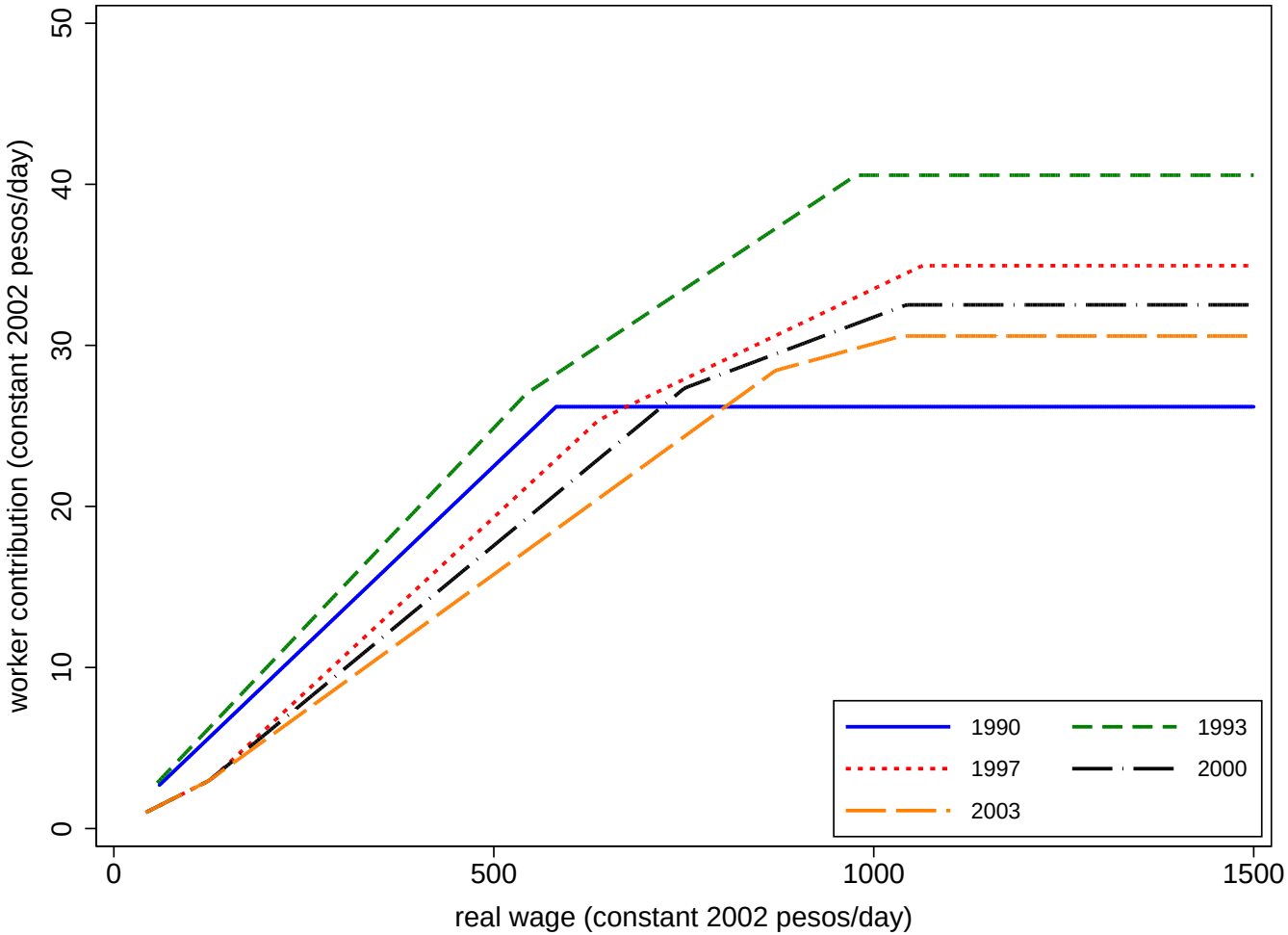


Fig. 2: Employee contribution schedule



Institutional background (cont.)

- Pension reform:
  - Beginning in 1944, operated as pay-as-you-go (PAYGO) system.
  - Rising number of retirees, macro crises in 1980s $\rightarrow$ "fiscal imbalances".
  - In 1992, personal accounts created in parallel with PAYGO system. Plagued by administrative problems.
  - In Dec. 1995, law passed creating new system of personal retirement accounts (PRAs). Implemented July 1, 1997.

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    - 70% of minimum wage in 1989.
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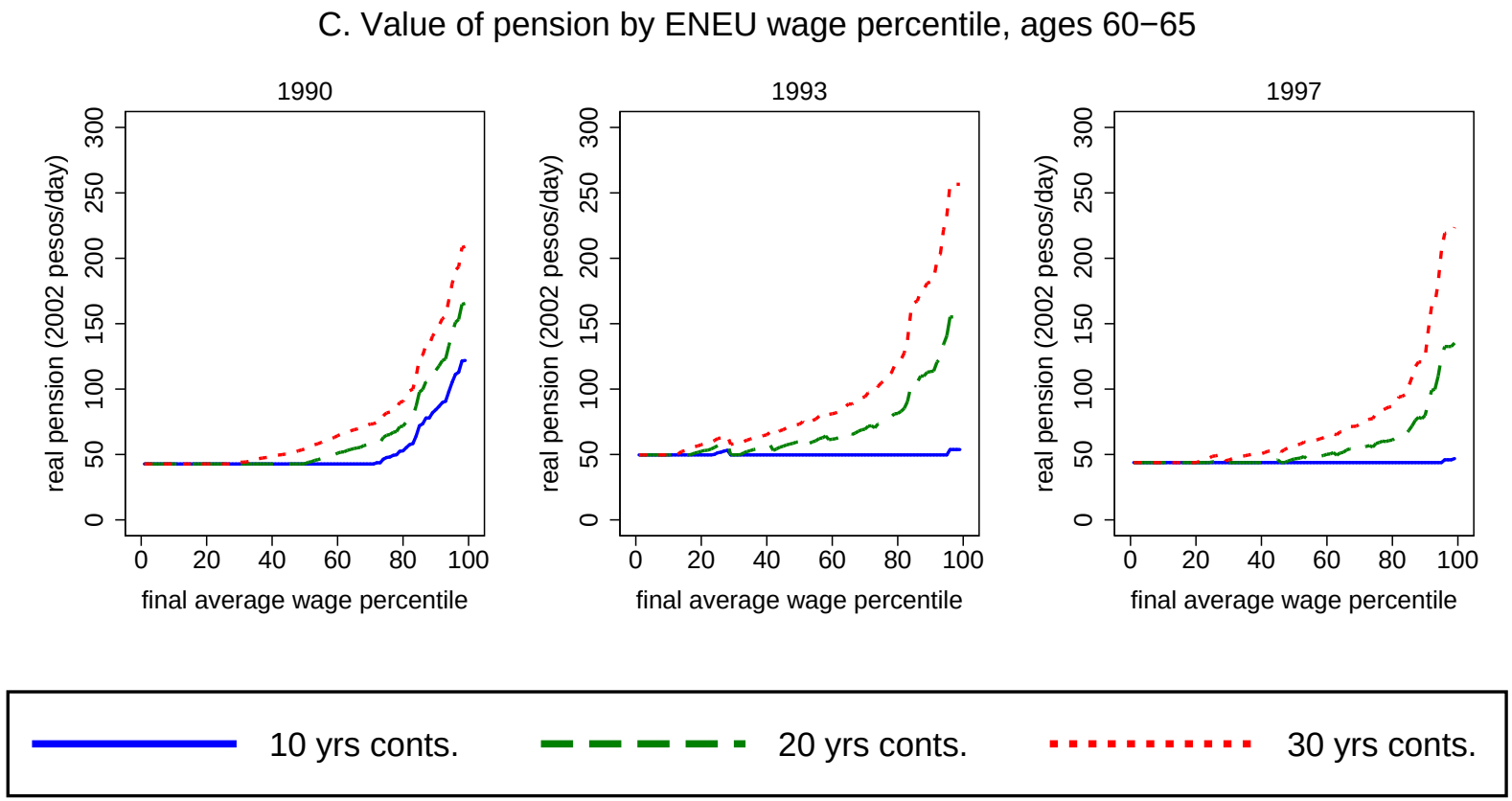
  - Many retirees near minimum 10 years of contributions.
  - Upshot: 80+% of retirees were getting minimum pension prior to 1997 reform. [See figure.]

Fig. 3: Value of pension, men ages 60-65



▸ Women

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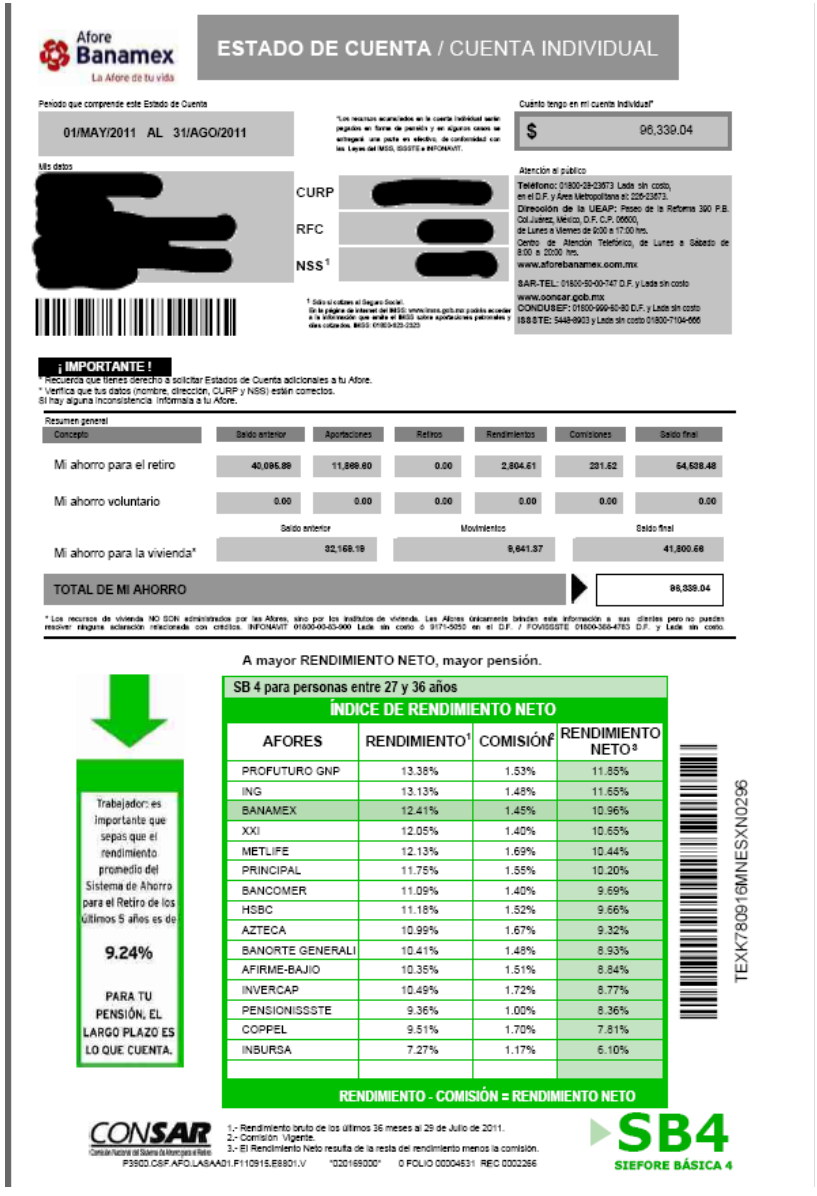
- Grandfathering: anyone in the system as of July 1, 1997 retained right to choose (at date of retirement) pension he/she would have had under pre-reform system, calculated as if he/she had always been under the pre-reform system.

Fig. 4: Estado de Cuenta



Afore Banamex
La Afore de tu vida

ESTADO DE CUENTA / CUENTA INDIVIDUAL

Periodo que comprende este Estado de Cuenta
01/MAY/2011 AL 31/AGO/2011

Cuánto tengo en mi cuenta individual*
$ 96,339.04

Mis datos
[redacted]
CURP [redacted]
RFC [redacted]
NSS[1] [redacted]

Atención al público
Teléfono: 01800-28-23673 Lada sin costo, en el D.F. y Área Metropolitana al: 2256-23673.
Dirección de la UEAP: Paseo de la Reforma 390 P.B. Col.Juárez, México, D.F. C.P. 06600, de Lunes a Viernes de 9:00 a 17:00 hrs.
Centro de Atención Telefónica, de Lunes a Sábado de 8:00 a 22:00 hrs.
www.aforebanamex.com.mx
SAR-TEL: 01800-50-00-747 D.F. y Lada sin costo
www.consar.gob.mx
CONDUSEF: 01800-999-80-80 D.F. y Lada sin costo
ISSSTE: 5448-8903 y Lada sin costo 01800-7104-666

¡ IMPORTANTE !
* Recuerda que tienes derecho a solicitar Estados de Cuenta adicionales a tu Afore.
* Verifica que tus datos (nombre, dirección, CURP y NSS) están correctos.
Si hay alguna inconsistencia infórmala a tu Afore.

Resumen general

Concepto	Saldo anterior	Aportaciones	Retiros	Rendimientos	Comisiones	Saldo final
Mi ahorro para el retiro	40,095.88	11,869.60	0.00	2,804.61	231.62	54,538.48
Mi ahorro voluntario	0.00	0.00	0.00	0.00	0.00	0.00

	Saldo anterior	Movimientos	Saldo final
Mi ahorro para la vivienda*	32,168.18	9,641.37	41,800.68
TOTAL DE MI AHORRO			96,339.04

* Los recursos de vivienda NO SON administrados por las Afores, sino por los institutos de vivienda. Las Afores únicamente brindan esta información a sus clientes pero no pueden resolver ninguna aclaración relacionada con créditos. INFONAVIT 01800-00-83-900 Lada sin costo ó 9171-5050 en el D.F. / FOVISSSTE 01800-368-4783 D.F. y Lada sin costo.

A mayor RENDIMIENTO NETO, mayor pensión.

Trabajador: es importante que sepas que el rendimiento promedio del Sistema de Ahorro para el Retiro de los últimos 5 años es de
9.24%
PARA TU PENSIÓN, EL LARGO PLAZO ES LO QUE CUENTA.

SB 4 para personas entre 27 y 36 años

ÍNDICE DE RENDIMIENTO NETO

AFORES	RENDIMIENTO[1]	COMISIÓN[2]	RENDIMIENTO NETO[3]
PROFUTURO GNP	13.38%	1.53%	11.85%
ING	13.13%	1.48%	11.65%
BANAMEX	12.41%	1.45%	10.96%
XXI	12.05%	1.40%	10.65%
METLIFE	12.13%	1.69%	10.44%
PRINCIPAL	11.75%	1.55%	10.20%
BANCOMER	11.09%	1.40%	9.69%
HSBC	11.18%	1.52%	9.66%
AZTECA	10.99%	1.67%	9.32%
BANORTE GENERALI	10.41%	1.48%	8.93%
AFIRME-BAJIO	10.35%	1.51%	8.84%
INVERCAP	10.49%	1.72%	8.77%
PENSIONISSSTE	9.36%	1.00%	8.36%
COPPEL	9.51%	1.70%	7.81%
INBURSA	7.27%	1.17%	6.10%

RENDIMIENTO - COMISIÓN = RENDIMIENTO NETO

CONSAR
1.- Rendimiento bruto de los últimos 36 meses al 29 de Julio de 2011.
2.- Comisión Vigente.
3.- El Rendimiento Neto resulta de la resta del rendimiento menos la comisión.

SB4
SIEFORE BÁSICA 4

P3900.CSF.AFO.LASAA01.F110915.E6801.V "020169000" 0 FOLIO 00004531 REC 0002266

TEXK780916MNESXN0296

Fig. 4: Estado de Cuenta

Afore Banamex
La Afore de tu vida

ESTADO DE CUENTA / CUENTA INDIVIDUAL

Periodo que comprende este Estado de Cuenta

01/MAY/2011 AL 31/AGO/2011

"Los recursos acumulados en la cuenta individual serán pagados en forma de pensión y en algunos casos se entregará una parte en efectivo, de conformidad con las Leyes del IMSS, ISSSTE e INFONAVIT.

Cuánto tengo en mi cuenta individual"

$ 96,339.04

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[1] Sólo si cotizas al Seguro Social.
En la página de internet del IMSS: www.imss.gob.mx podrás acceder a la información que emite el IMSS sobre aportaciones patronales y días cotizados. IMSS: 01800-623-2323

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Table 1: Pension wealth simulation

Years of Contributions	Plan	Real Daily Wage					
		43	100	200	300	500	1079
35	PRA	399.0	815.0	1626.2	2437.3	4059.7	8759.2
	PAYGO	399.0	672.2	1263.6	1862.8	3104.6	6702.0
30	PRA	399.0	523.4	1044.3	1565.3	2607.1	5625.1
	PAYGO	399.0	594.1	1068.7	1555.4	2592.4	5596.3
25	PRA	399.0	399.0	659.1	987.8	1645.3	3549.9
	PAYGO	399.0	507.0	851.4	1212.7	2021.1	4363.0
20	PRA	88.0	202.4	403.9	605.4	1008.4	2175.7
	PAYGO	399.0	437.9	679.0	940.8	1568.0	3384.8
15	PRA	51.2	117.8	235.0	352.2	586.6	1265.7
	PAYGO	399.0	399.0	484.2	633.5	1055.8	2279.1
10	PRA	26.8	61.7	123.1	184.5	307.4	663.2
	PAYGO	399.0	399.0	399.0	399.0	543.6	1173.4
5	PRA	10.7	24.6	49.0	73.5	122.4	264.2
	PAYGO	0.0	0.0	0.0	0.0	0.0	0.0

Notes: Values are real present discounted value of the future stream of pension benefits in thousands of 2002 pesos, for a male worker who enters the system on June 30, 1997.

Data

- IMSS administrative records:
  - Full set of employers' reports of employees' wages, 1985-2005.
  - Variables: age, sex, daily wage, state and year of first registration with IMSS, employer id (location, industry)
  - Wages reported as spells; we draw last day of quarter.
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- *Encuesta Nacional de Empleo Urbano* (ENEU)
  - CPS-like household survey.
  - Households survey quarterly for 5 quarters, same questionnaire each period.
  - Began in 1987, some weirdness in first year.
  - Initial sample from 16 cities, expanded over time.
  - Questionnaire modified in 1994.
  - More extensive re-design in 2003.
  - Asks if workers receive IMSS coverage.
  - Contract type available 1994 on.

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  - Ages: 16-65
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  - Women often covered through husband. (Incentive to remain informal? Topic for future.)
  - Small N problem in ENEU, especially for older women by metro area.

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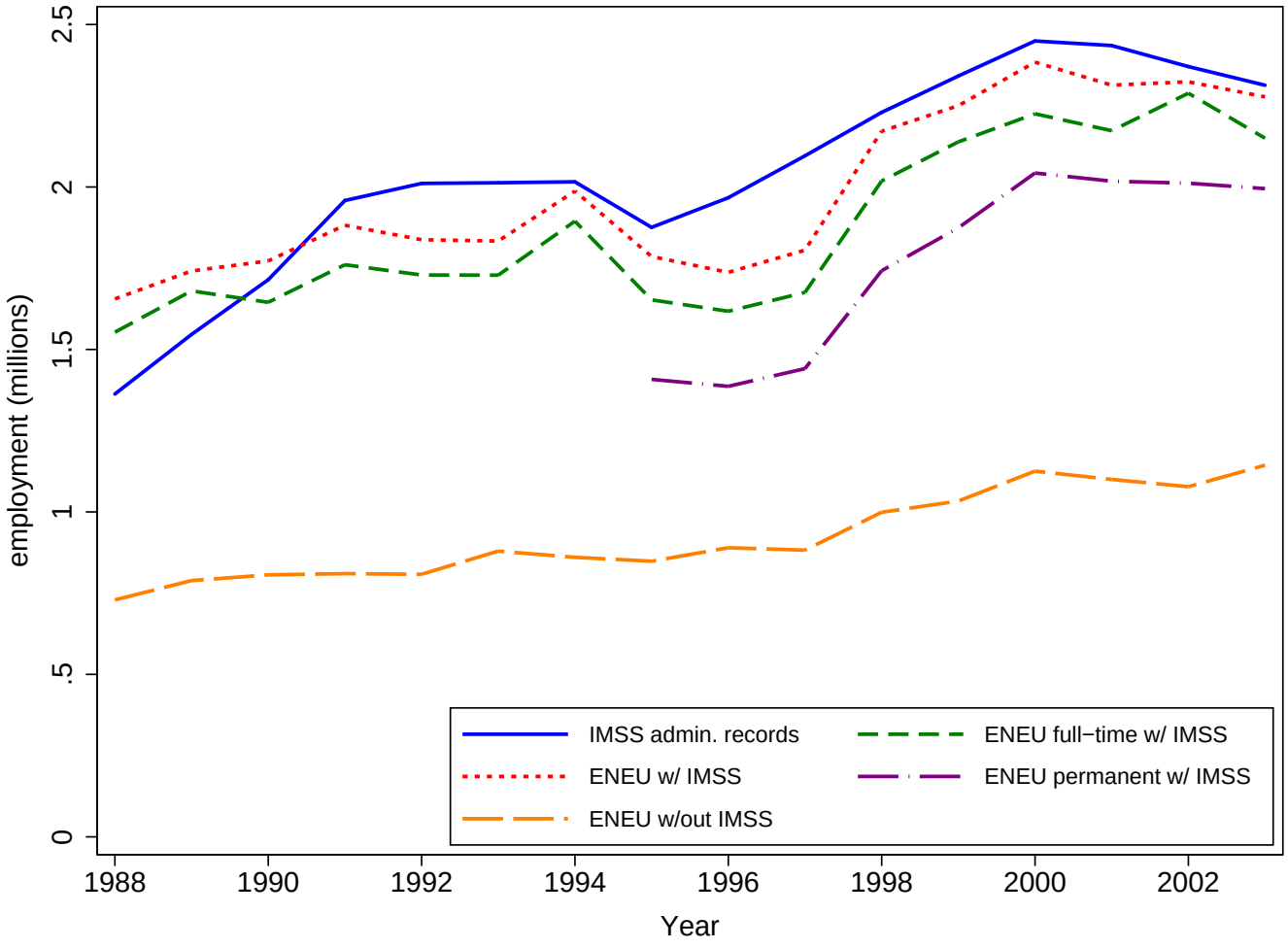
  - Small N problem in ENEU, especially for older women by metro area.
- Summary: cross-sectional results for women similar to those for men. D-in-D noisier, no clear pattern.

Table 2: Comparison of IMSS and ENEU, 1990, men

	IMSS baseline sample (1)	full ENEU sample (2)	ENEU w/ IMSS (3)	ENEU w/o IMSS (4)	ENEU permanent w/ IMSS (5)	ENEU full-time w/ IMSS (6)
A. 1990						
real avg daily wage	156.41	164.01	173.12	144.00		166.87
	(0.09)	(1.58)	(1.94)	(2.62)		(1.85)
age	31.81	31.46	32.13	29.98		32.22
	(0.01)	(0.15)	(0.17)	(0.29)		(0.17)
fraction employed in ests >100 employees	0.52	0.43	0.55	0.18		0.55
	(0.00)	(0.01)	(0.01)	(0.01)		(0.01)
N (raw observations)	1714518	16169	11592	4577		10978
N (population, using weights)	1714518	2578847	1772523	806324		1645229
B. 2000						
real avg daily wage	160.28	148.32	161.28	120.88	166.56	155.93
	(0.09)	(1.31)	(1.60)	(2.16)	(1.80)	(1.59)
age	32.77	32.22	32.82	30.94	33.22	32.88
	(0.01)	(0.14)	(0.16)	(0.28)	(0.17)	(0.16)
fraction employed in ests >100 employees	0.58	0.44	0.59	0.10	0.63	0.59
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
N (raw observations)	2449442	19171	14063	5108	11918	13246
N (population, using weights)	2449442	3509828	2384267	1125561	2042988	2225318

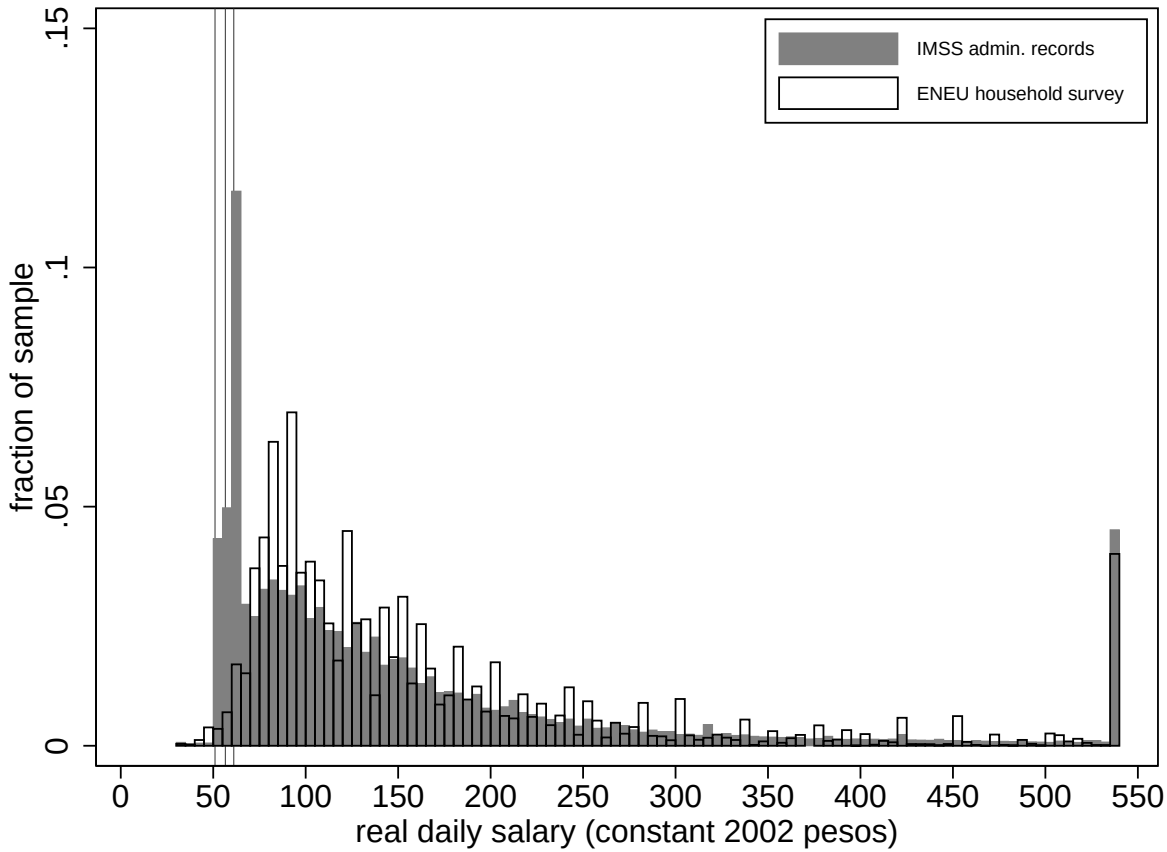
▸ Women

Fig. 5: Employment, IMSS vs. ENEU samples, men



▸ Women

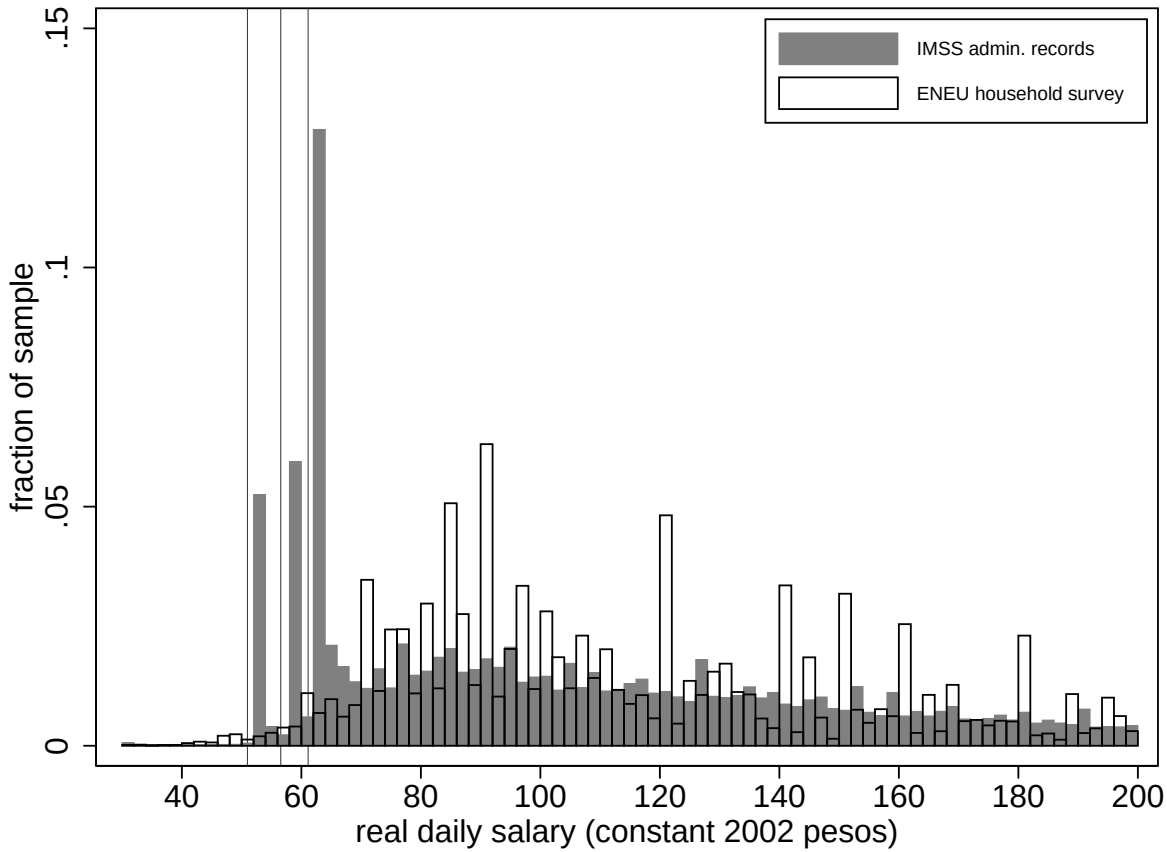
Fig. 6: Wage histogram, men, 1990



Notes: Bins are 5 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar. Vertical lines represent the three region-specific minimum wages.

▸ Women

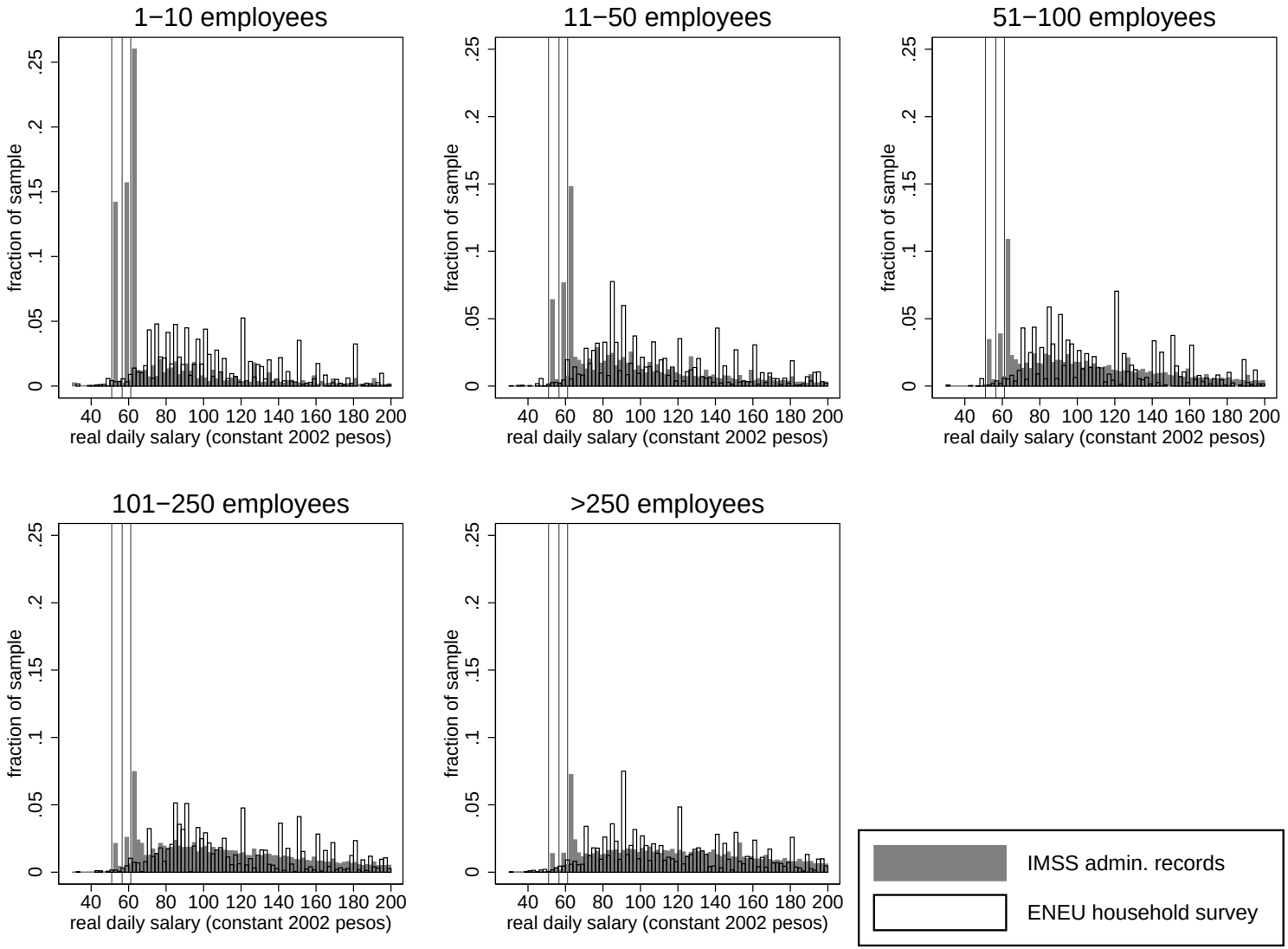
Fig. 7: Wage histogram, men, 1990, low wages



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar. Vertical lines represent the three region-specific minimum wages.

▸ Women

Fig. 8: Wage histograms, men, 1990, by firm size



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Women ▸ Non-EIA plants ▸ Other years ▸ Size histograms

Fig. 11: Wage densities by age group, men

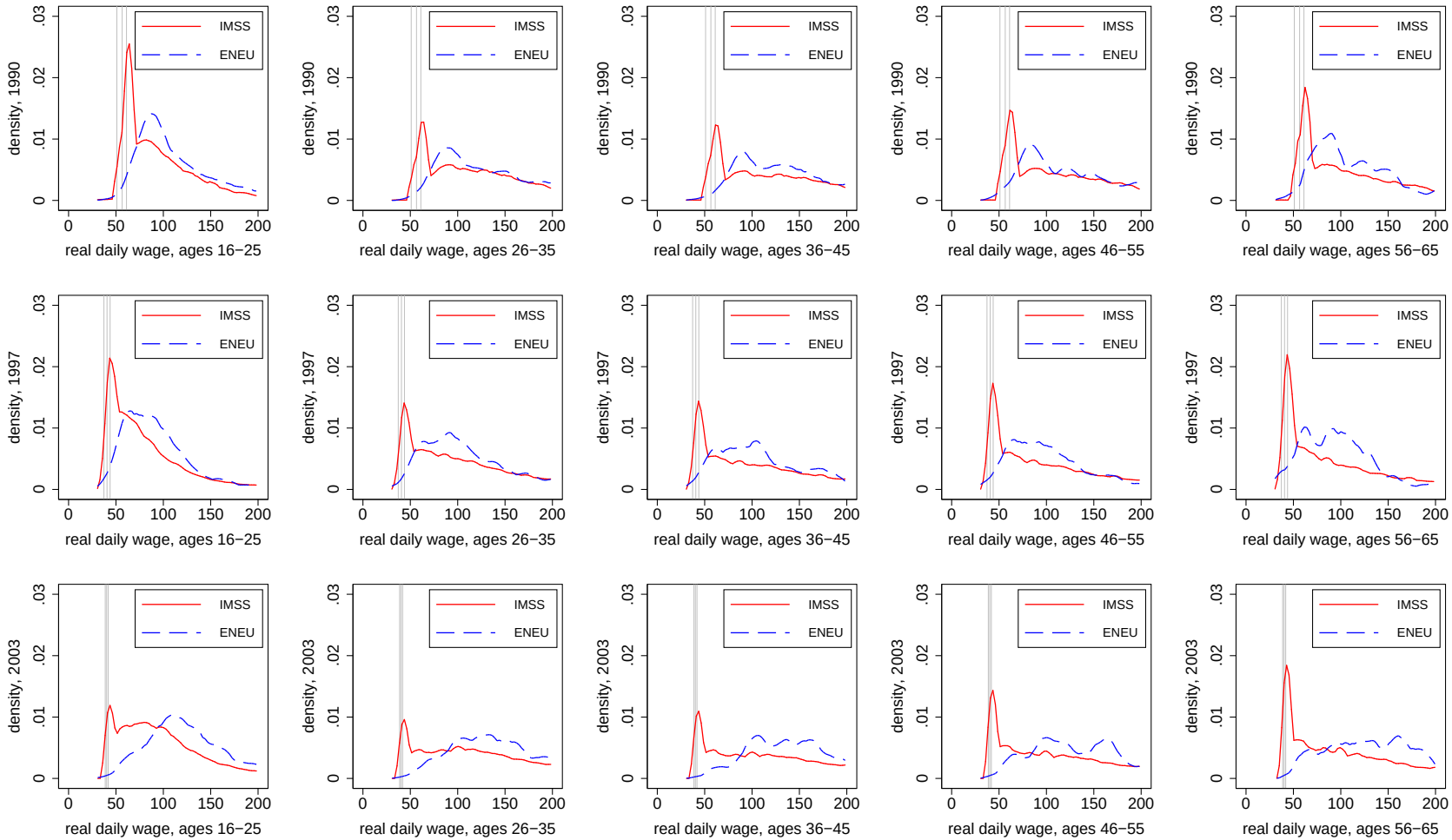
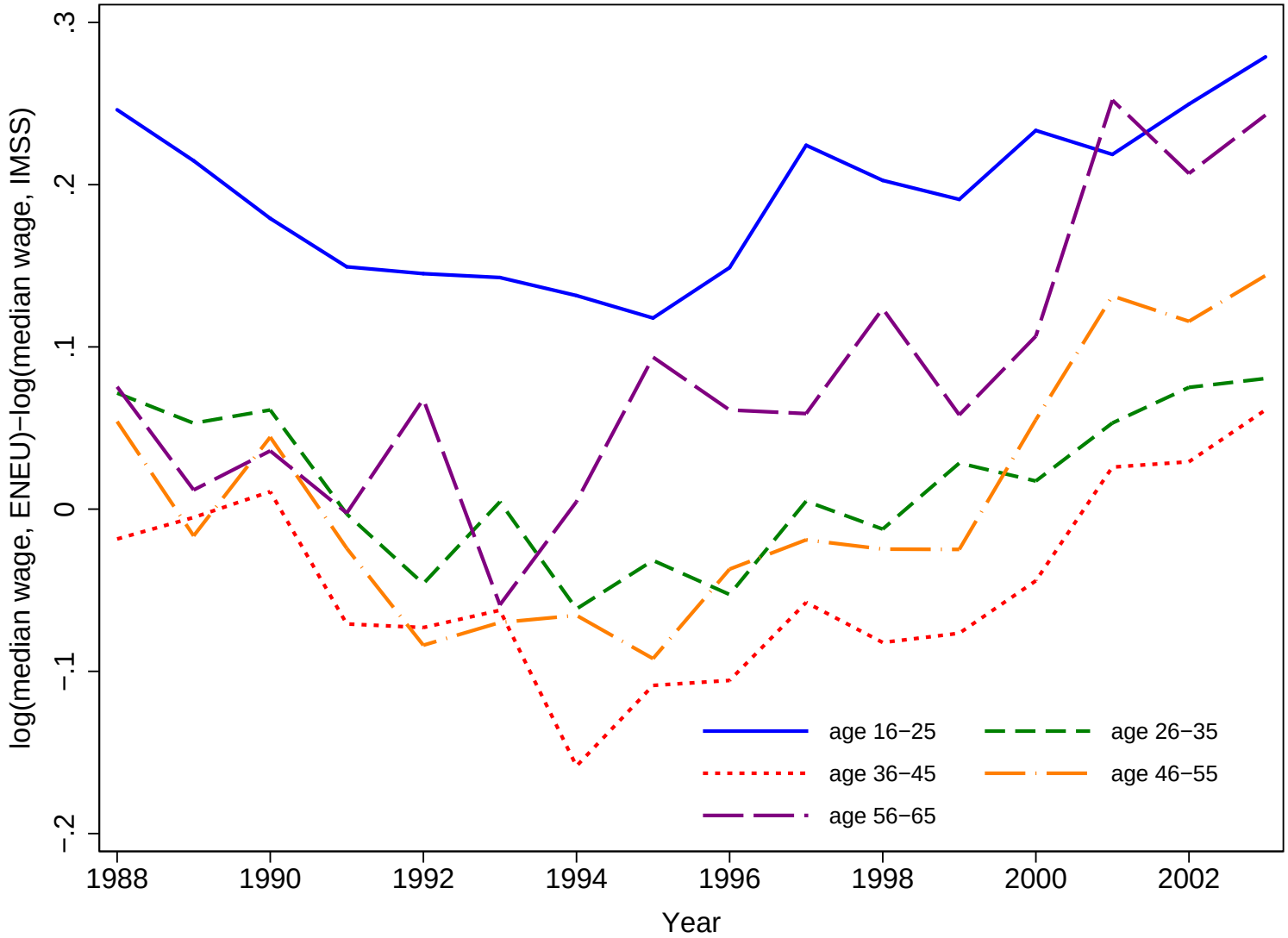
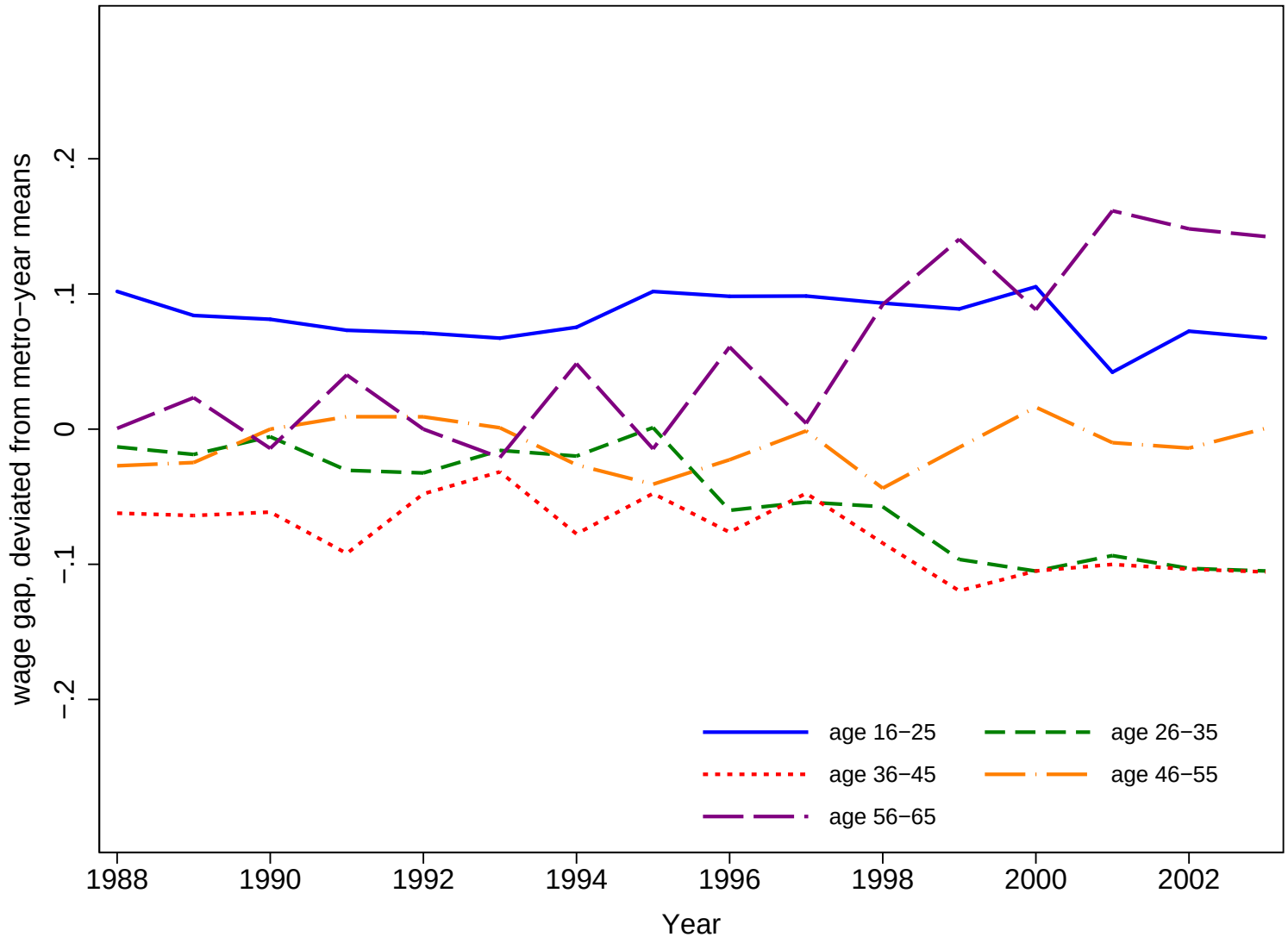


Fig. 12: Wage gaps by age group, men



▸ Women

Fig. 13: Wage gaps by age group, men, deviated from metro-year means



▸ Women

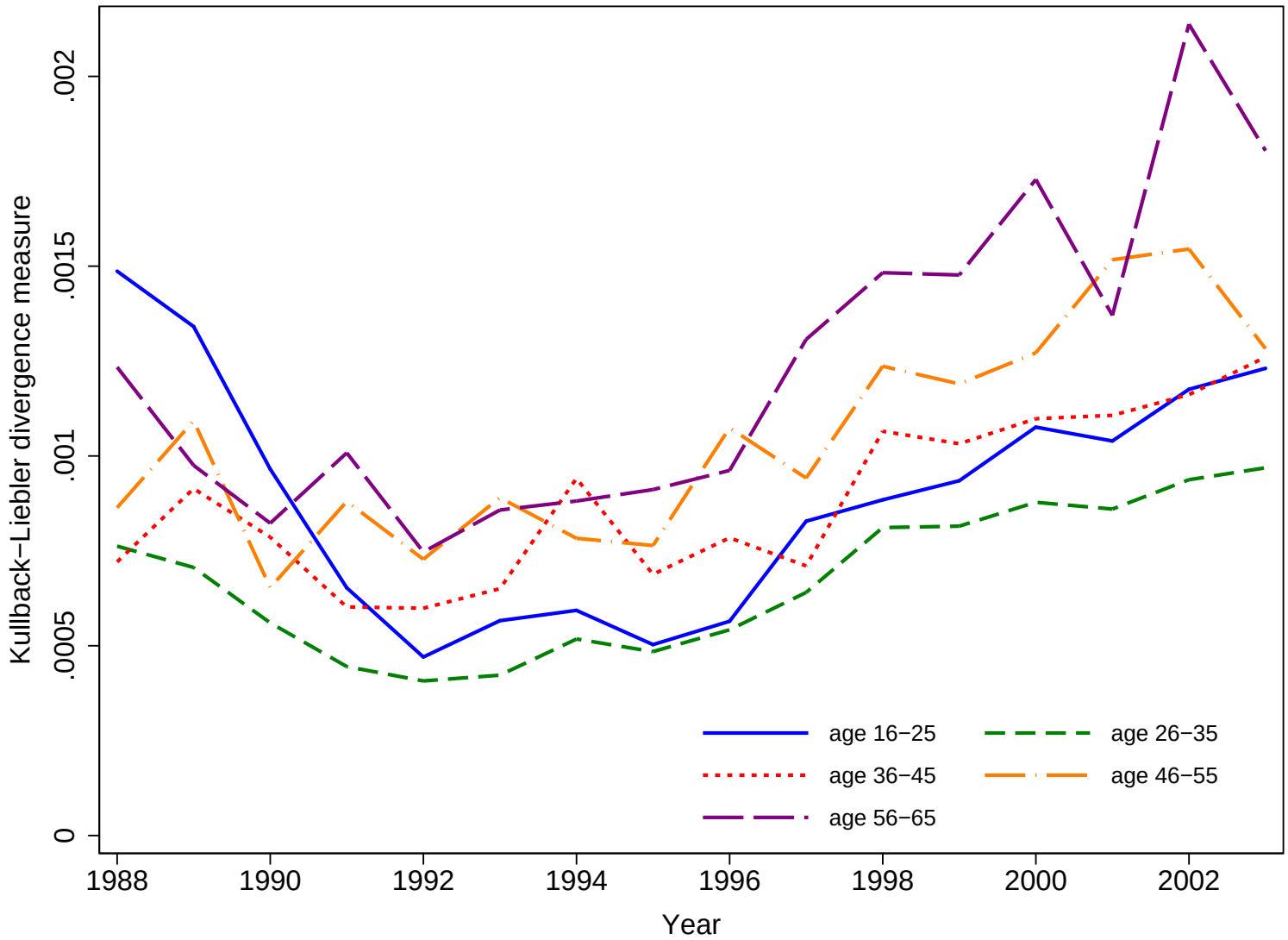
Kullback-Liebler divergence

- Kullback-Liebler divergence between two densities, f_1 and f_2:

$$D_{12} = \int_0^\infty \frac{f_1(w) - f_2(w)}{f_2(w)} f_1(w) dw$$

  - Only defined for $f_2(w) > 0$; use non-parametric density estimates.
  - Used by DiNardo, Fortin and Lemieux (1996) among others.

Fig. 14: Kullback-Liebler divergence by age group, men



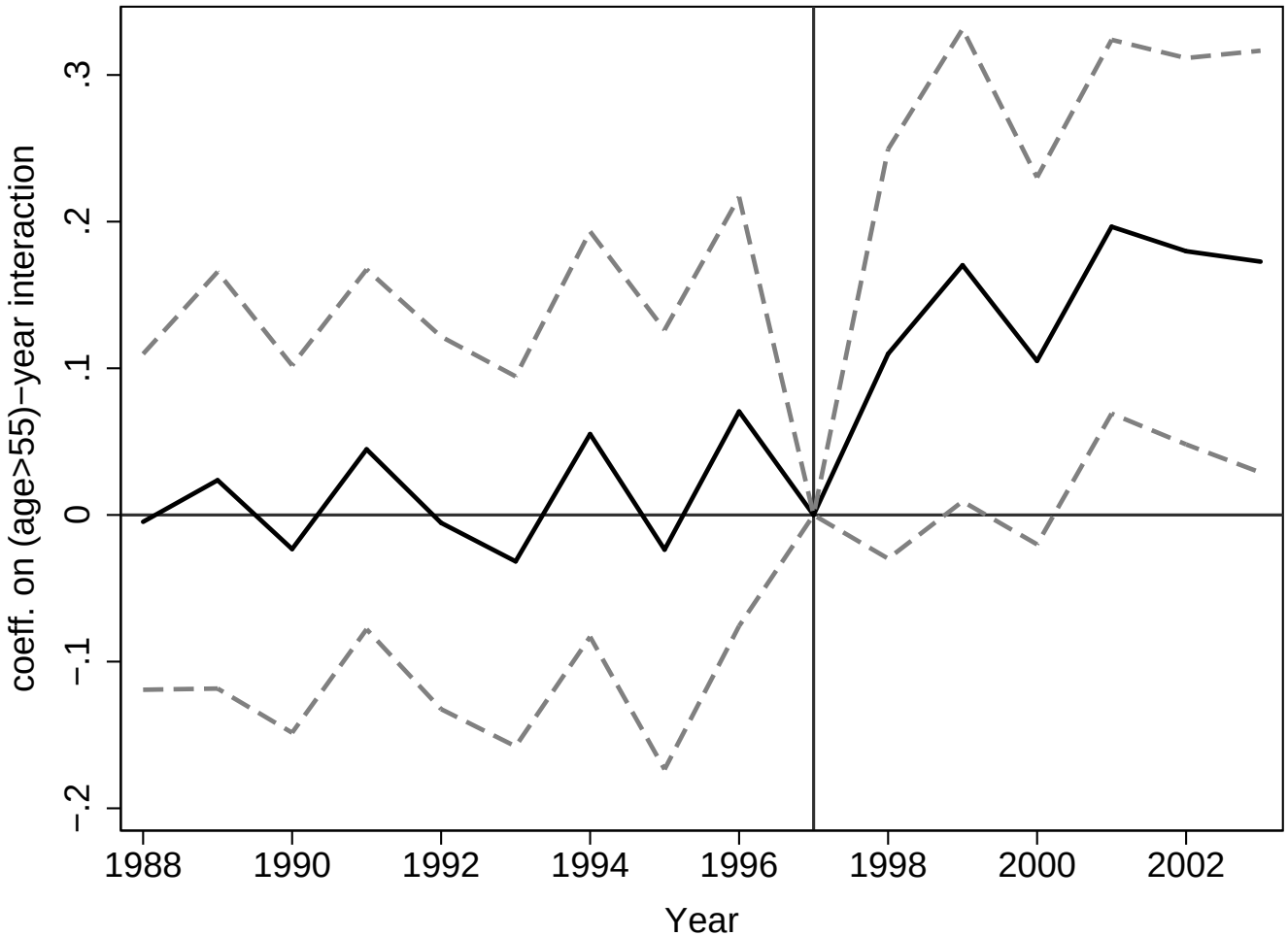
▸ Women

Table 3: Differential effects on wage gap, men

	dep. var.: log(median wage, ENEU) - log(median wage, IMSS)		
	(1)	(2)	(3)
1(age > 55)*1988	-0.005	-0.005	-0.005
	(0.088)	(0.065)	(0.058)
1(age > 55)*1989	0.024	0.024	0.024
	(0.103)	(0.083)	(0.072)
1(age > 55)*1990	-0.023	-0.023	-0.023
	(0.099)	(0.071)	(0.064)
1(age > 55)*1991	0.045	0.045	0.045
	(0.106)	(0.070)	(0.063)
1(age > 55)*1992	-0.005	-0.005	-0.005
	(0.090)	(0.068)	(0.065)
1(age > 55)*1993	-0.032	-0.032	-0.032
	(0.100)	(0.071)	(0.064)
1(age > 55)*1994	0.055	0.055	0.055
	(0.103)	(0.076)	(0.071)
1(age > 55)*1995	-0.024	-0.024	-0.024
	(0.101)	(0.080)	(0.076)
1(age > 55)*1996	0.071	0.071	0.071
	(0.102)	(0.077)	(0.075)
1(age > 55)*1998	0.110	0.110	0.110
	(0.092)	(0.077)	(0.071)
1(age > 55)*1999	0.170	0.170*	0.170**
	(0.120)	(0.092)	(0.082)
1(age > 55)*2000	0.105	0.105	0.105*
	(0.104)	(0.069)	(0.064)
1(age > 55)*2001	0.197**	0.197***	0.197***
	(0.098)	(0.071)	(0.065)
1(age > 55)*2002	0.180*	0.180**	0.180***
	(0.103)	(0.071)	(0.067)
1(age > 55)*2003	0.173*	0.173**	0.173**
	(0.104)	(0.075)	(0.073)
metro area effects	N	Y	
year effects	Y	Y	
metro-year effects	N	N	Y
age category effects	Y	Y	Y
R-squared	0.14	0.67	0.77
N	1280	1280	1280

Women

Fig. 15: Coeffs. on age*year interaction (Table 4 Col 3)



▸ Women

Conclusion

- Two basic points:
  - There is under-reporting. Third-party reporting does not eliminate evasion.
  - The extent of under-reporting appears to respond to economic incentives, in particular to change in employees' incentive to ensure accurate reporting.
- Implication: giving employees incentives to monitor employers should be a consideration in the design of social-insurance systems.
- Future work:
  - Estimating incidence of payroll taxes/social insurance benefits in presence of evasion.
  - Does greater compliance on intensive margin (less under-reporting by registered firms) induce lower compliance on extensive margin (fewer firms registering)?

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Related literature

- Results broadly consistent with theoretical model in Kleven, Kreiner and Saez (2009).
  - Firms are cooperatives of workers who may collude in under-reporting.
  - In baseline case, all workers have access to firm's records, can credibly denounce evasion if it exists, cannot pre-commit not to denounce.
  - Two mechanisms make collusion more difficult in larger firms:
    - Workers subject to random shocks (e.g. becoming disgruntled).
    - Reward for whistle-blowing increasing in amount of evasion.
  - Tailorable to our setting:
    - Interpret pension reform as (small) increase in reward for whistle-blowing.
    - In presence of disgruntlement shocks, predicts (1) greater compliance in larger firms, (2) increased compliance by firms employing affected workers.

Related literature (cont.)

- Attractive enforcement properties of VATs:
  - Kopczuk and Slemrod (2006), Keen and Lockwood (2010), Pomeranz (2011).
- Papers using independent sources of information to infer under-reporting (not of payroll):
  - Fisman and Wei (2004), Gorodnichenko et al. (2009), Marion and Muehlegger (2008), Hurst et al. (2011), Braguinsky et al. (2010).
- Small literature on under-reporting of payroll:
  - Nyland et al. (2006), Tonin (2011), Elek et al. (forthcoming).
- Broader literatures on the role of firms in tax systems and on tax evasion/avoidance. Reviews:
  - Slemrod (2008), Gordon and Li (2009), Andreoni et al. (1998) Slemrod and Yitzhaki (2002), Saez et al. (2012).
- This paper appears to be the first empirical study of response of under-reporting by firms to changes in the incentives of employees.

Fig. 1: Employer contribution schedule (low wages)

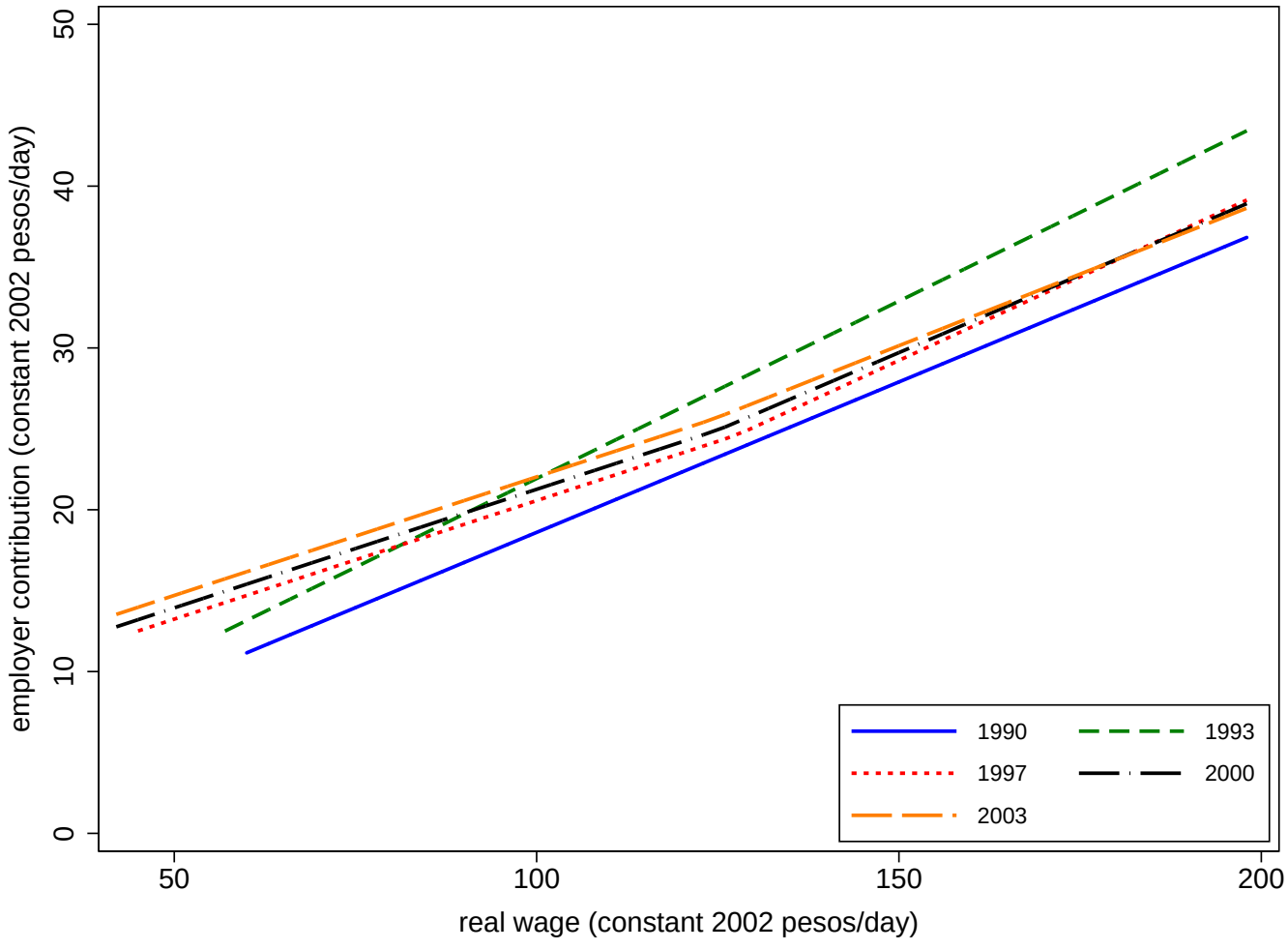
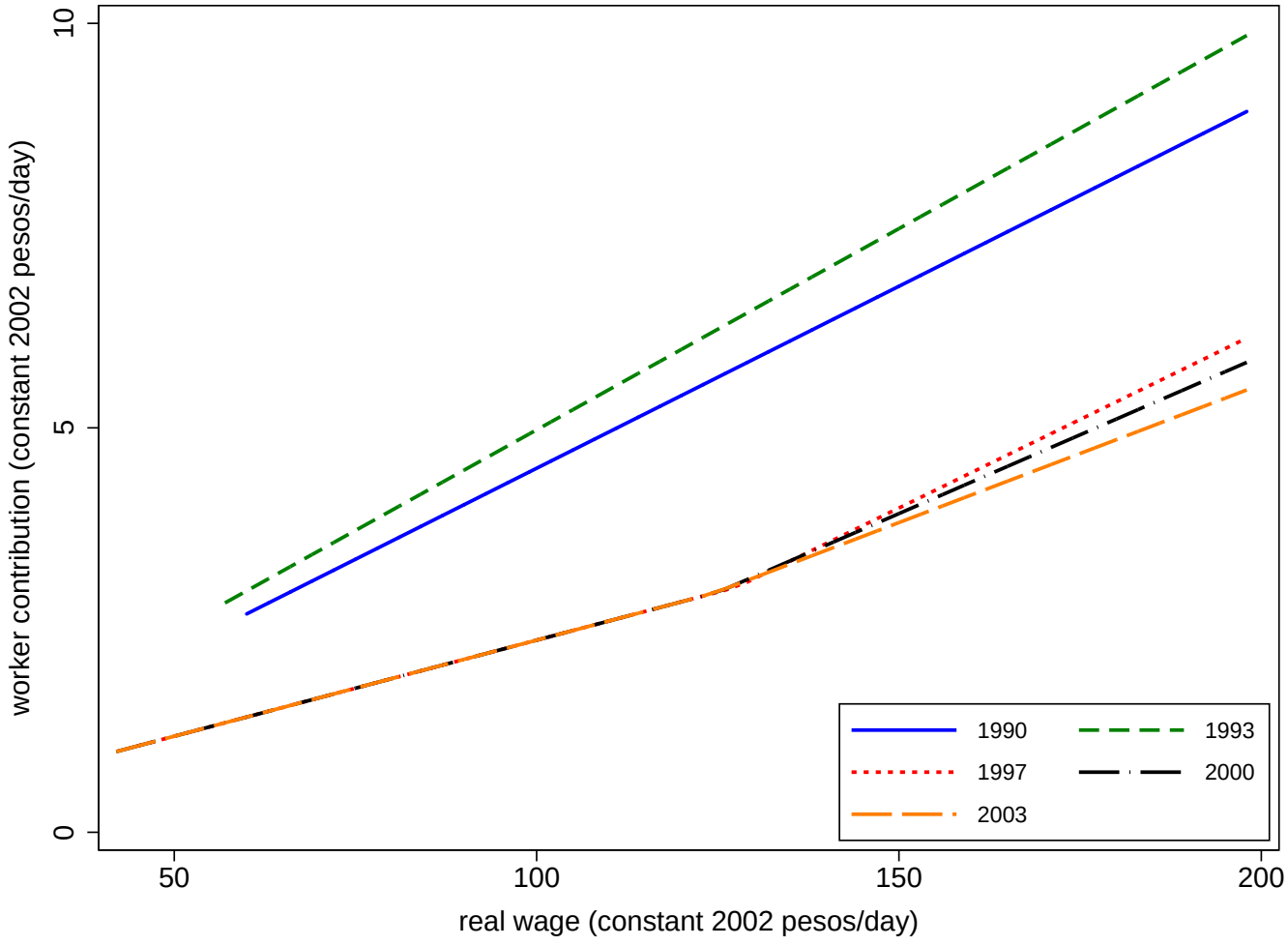
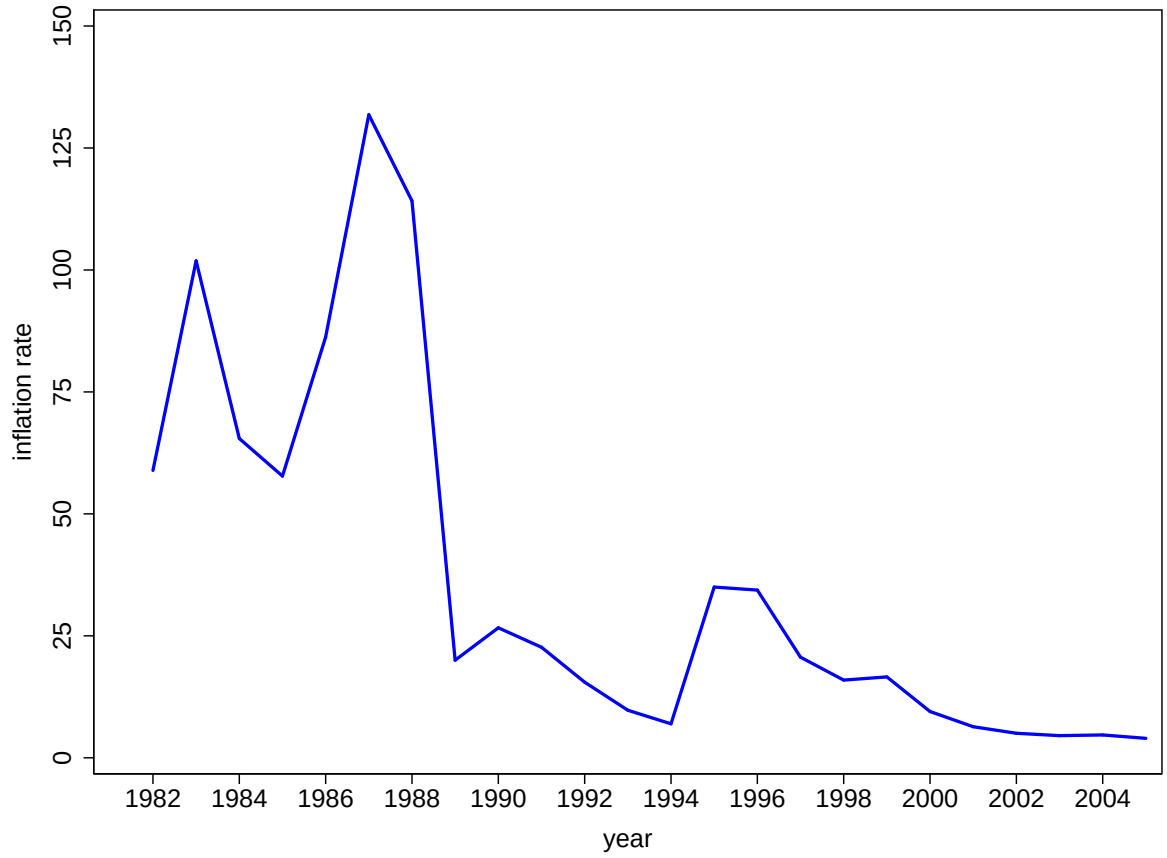


Fig. 2: Employee contribution schedule (low wages)



Inflation rate



Institutional background (cont.)

- Housing account
  - Employer contributes 5% of worker's wage to housing fund (INFONAVIT), to which workers can apply for loans.
  - Workers can claim unused funds at retirement.
    - Prior to 1992: *nominal* contributions, real value low.
    - 1992-1997: nominal contributions + interest, but real rate of return negative.
    - Post-reform: Funds administered by AFORE, can be claimed by workers who choose PRA.
    - Grandfathered workers who choose PAYGO only receive unused housing funds from 1992-1997.
  - Changes reinforce pension changes.

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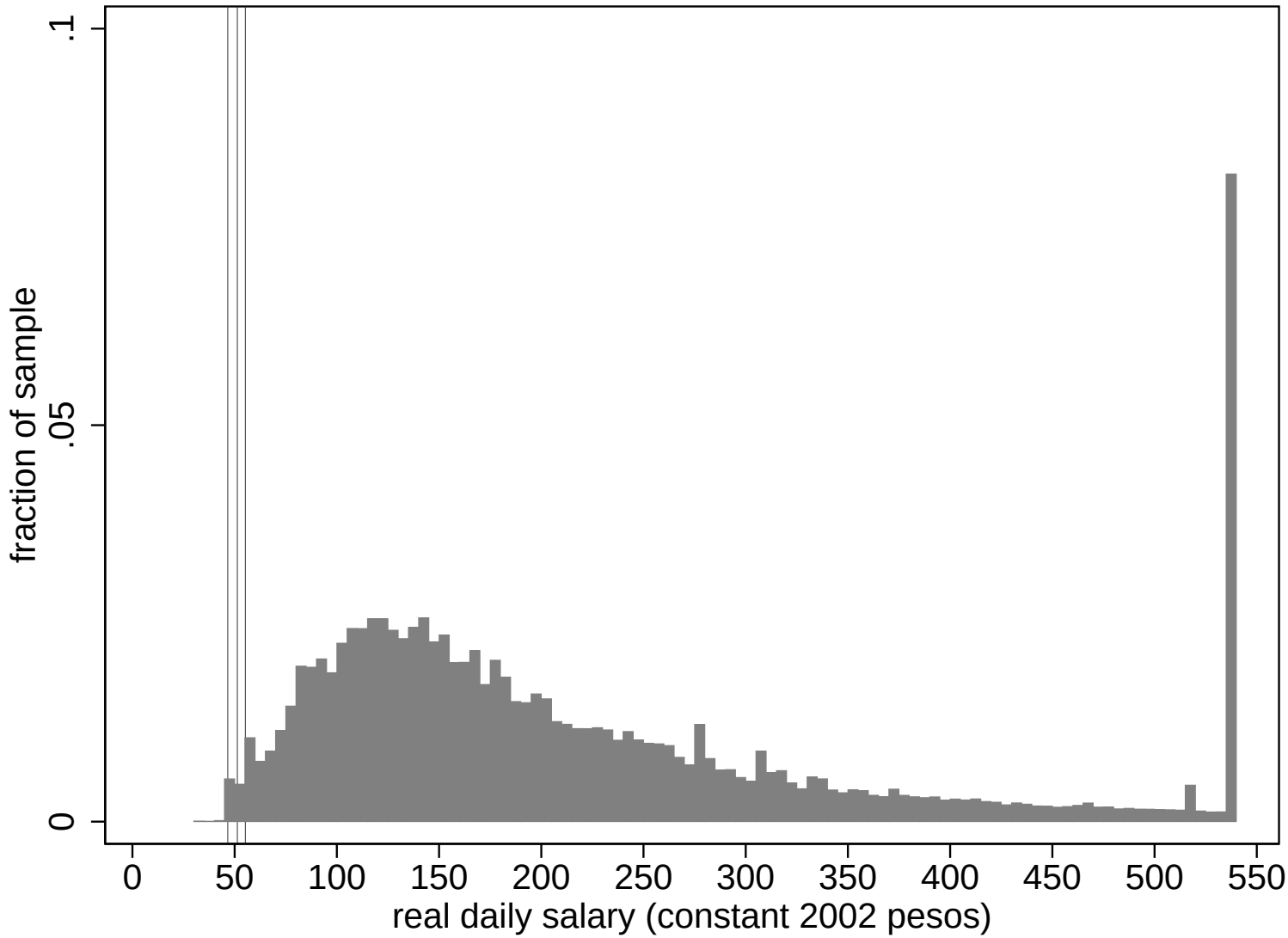
    - Post-reform: Funds administered by AFORE, can be claimed by workers who choose PRA.
    - Grandfathered workers who choose PAYGO only receive unused housing funds from 1992-1997.
  - Changes reinforce pension changes.
- Enforcement:
  - Law provides for penalties as share of evasion (currently 40-100%), in addition to paying unpaid contributions.
  - No reward for whistle-blowers (beyond correcting employer contributions)
  - Wage must be corresponding minimum wage + 4.5% (to cover legally required annual bonus)

Institutional background (cont.)

- Other dimensions of tax system:
  - VAT: 15% for 1988-2003 period.
  - Corporate income taxes:
    - 39.2% in 1988, 34% in 2003
    - Widspread evasion: e.g. in early 1990s, 70% of corporations declared no income (OECD, 1992).
  - Personal income taxes:
    - 3-50% in 1988, 3-34% in 2003.
    - Extensive tax credits for low-income workers, to offset regressive effects of VAT.
    - In 1997, individuals making $<$3.2 minimum wages (70% of all employees) paid $\leq$0 income tax (OECD, 1999, p. 80).
  - VAT, social security taxes each $\sim$3% of GDP; corporate + personal income taxes and PEMEX contributions each $\sim$4% of GDP (OECD, 1999).
  - IMSS and tax authority first signed agreement to share data in June 2002. No information sharing previously.

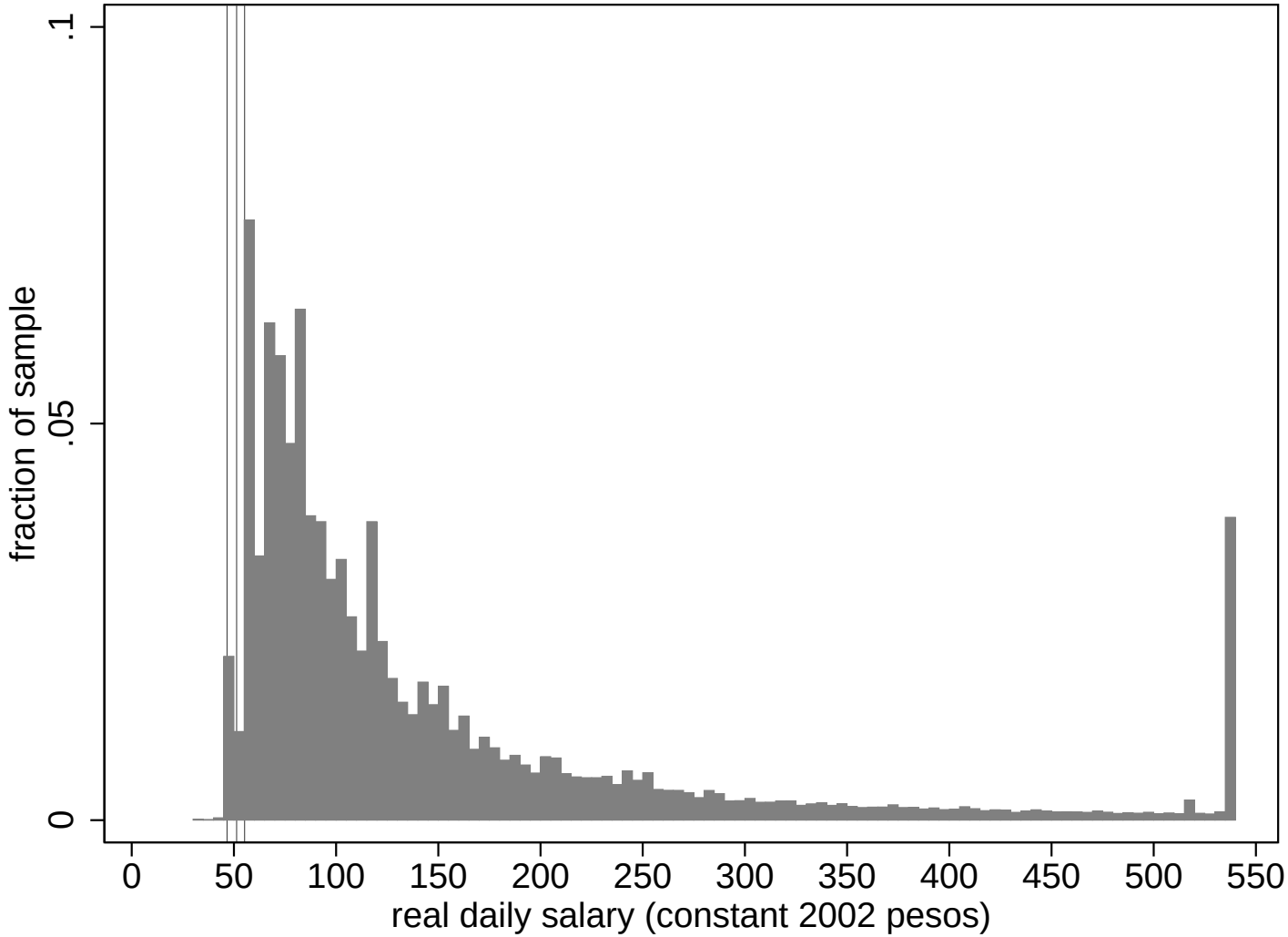
Fig. 9: Wage histogram, men, 1993, EIA plants



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Women ▸ Non-EIA plants

Fig. 10: Wage histogram, men, 1993, EMIME plants



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Women

Table 4: Differential effects on employment gap, men

	dep. var.: log(employment, IMSS) - log(employment, ENEU)		
	(1)	(2)	(3)
1(age > 55)*1988	-0.026	-0.026	-0.026
	(0.105)	(0.098)	(0.100)
1(age > 55)*1989	0.048	0.048	0.048
	(0.103)	(0.097)	(0.103)
1(age > 55)*1990	0.077	0.077	0.077
	(0.096)	(0.088)	(0.097)
1(age > 55)*1991	0.109	0.109	0.109
	(0.111)	(0.110)	(0.109)
1(age > 55)*1992	0.054	0.054	0.054
	(0.101)	(0.096)	(0.100)
1(age > 55)*1993	0.098	0.098	0.098
	(0.092)	(0.087)	(0.091)
1(age > 55)*1994	-0.224**	-0.224**	-0.224**
	(0.098)	(0.095)	(0.101)
1(age > 55)*1995	0.029	0.029	0.029
	(0.112)	(0.105)	(0.107)
1(age > 55)*1996	0.005	0.005	0.005
	(0.102)	(0.100)	(0.102)
1(age > 55)*1998	0.045	0.045	0.045
	(0.106)	(0.099)	(0.104)
1(age > 55)*1999	0.031	0.031	0.031
	(0.112)	(0.104)	(0.106)
1(age > 55)*2000	-0.006	-0.006	-0.006
	(0.094)	(0.093)	(0.093)
1(age > 55)*2001	0.014	0.014	0.014
	(0.110)	(0.109)	(0.105)
1(age > 55)*2002	0.091	0.091	0.091
	(0.113)	(0.107)	(0.103)
1(age > 55)*2003	0.034	0.034	0.034
	(0.094)	(0.093)	(0.091)
metro area effects	N	Y	
year effects	Y	Y	
metro-year effects	N	N	Y
age category effects	Y	Y	Y
R-squared	0.28	0.37	0.54
N	1280	1280	1280

Extension: Differential changes in IMSS "premium"?

- Did reform affect wage difference between formal and informal sectors?

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- Did reform affect wage difference between formal and informal sectors?
- Estimate a Mincer-type wage equation, separately by age group and year:

$$\ln w_i = \alpha + \beta(has\_imss_i) + X_i\gamma + \varepsilon_i$$

where X_i includes age, indicators for married, 9 schooling categories, 22 occupational categories, 16 metropolitan areas, 50 sectors

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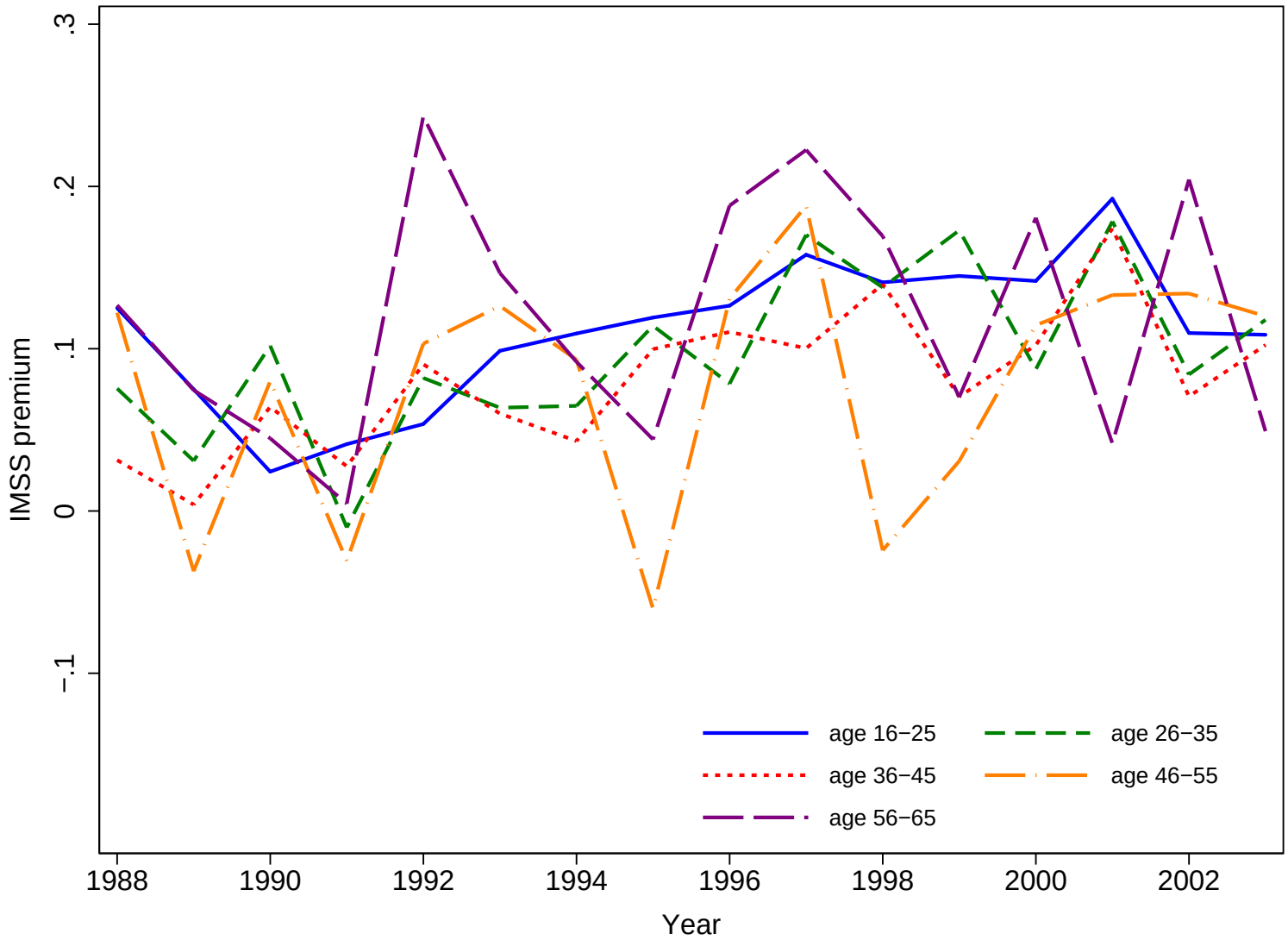
  where X_i includes age, indicators for married, 9 schooling categories, 22 occupational categories, 16 metropolitan areas, 50 sectors
- Call $\widehat{\beta}$ the "IMSS premium."

Extension: Differential changes in IMSS "premium"?

- All else equal, we would expect $\beta < 0$: covered workers pay for benefits in form of lower wage.
- If workers are aware of under-reporting, we would expect $\beta \downarrow$ relatively more for younger workers with reform, since pension value of being covered $\uparrow$.

IMSS "premium", by age group over time



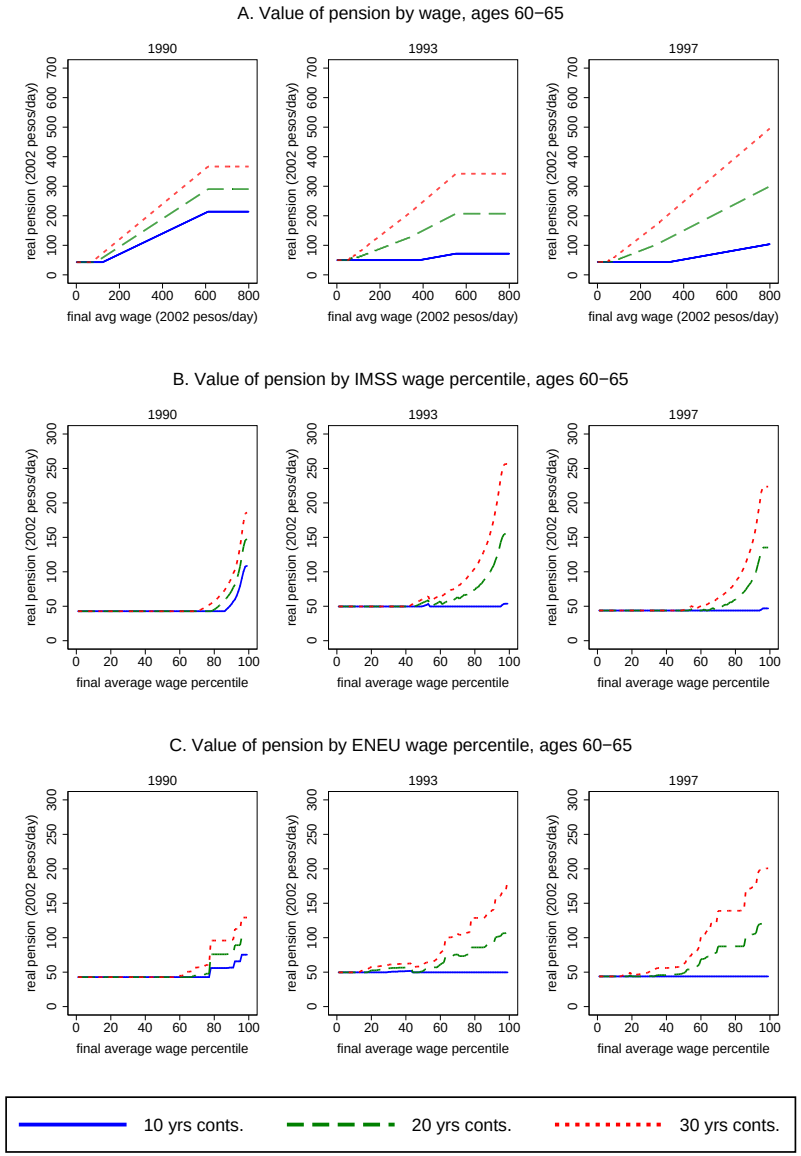
Discussion: IMSS "premium"

- $\widehat{\beta}$'s generally positive, increasing over period.
  - Suggests positive selection on unobservables into formal-sector jobs.
  - N.B.: Sample is same as above, does not include self-employed, may understate payoff in informal sector. (May explain difference with Marcouiller et al. (1997).)

Discussion: IMSS "premium"

- $\widehat{\beta}$'s generally positive, increasing over period.
  - Suggests positive selection on unobservables into formal-sector jobs.
  - N.B.: Sample is same as above, does not include self-employed, may understate payoff in informal sector. (May explain difference with Marcouiller et al. (1997).)
- No evidence of differential effect on IMSS "premium" by age.
  - Suggestive that workers were not aware of under-reporting, became more willing to pay (now reduced) cost of figuring out extent of under-reporting.
  - Need research design with exogenous variation in formality/informality at worker level to answer definitively.

Fig. A1: Value of pension, women ages 60-65



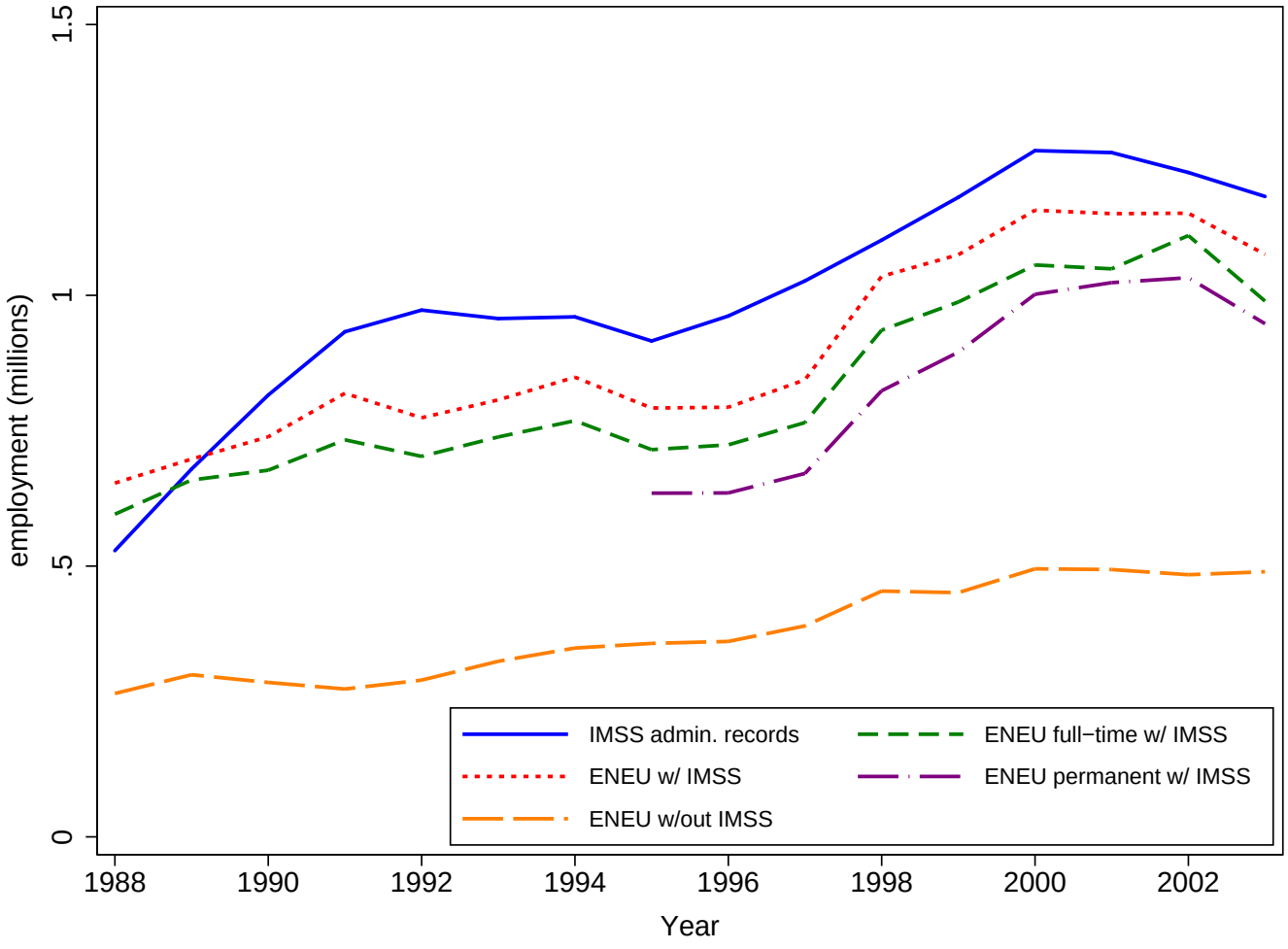
▸ Return

Table A5: Comparison of IMSS and ENEU, 1990, women

	IMSS baseline sample (1)	full ENEU sample (2)	ENEU w/ IMSS (3)	ENEU w/o IMSS (4)	ENEU permanent w/ IMSS (5)	ENEU full-time w/ IMSS (6)
A. 1990						
real avg daily wage	114.29	133.66	137.03	124.94		128.68
	(0.10)	(2.16)	(2.65)	(3.59)		(2.51)
age	28.16	28.35	28.03	29.17		27.82
	(0.01)	(0.21)	(0.23)	(0.47)		(0.24)
fraction employed in ests >100 employees	0.54	0.45	0.54	0.21		0.54
	(0.00)	(0.01)	(0.01)	(0.02)		(0.01)
N (raw observations)	815760	6685	5126	1559		4745
N (population, using weights)	815760	1023858	738698	285160		677053
B. 2000						
real avg daily wage	119.01	128.15	135.99	109.81	140.67	129.75
	(0.09)	(1.82)	(2.22)	(3.06)	(2.49)	(2.19)
age	30.50	30.34	29.85	31.50	30.17	29.71
	(0.01)	(0.18)	(0.19)	(0.40)	(0.21)	(0.20)
fraction employed in ests >100 employees	0.63	0.49	0.62	0.19	0.64	0.62
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
N (raw observations)	1267196	9670	7227	2443	6305	6607
N (population, using weights)	1267196	1652164	1157184	494980	1001866	1056013

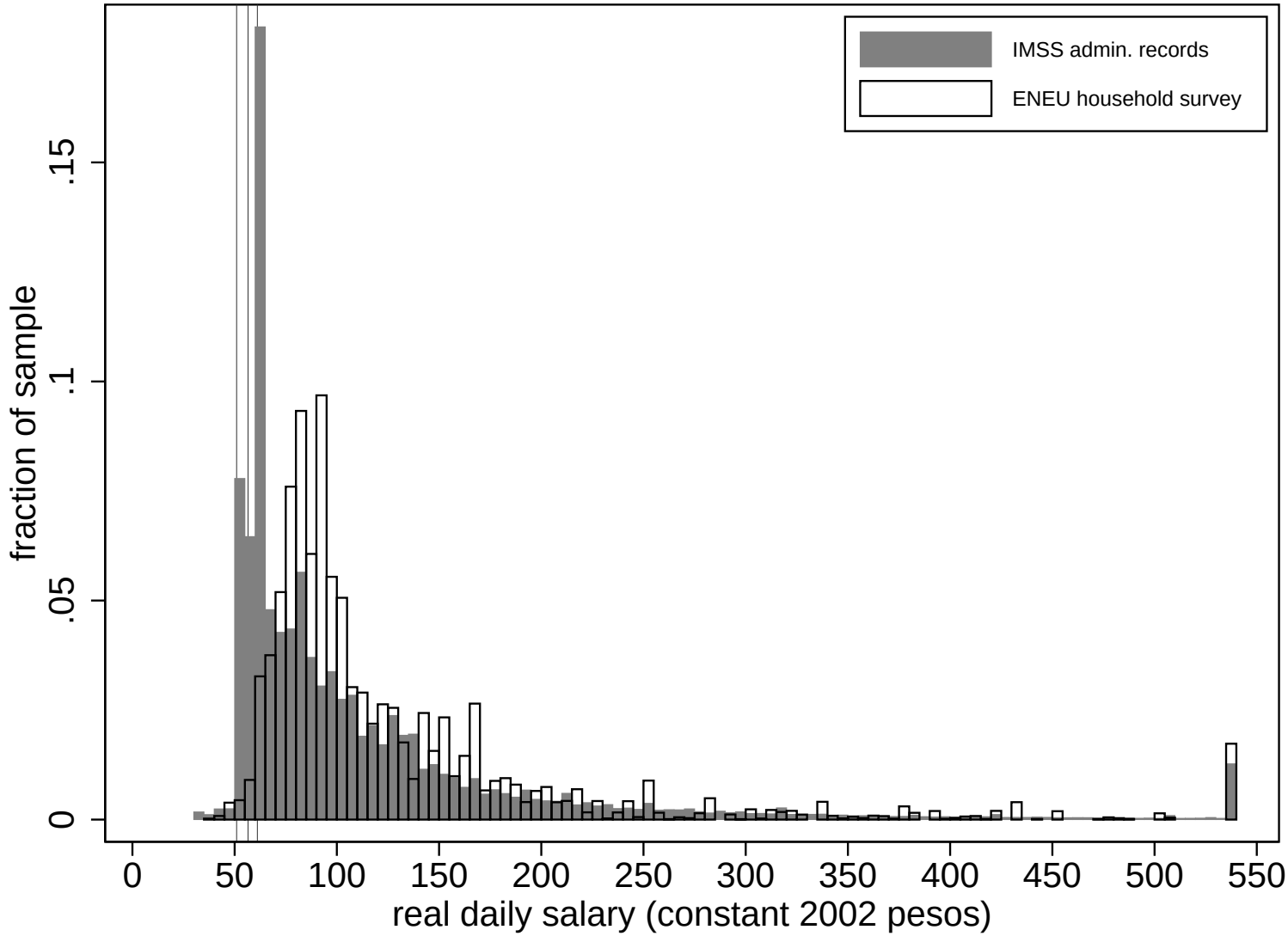
Return

Fig. A2: Employment, IMSS vs. ENEU samples, women



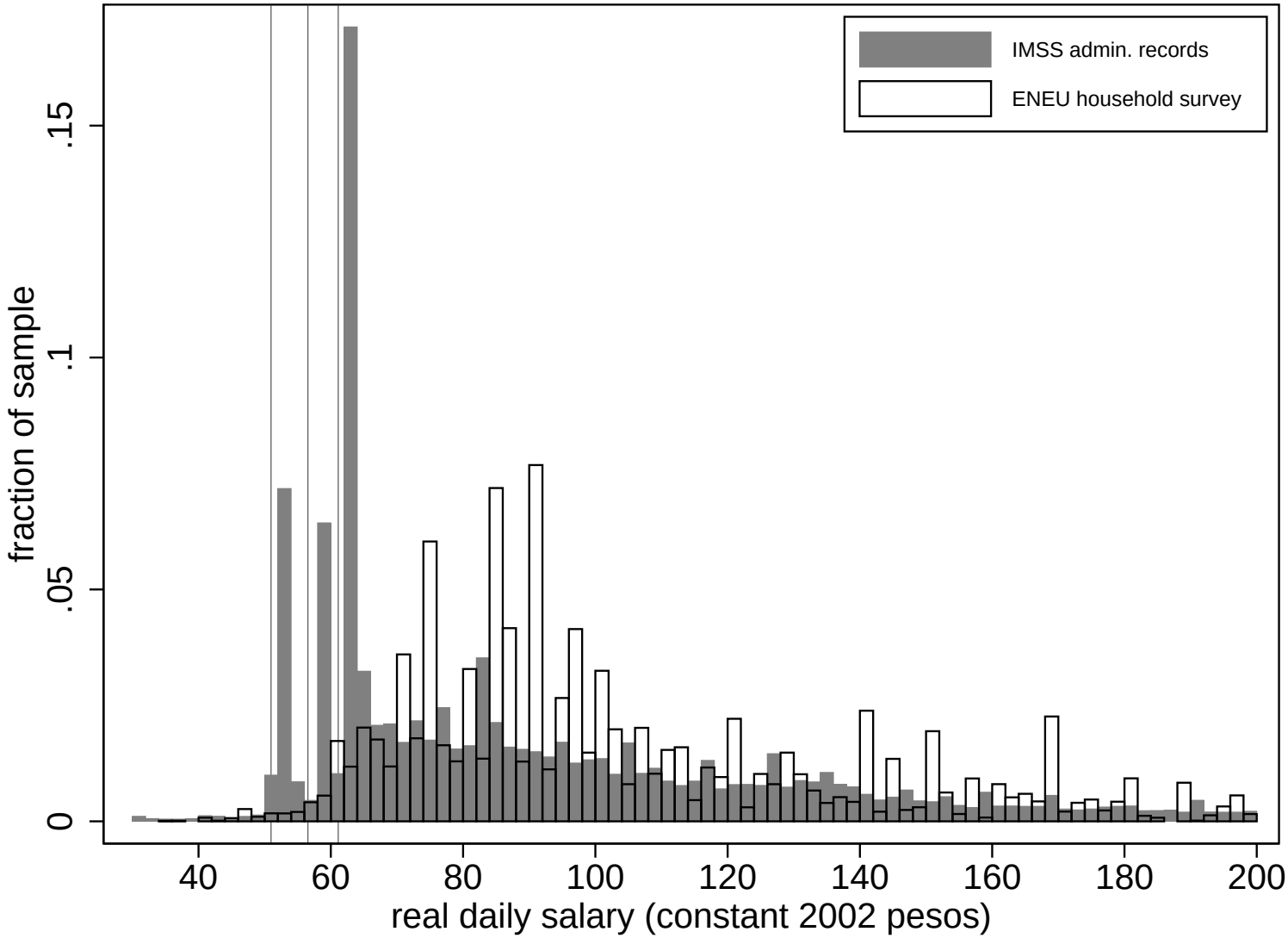
▸ Return

Fig. A3: Wage histograms, women, 1990



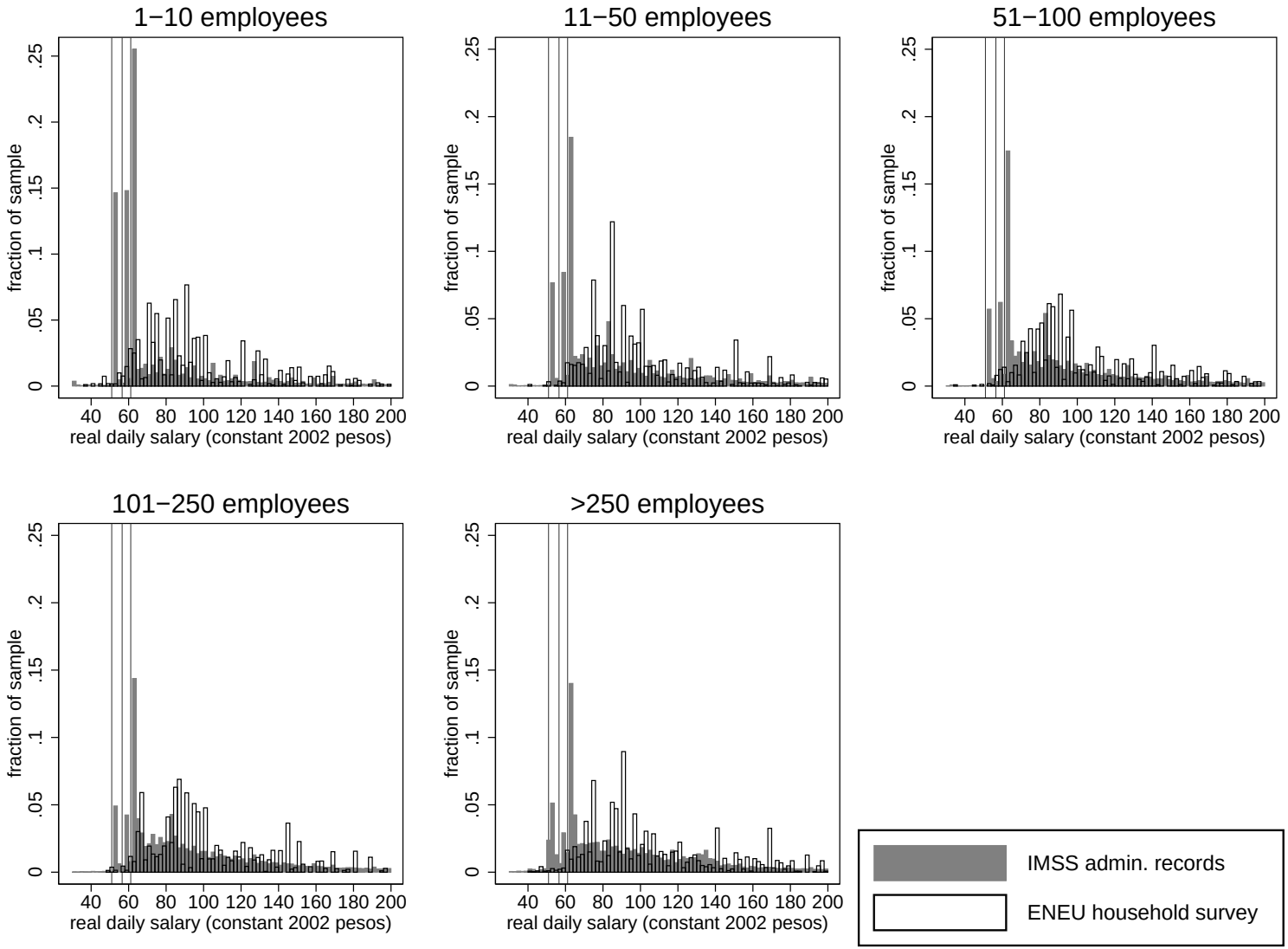
▸ Return

Fig. A4: Wage histograms, women, 1990, low wages



▸ Return

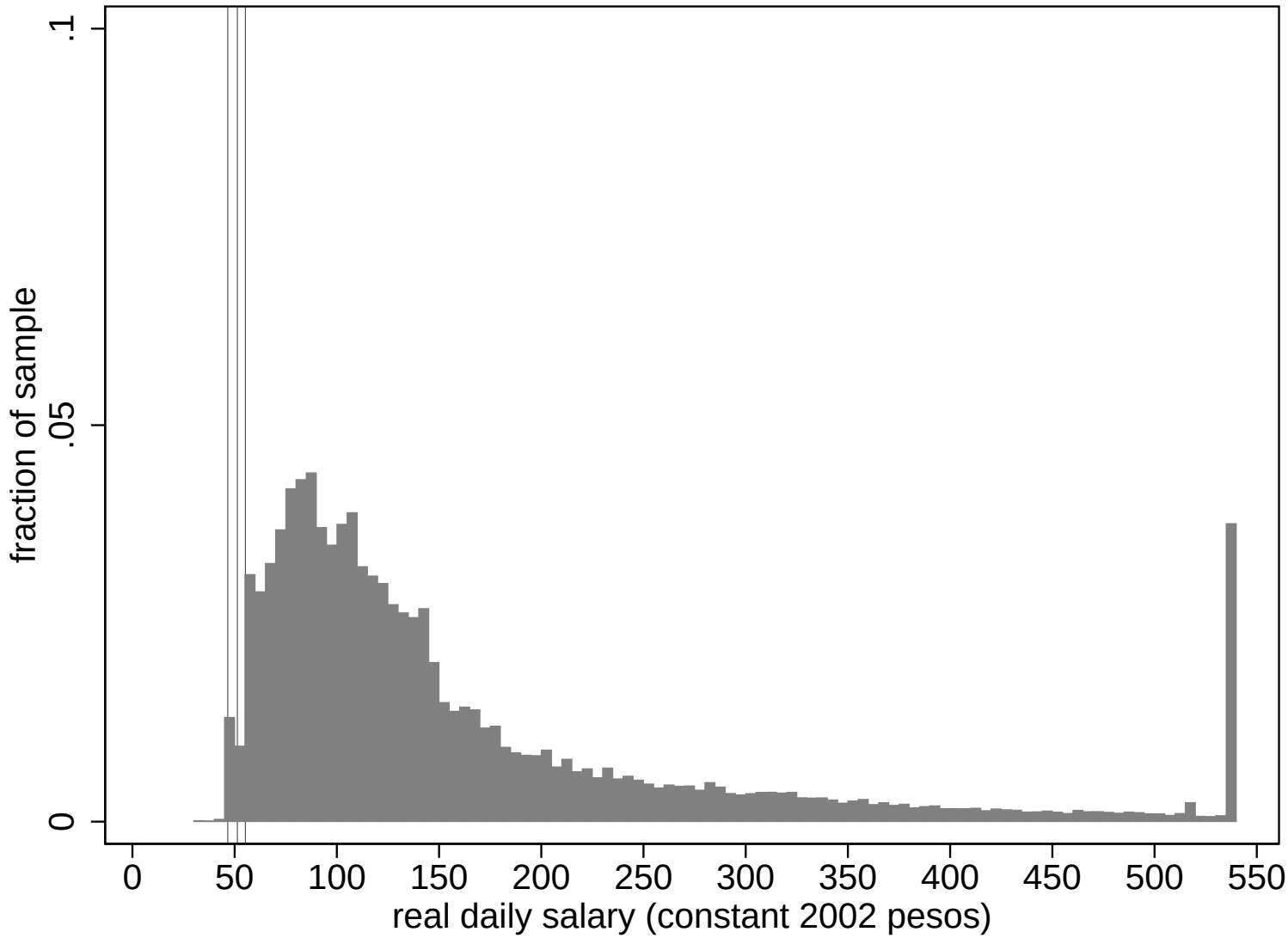
Fig. A5: Wage histograms, women, 1990, by firm size



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Return

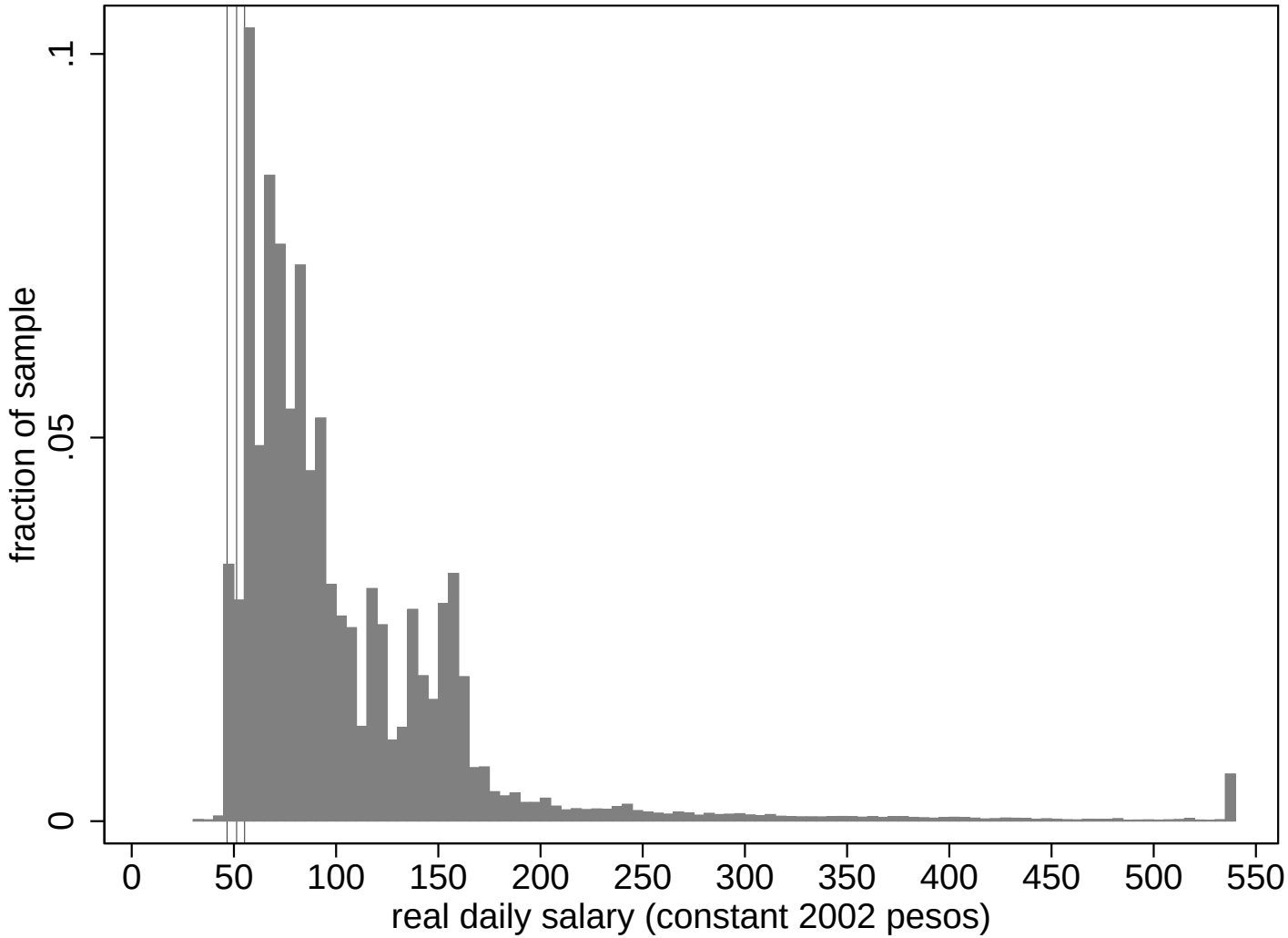
Fig. A6: Wage histogram, women, 1993, EIA plants



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

Return

Fig. A7: Wage histogram, women, 1993, EMIME plants



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Return

Fig. A8: Wage densities by age group, women

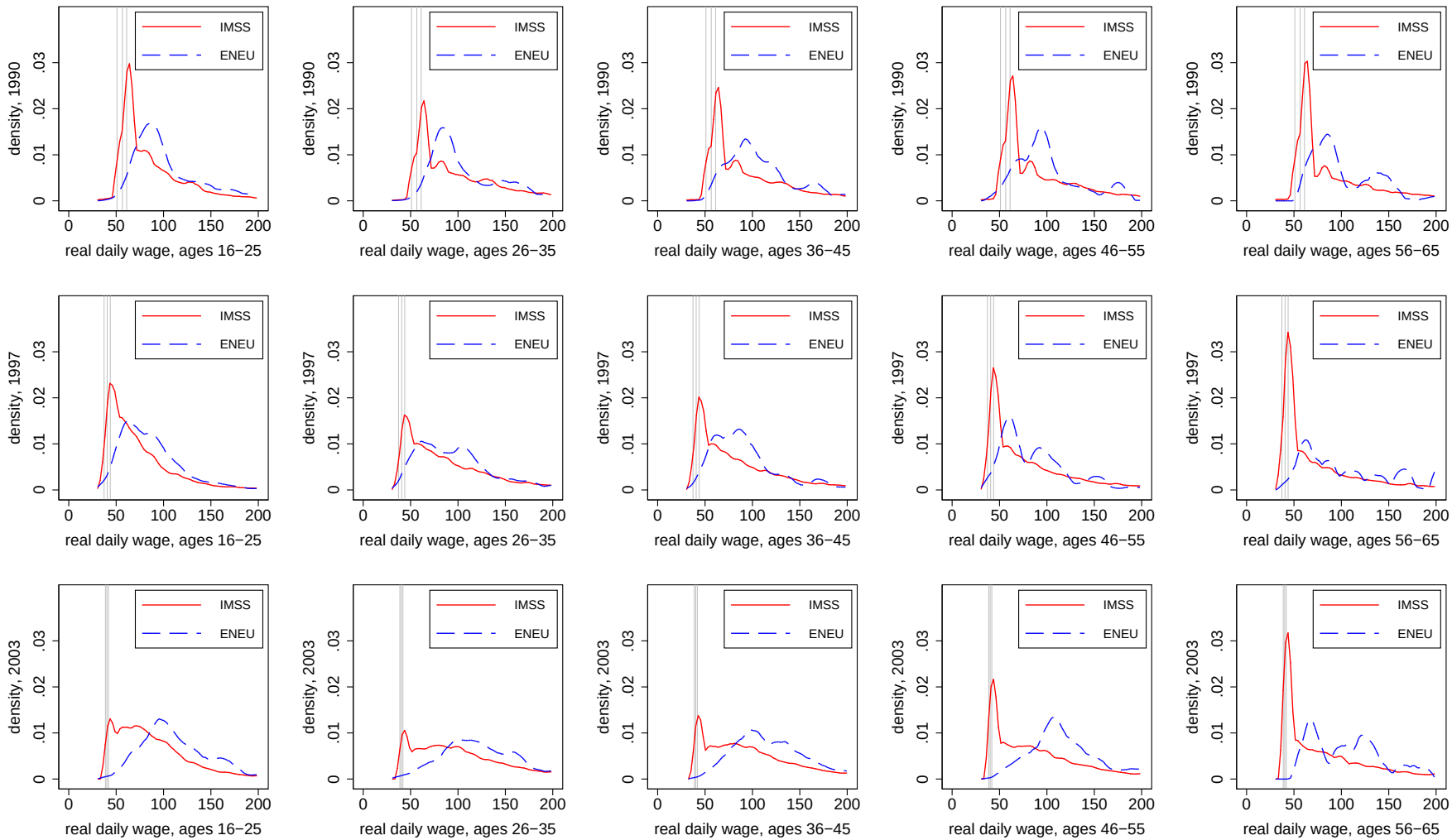
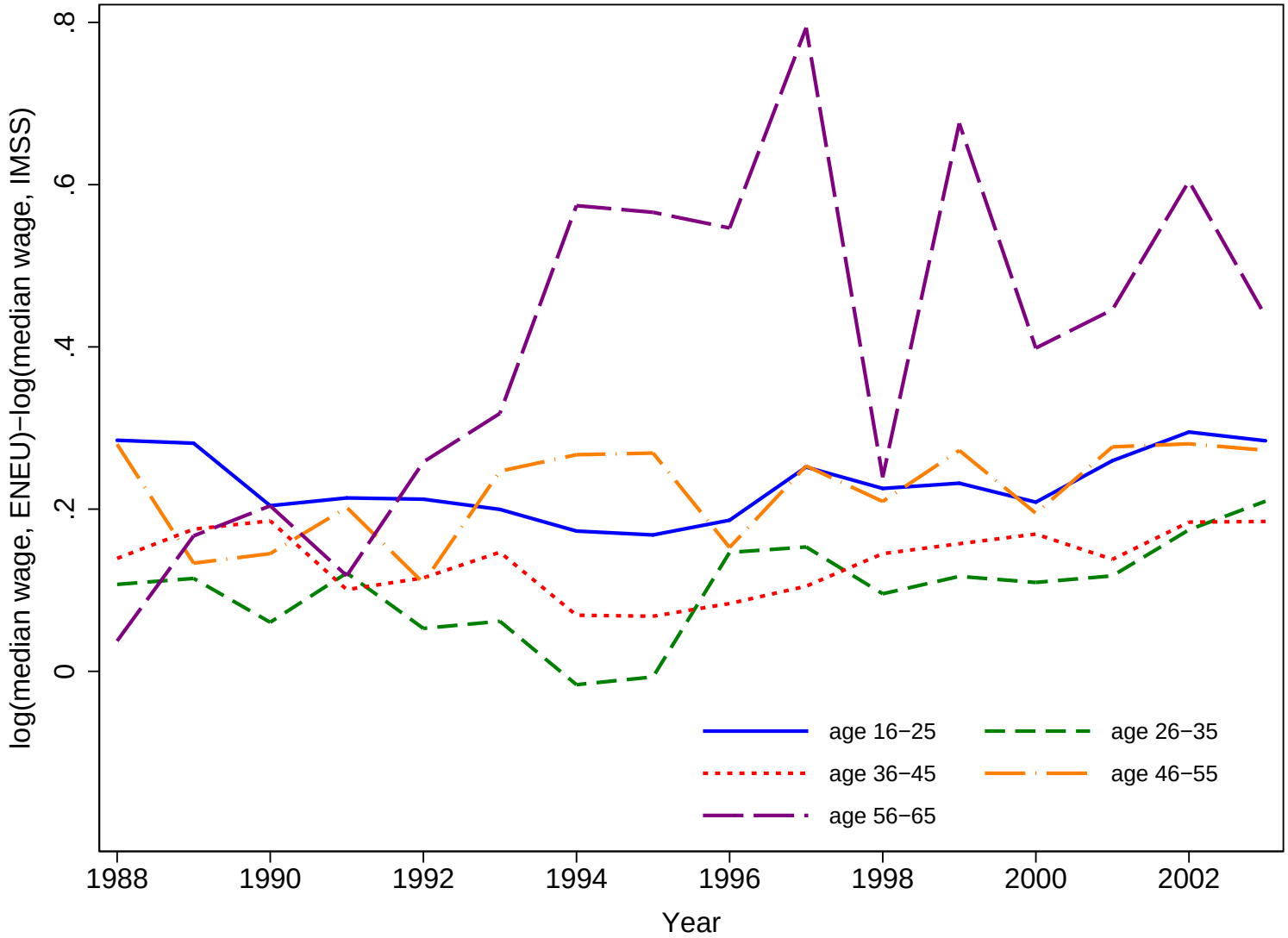
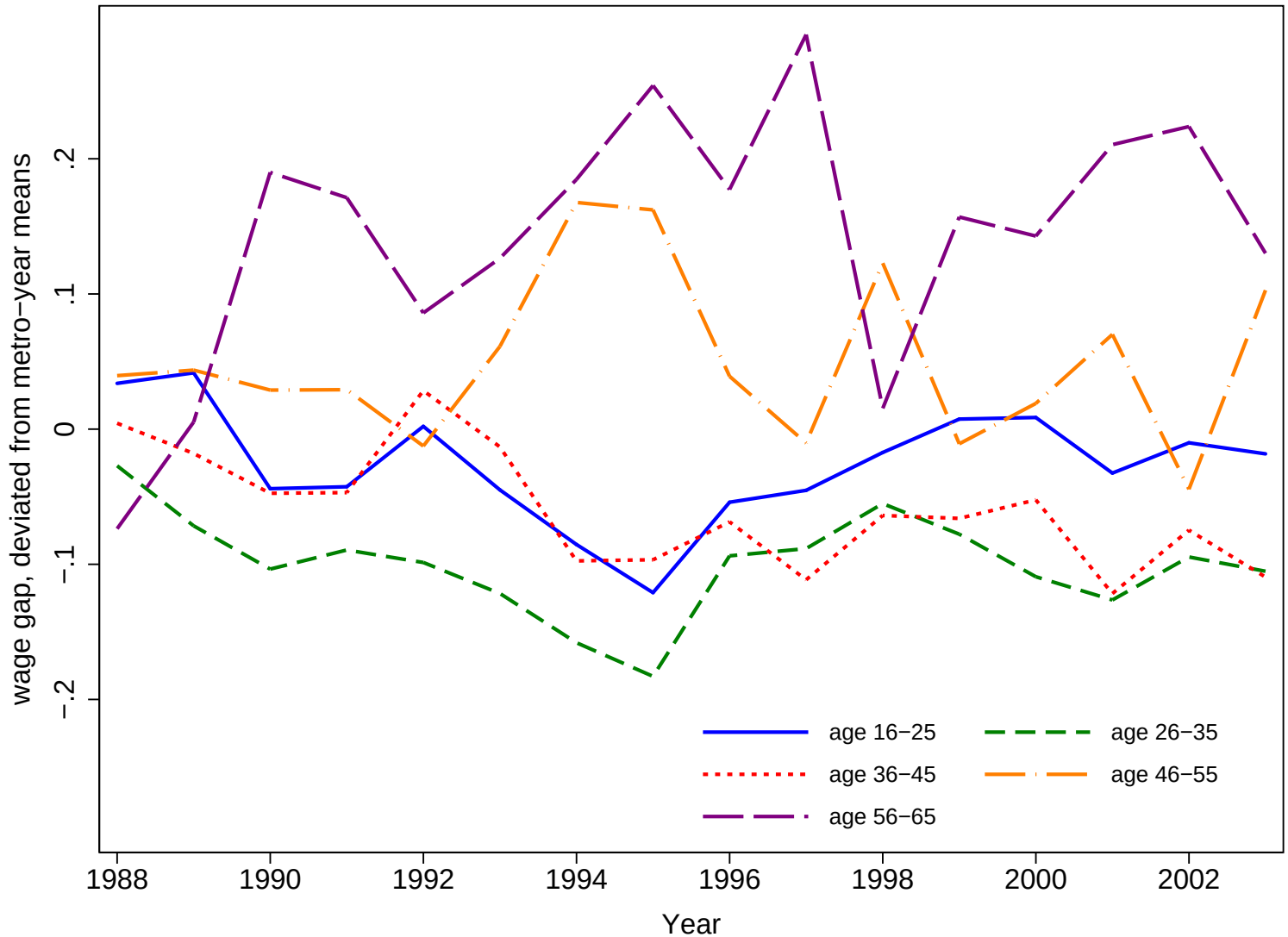


Fig. A9: Wage gaps by age group, women



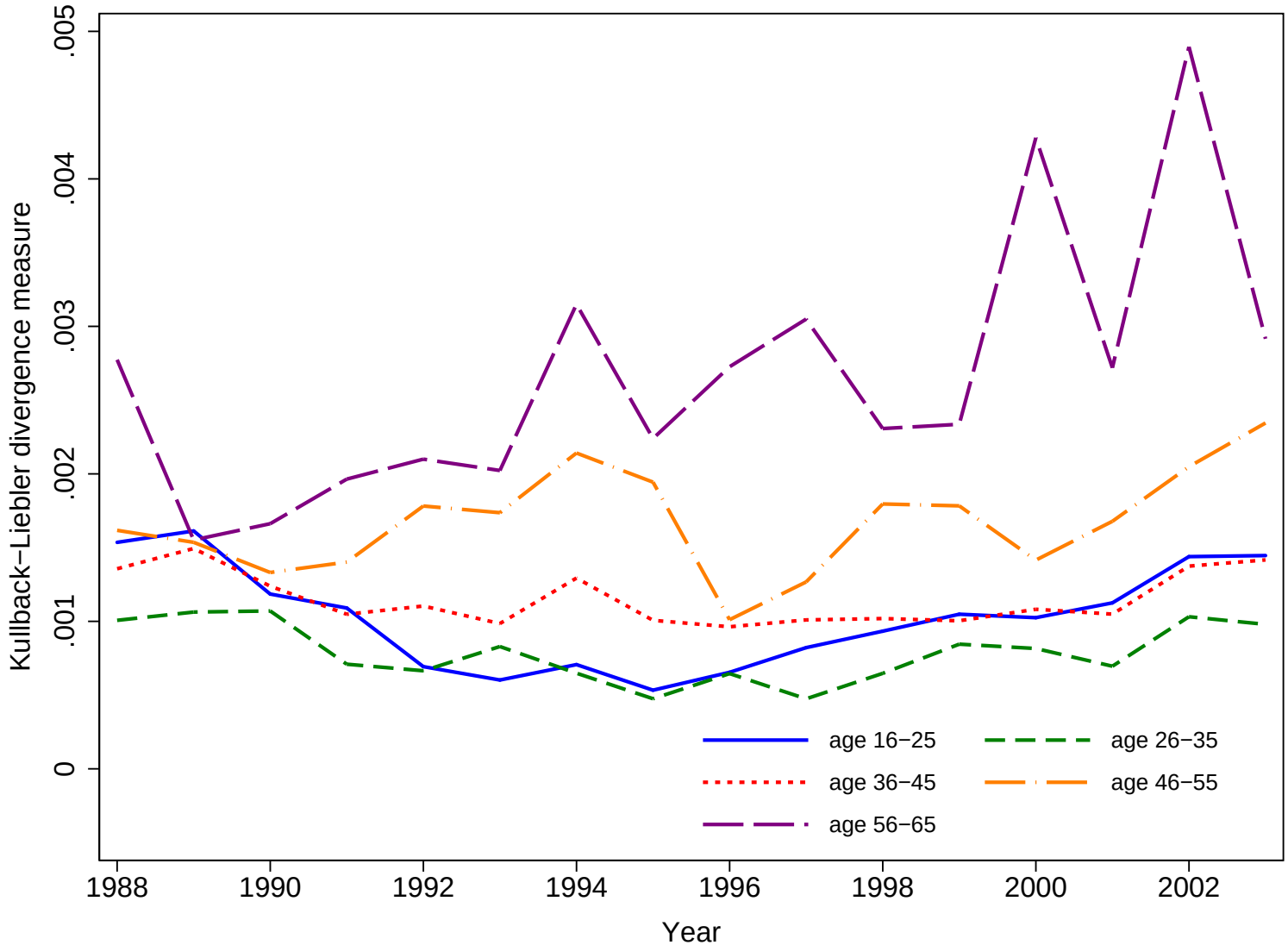
▸ Return

Fig. A10: Wage gaps by age group, women, deviated from metro-year means



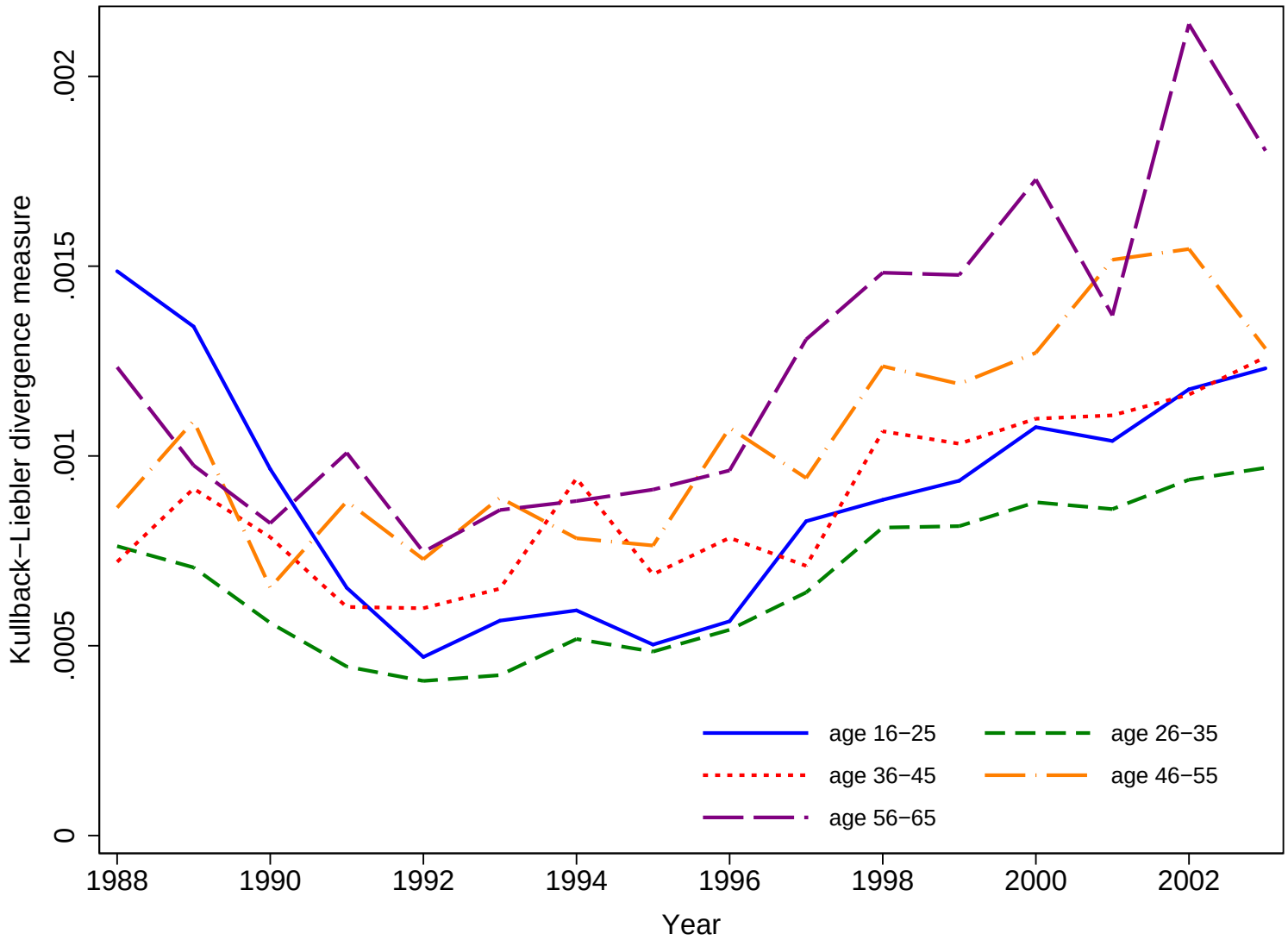
Return

Fig. A11: Kullback-Liebler divergence by age group, women



Return

Fig. 14: Kullback-Liebler divergence by age group, men



▸ Return

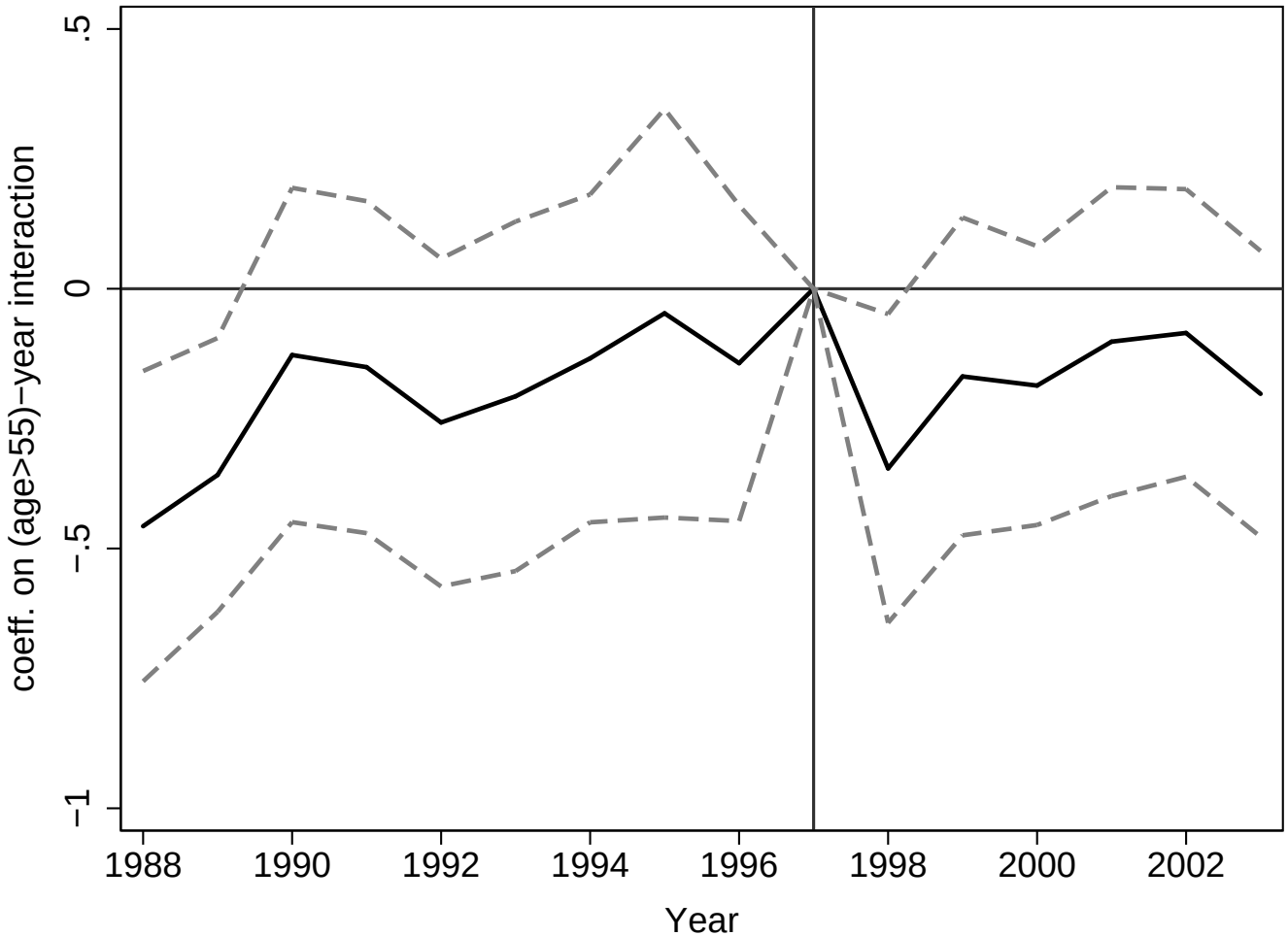
Table A6: Differential effects on wage gap, women

dep. var.: log(median wage, ENEU) - log(median wage, IMSS)

	(1)	(2)	(3)
1(age > 55)*1988	-0.477***	-0.457***	-0.457***
	(0.178)	(0.164)	(0.152)
1(age > 55)*1989	-0.362**	-0.370**	-0.358***
	(0.158)	(0.155)	(0.134)
1(age > 55)*1990	-0.147	-0.123	-0.127
	(0.191)	(0.177)	(0.164)
1(age > 55)*1991	-0.167	-0.159	-0.151
	(0.207)	(0.188)	(0.163)
1(age > 55)*1992	-0.283	-0.267	-0.257
	(0.185)	(0.180)	(0.161)
1(age > 55)*1993	-0.219	-0.211	-0.207
	(0.198)	(0.189)	(0.172)
1(age > 55)*1994	-0.180	-0.167	-0.134
	(0.182)	(0.178)	(0.161)
1(age > 55)*1995	-0.066	-0.060	-0.047
	(0.216)	(0.218)	(0.201)
1(age > 55)*1996	-0.155	-0.149	-0.143
	(0.186)	(0.175)	(0.155)
1(age > 55)*1998	-0.363**	-0.350**	-0.346**
	(0.179)	(0.165)	(0.152)
1(age > 55)*1999	-0.185	-0.177	-0.169
	(0.185)	(0.174)	(0.156)
1(age > 55)*2000	-0.197	-0.185	-0.186
	(0.176)	(0.159)	(0.137)
1(age > 55)*2001	-0.114	-0.108	-0.102
	(0.186)	(0.174)	(0.152)
1(age > 55)*2002	-0.097	-0.091	-0.085
	(0.173)	(0.161)	(0.141)
1(age > 55)*2003	-0.214	-0.208	-0.202
	(0.163)	(0.156)	(0.140)
metro area effects	N	Y	
year effects	Y	Y	
metro-year effects	N	N	Y
age category effects	Y	Y	Y
R-squared	0.14	0.34	0.50
N	1258	1258	1258

Return

Fig. A12: Coeffs. on age*year interaction (Table 4 Col 3)



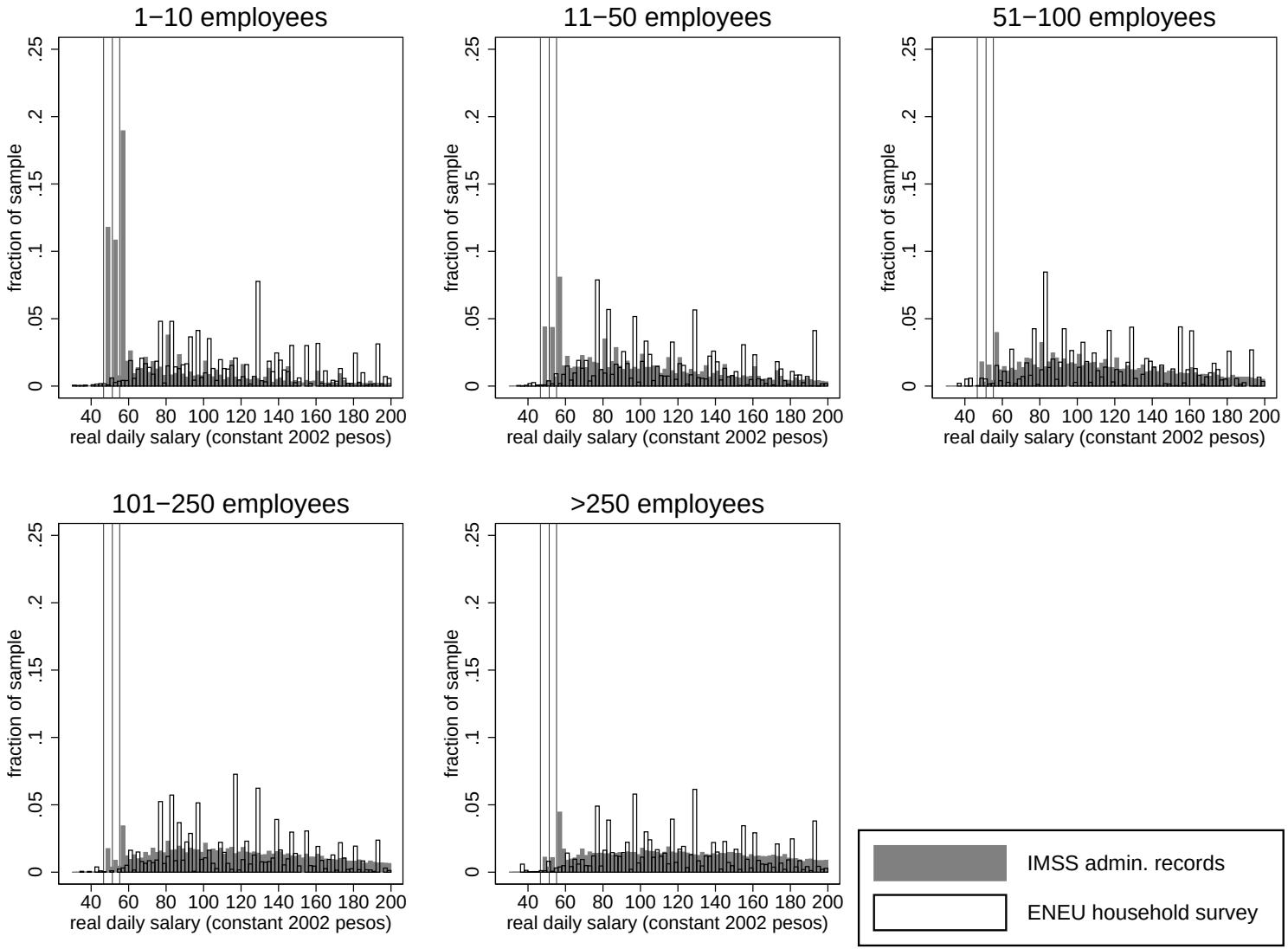
Return

Table A7: Differential effects on employment gap, women

	dep. var.: log(employment, IMSS) - log(employment, ENEU)		
	(1)	(2)	(3)
1(age > 55)*1988	-0.141	-0.176	-0.185
	(0.252)	(0.237)	(0.229)
1(age > 55)*1989	0.161	0.153	0.186
	(0.234)	(0.222)	(0.194)
1(age > 55)*1990	0.139	0.129	0.153
	(0.238)	(0.219)	(0.199)
1(age > 55)*1991	0.246	0.243	0.244
	(0.220)	(0.215)	(0.201)
1(age > 55)*1992	-0.172	-0.174	-0.174
	(0.265)	(0.259)	(0.236)
1(age > 55)*1993	0.156	0.169	0.165
	(0.234)	(0.230)	(0.222)
1(age > 55)*1994	0.029	0.019	-0.014
	(0.260)	(0.244)	(0.232)
1(age > 55)*1995	-0.331	-0.321	-0.314
	(0.285)	(0.271)	(0.255)
1(age > 55)*1996	-0.095	-0.093	-0.091
	(0.240)	(0.222)	(0.207)
1(age > 55)*1998	-0.133	-0.115	-0.116
	(0.203)	(0.191)	(0.183)
1(age > 55)*1999	-0.286	-0.295	-0.289
	(0.255)	(0.239)	(0.220)
1(age > 55)*2000	-0.153	-0.163	-0.153
	(0.257)	(0.238)	(0.221)
1(age > 55)*2001	0.144	0.146	0.148
	(0.225)	(0.211)	(0.201)
1(age > 55)*2002	-0.013	-0.011	-0.009
	(0.300)	(0.286)	(0.260)
1(age > 55)*2003	-0.275	-0.272	-0.271
	(0.245)	(0.245)	(0.223)
metro area effects	N	Y	
year effects	Y	Y	
metro-year effects	N	N	Y
age category effects	Y	Y	Y
R-squared	0.23	0.32	0.46
N	1258	1258	1258

Return

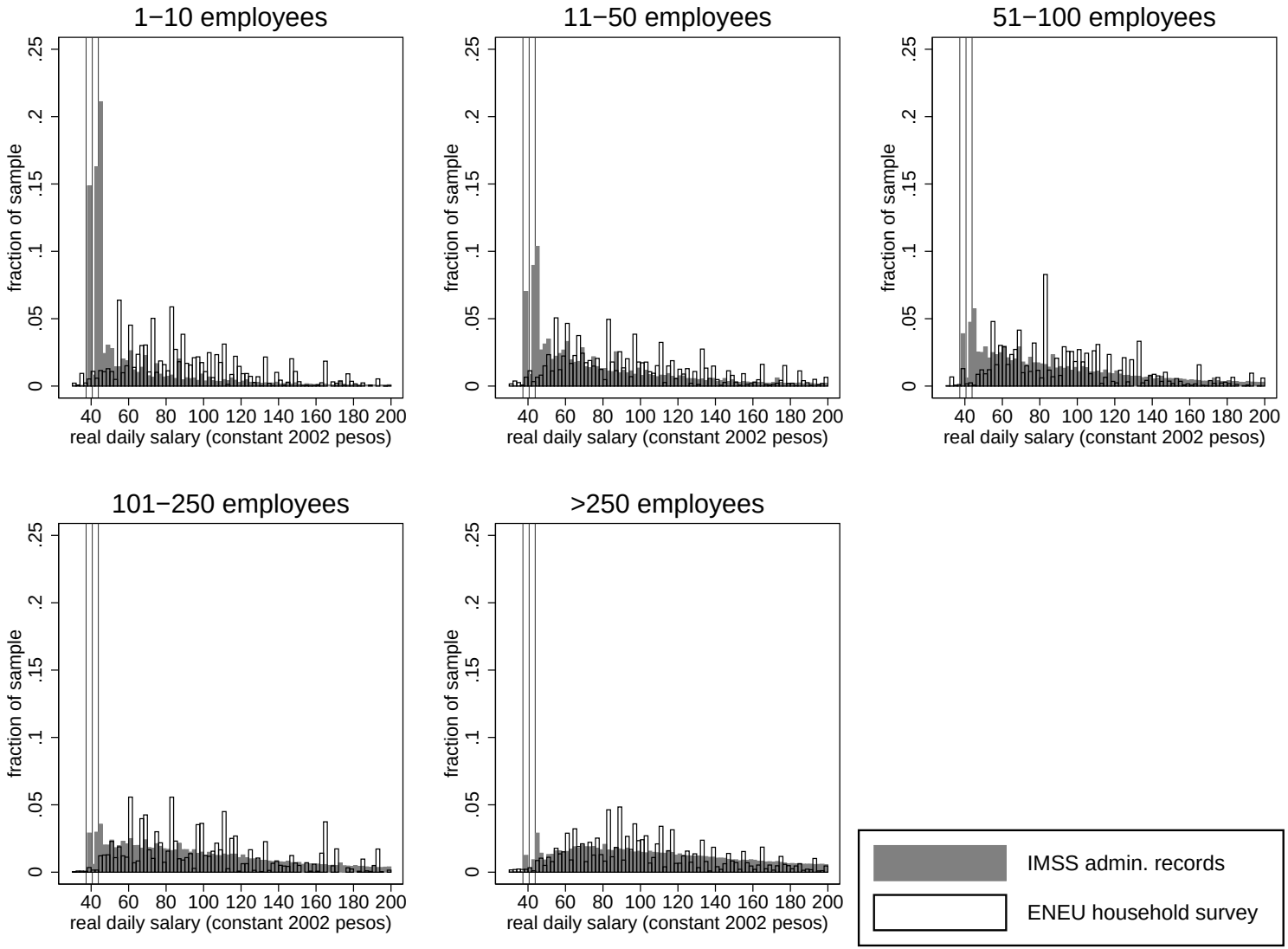
Wage histograms, men, 1993, by firm size



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Return

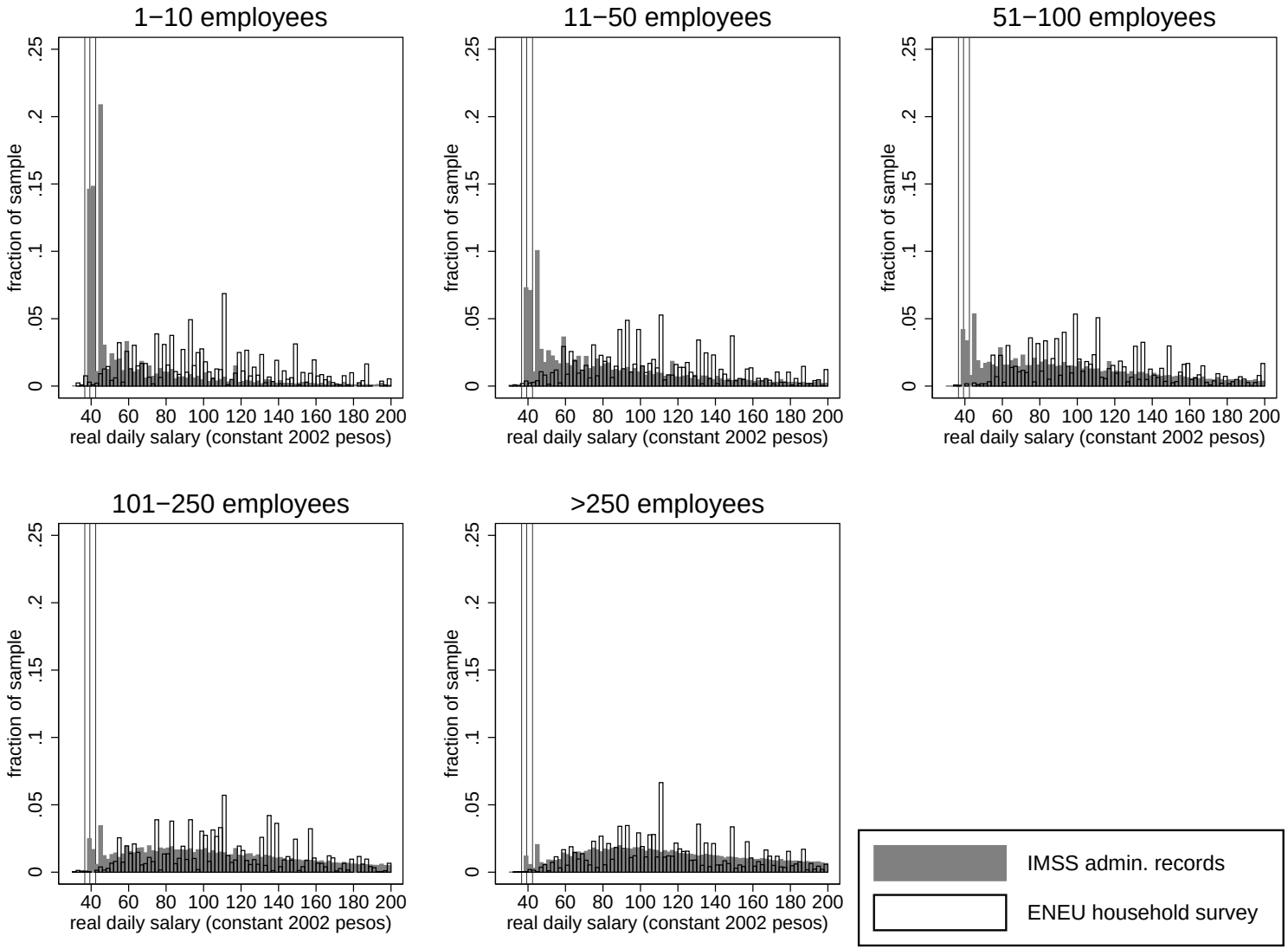
Wage histograms, men, 1997, by firm size



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Return

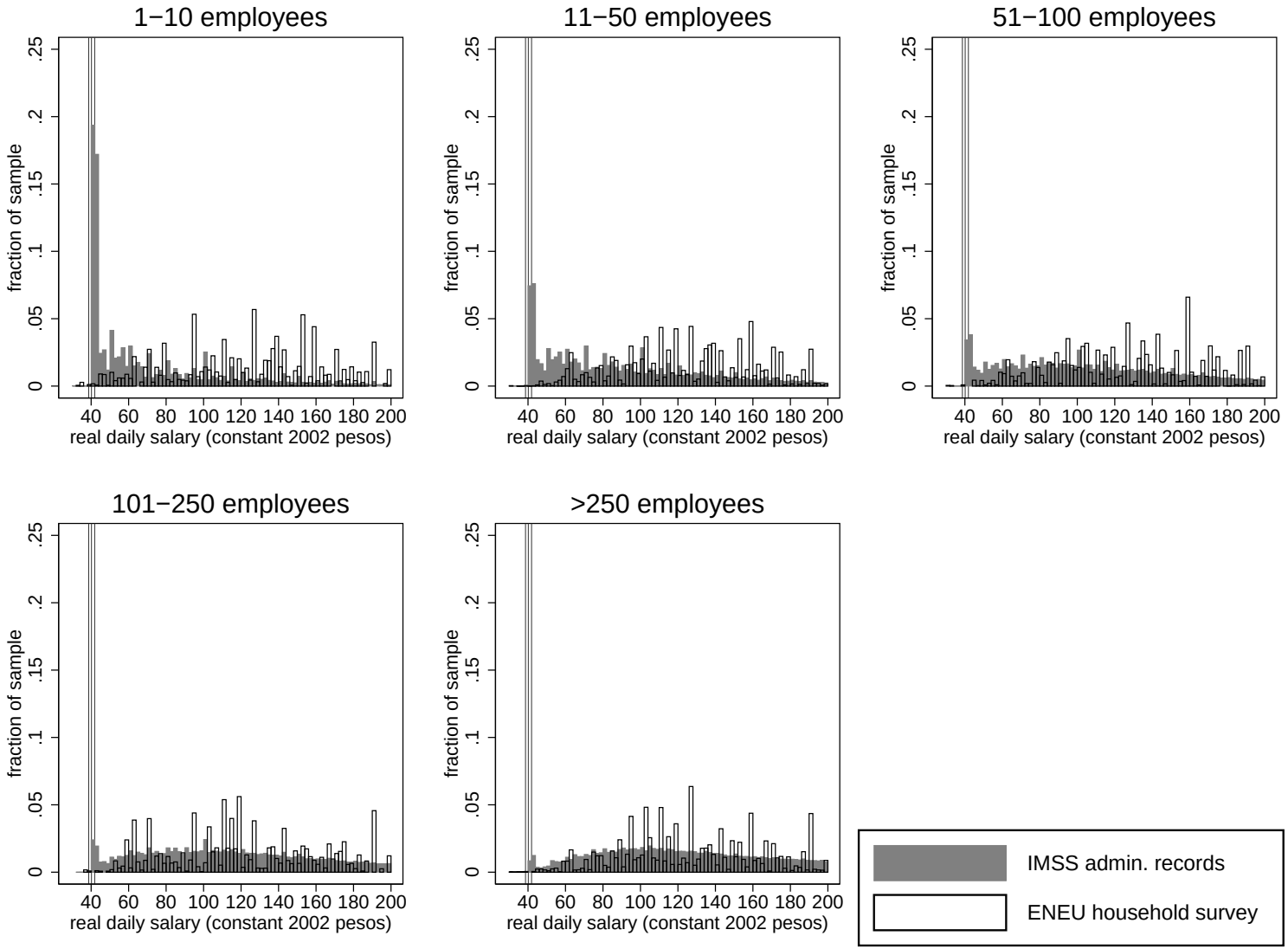
Wage histograms, men, 2000, by firm size



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Return

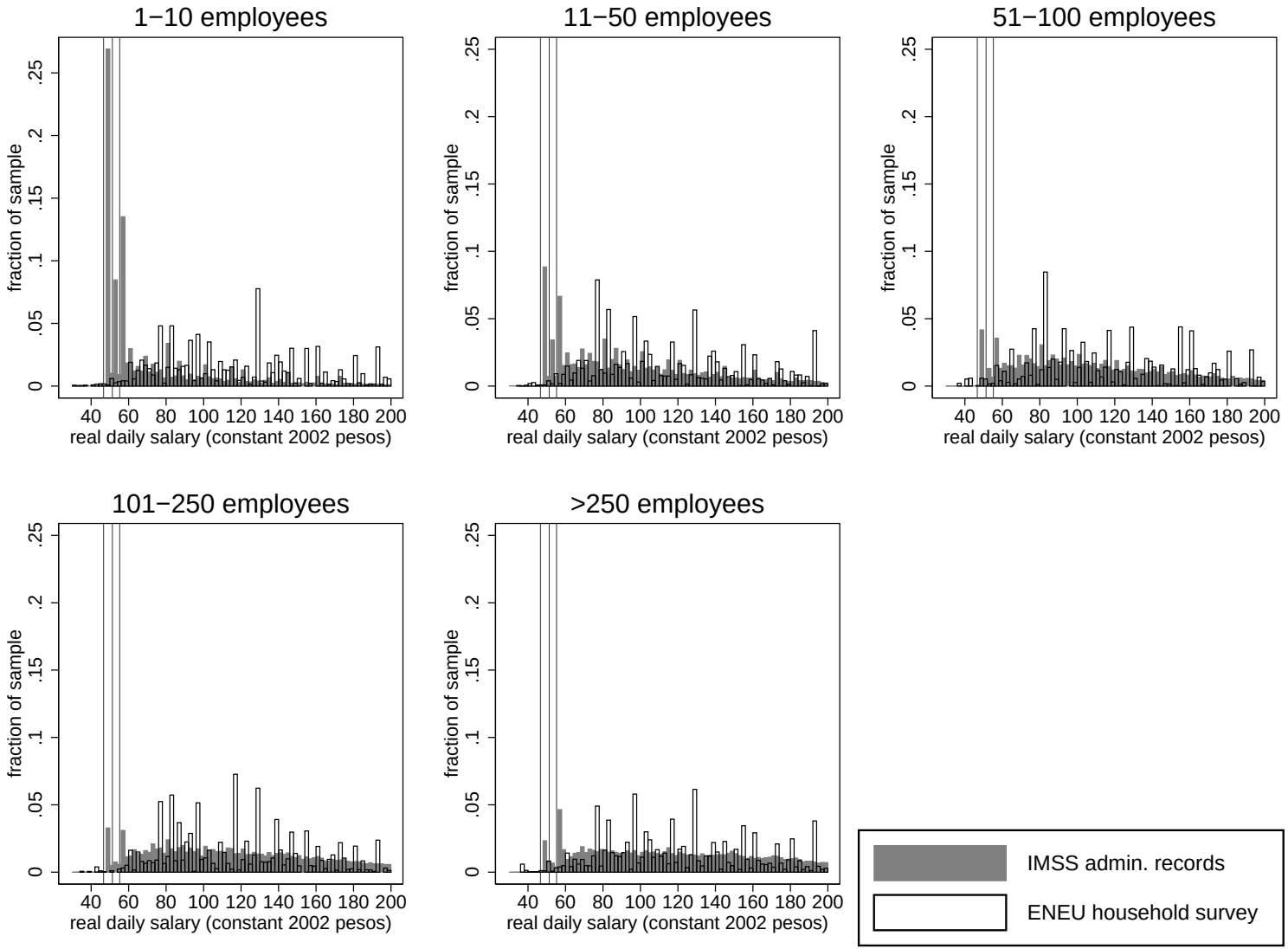
Wage histograms, men, 2003, by firm size



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Return

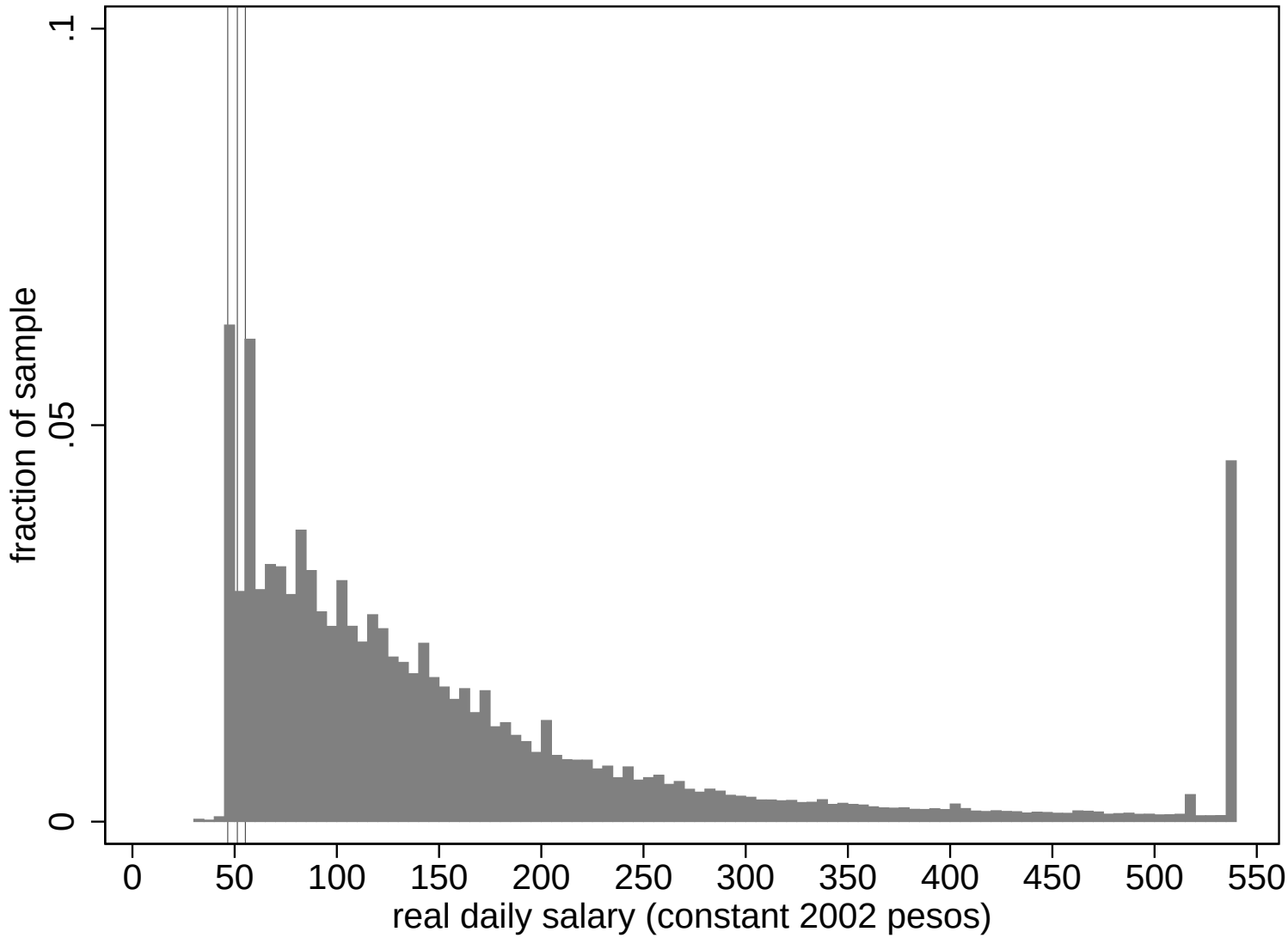
Wage histograms, men, 1993, by firm size, non-EIA plants



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

▸ Return

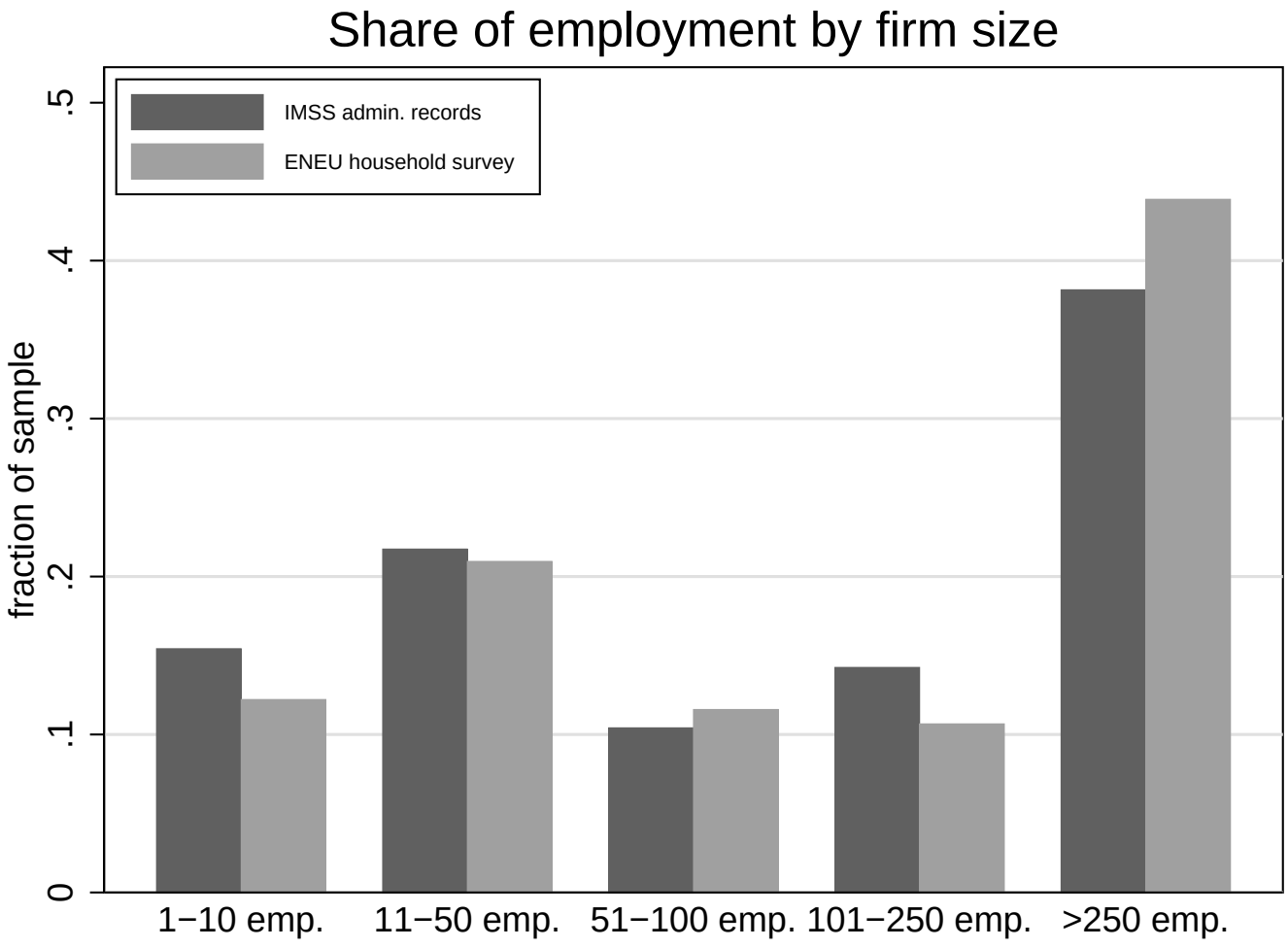
Wage histogram, men, 1993, non-EIA plants



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar.

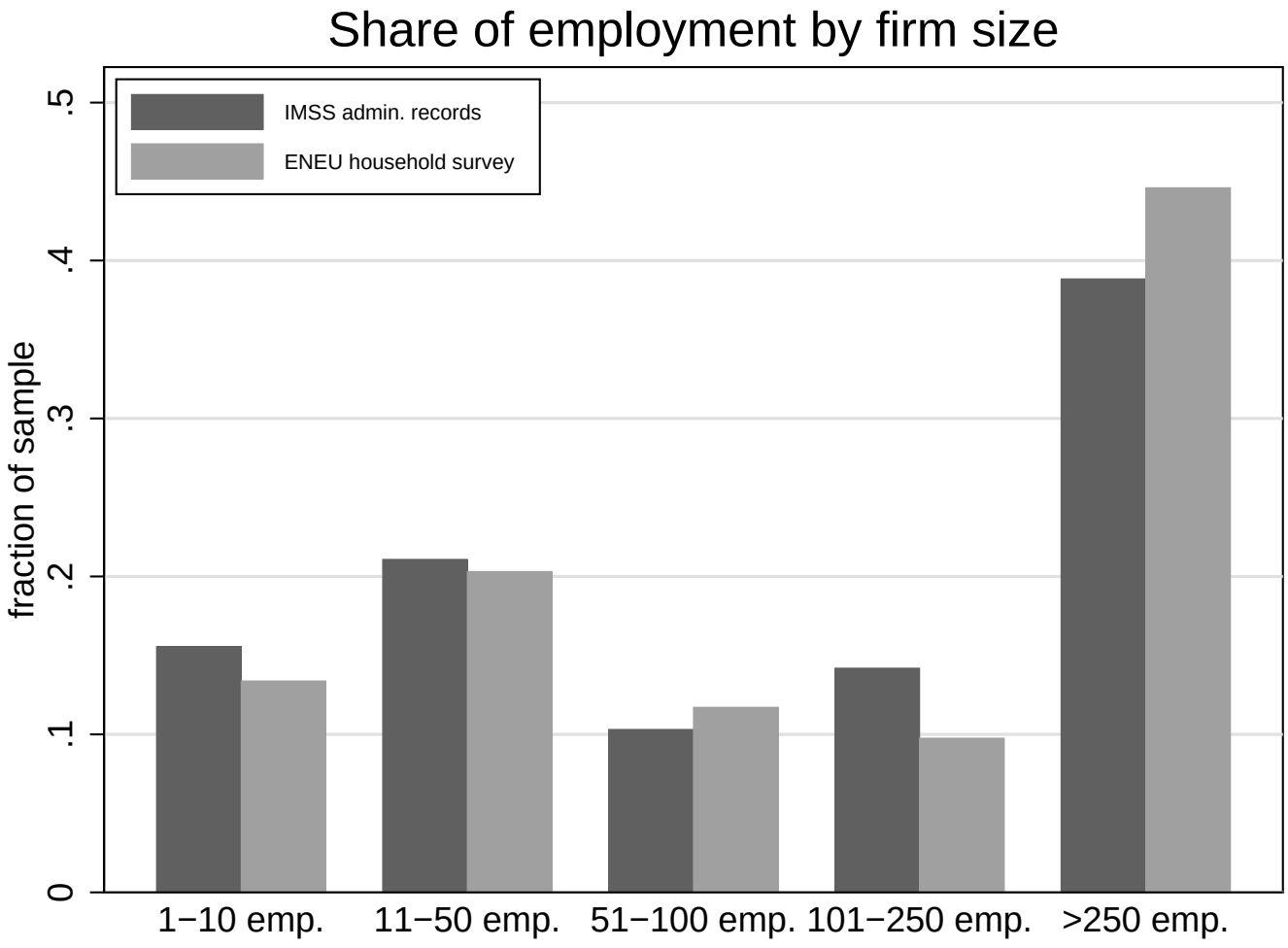
▸ Return

Firm size distributions, IMSS vs. ENEU, 1990

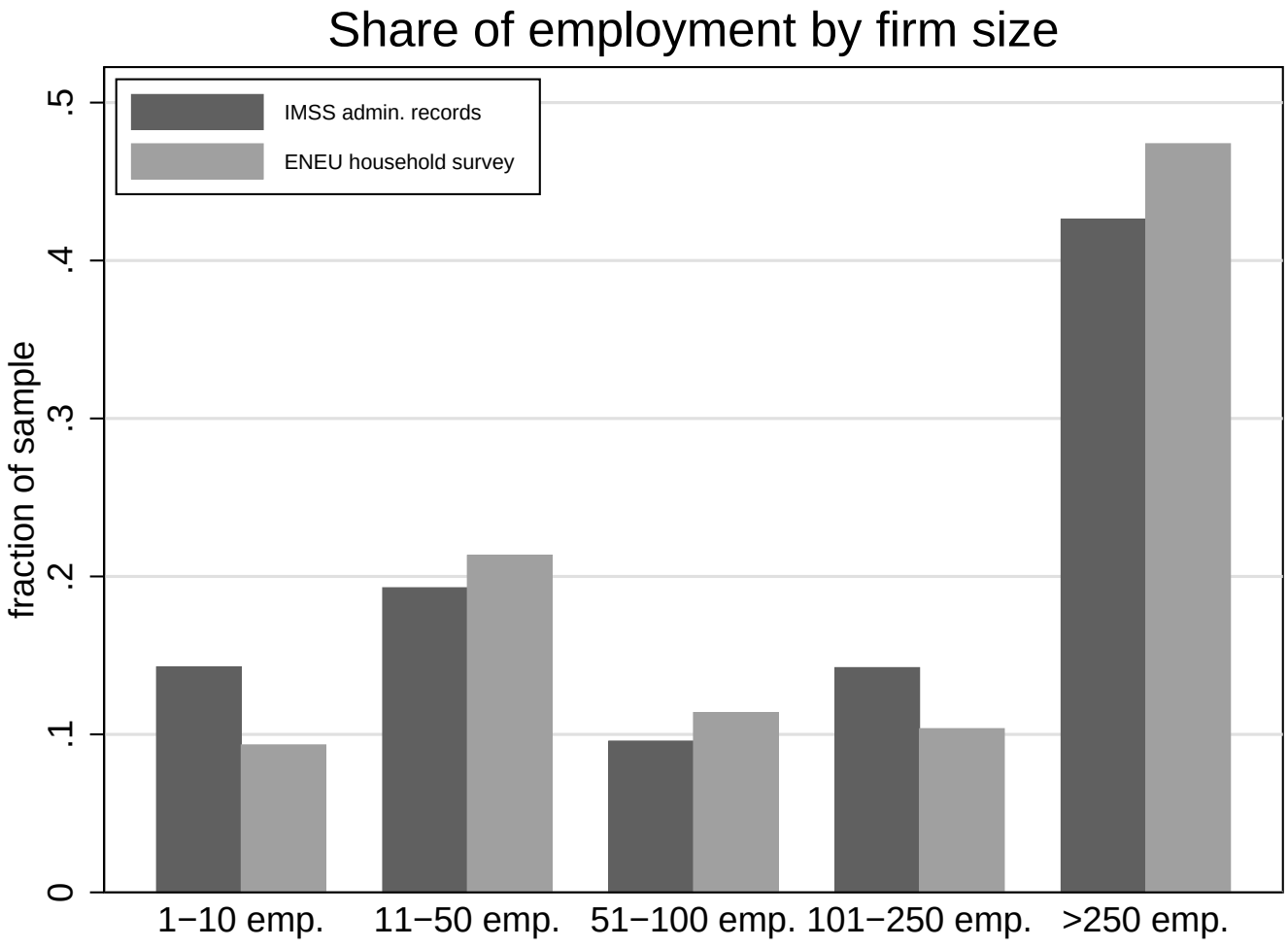


▸ Return

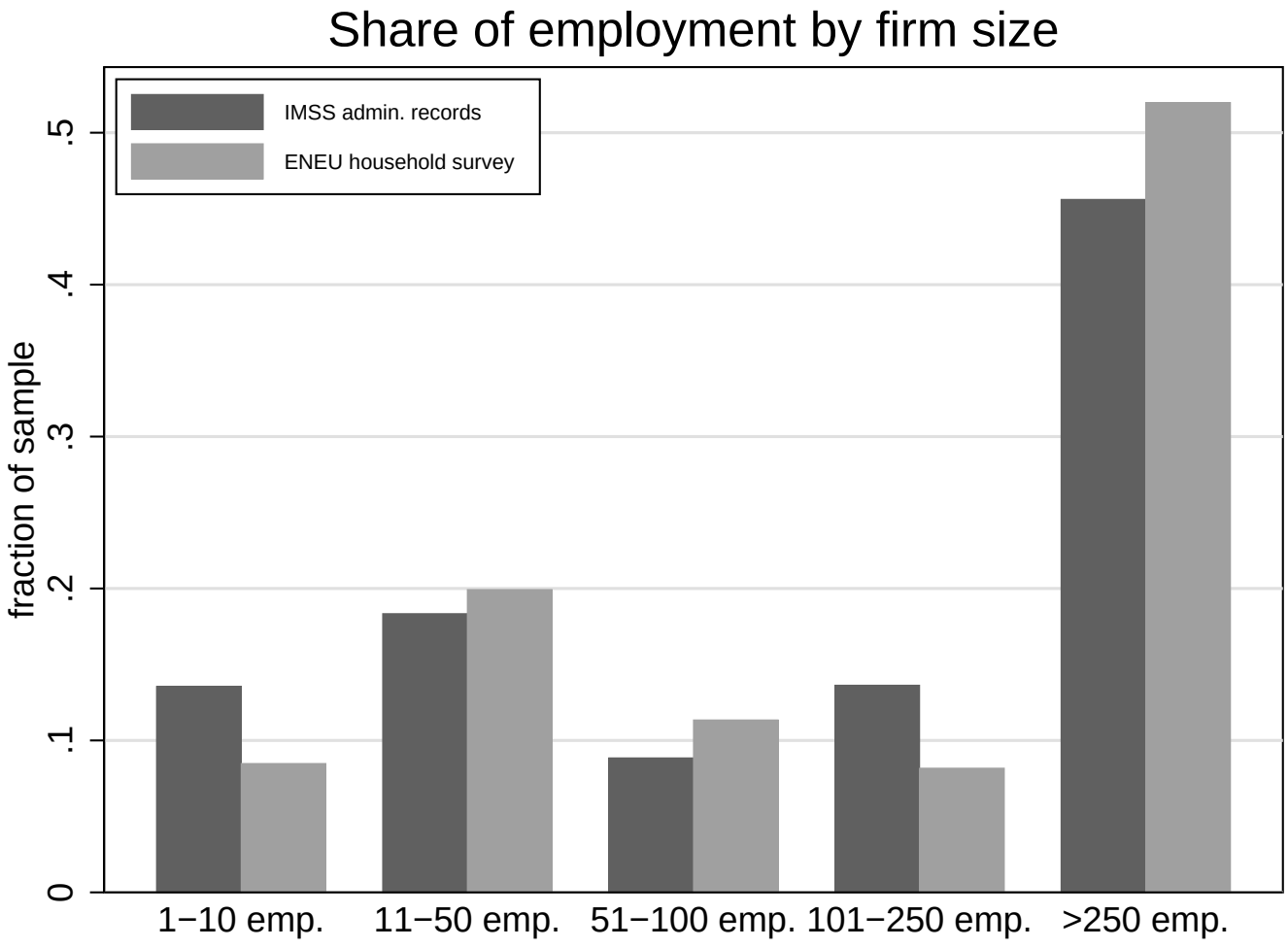
Firm size distributions, IMSS vs. ENEU, 1993



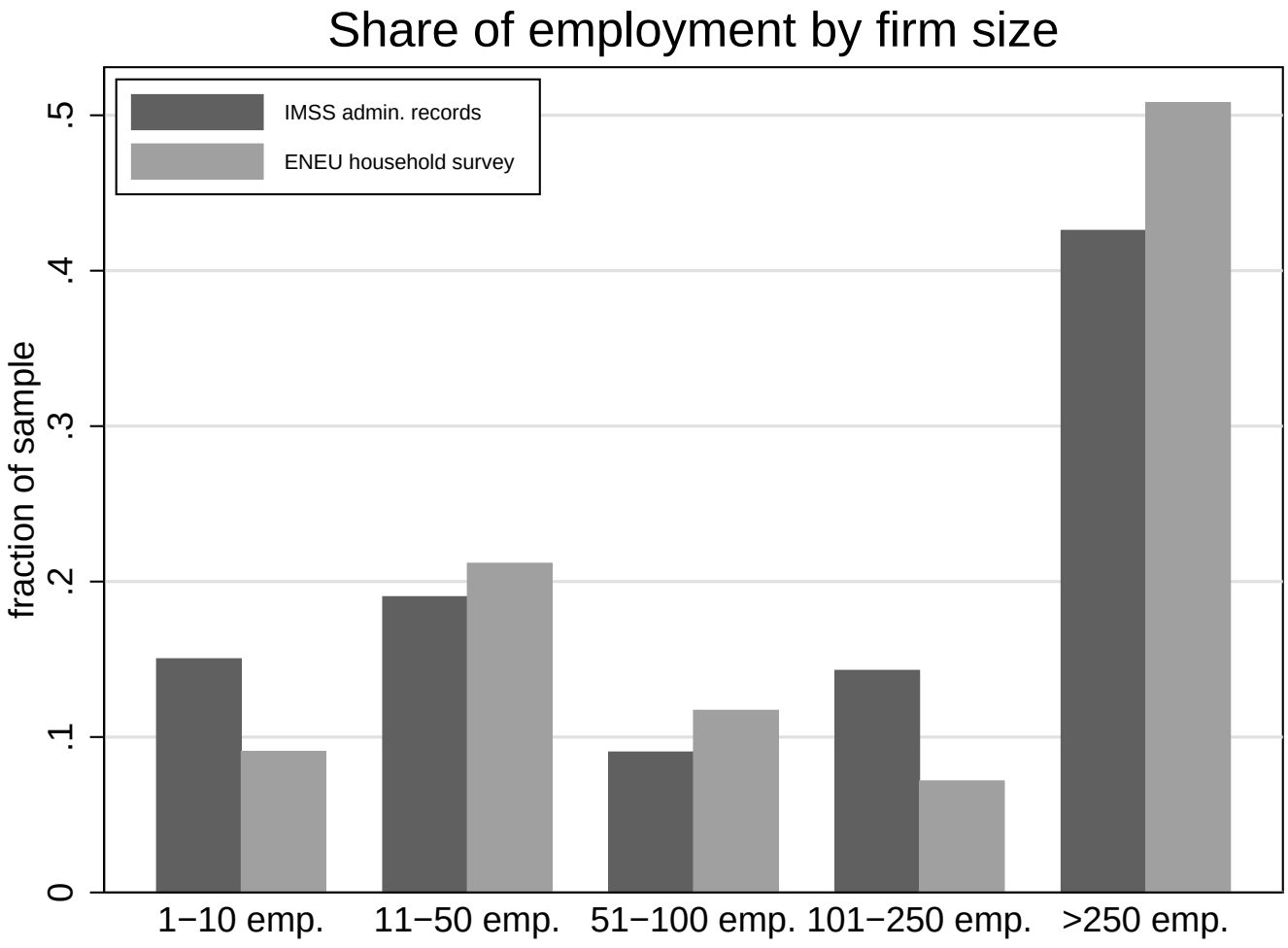
Firm size distributions, IMSS vs. ENEU, 1997



Firm size distributions, IMSS vs. ENEU, 2000

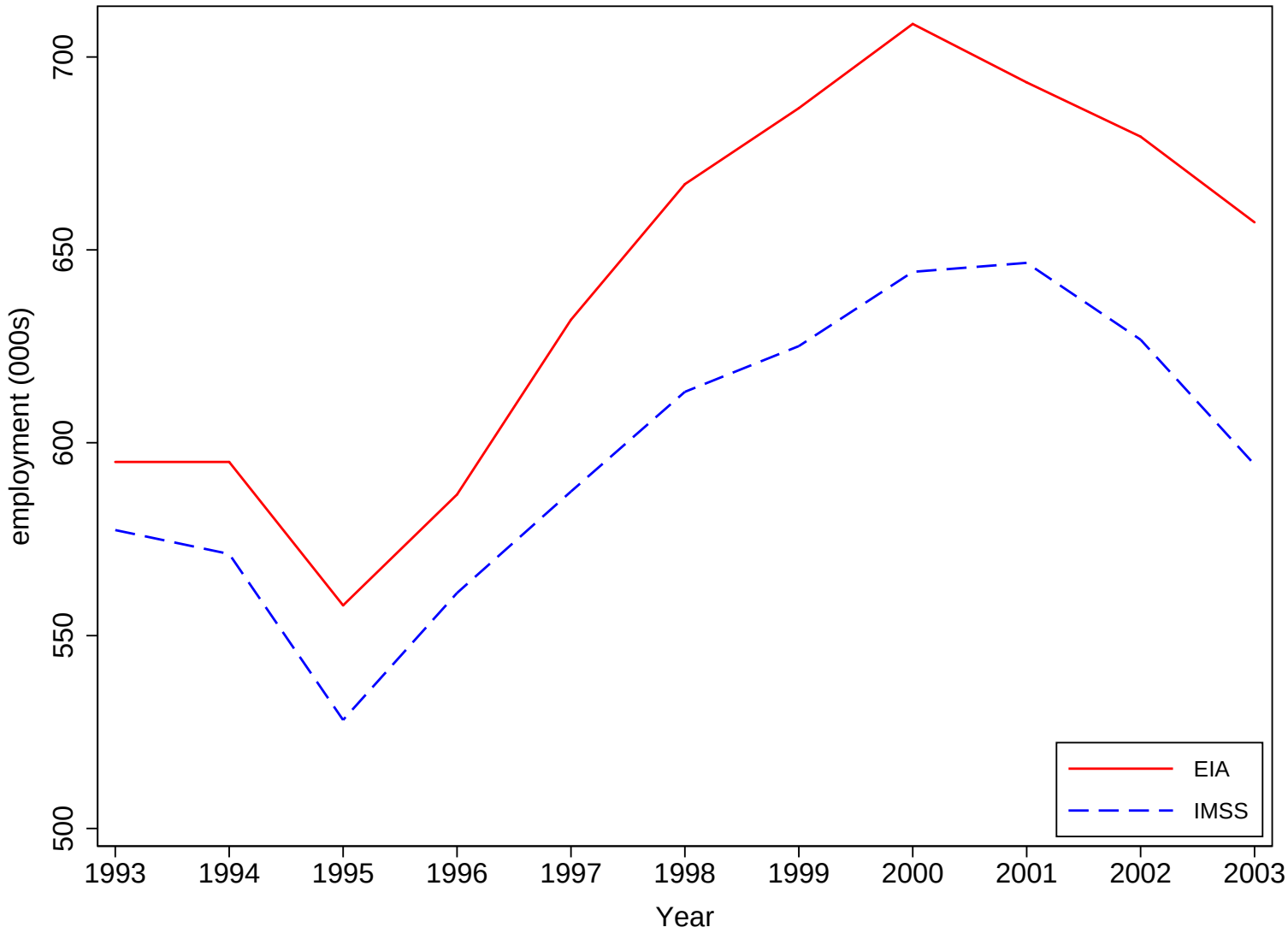


Firm size distributions, IMSS vs. ENEU, 2003

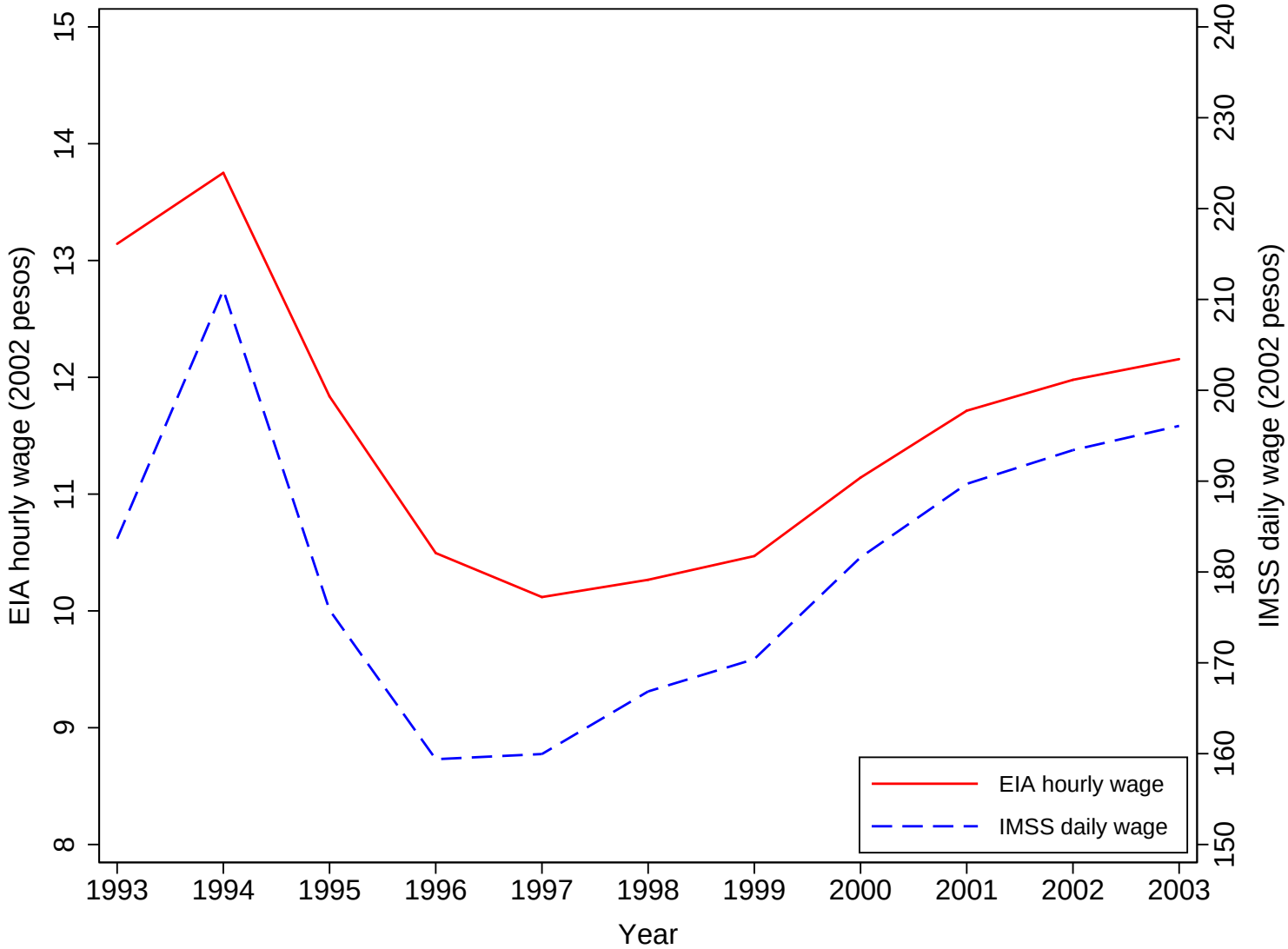


▸ Return

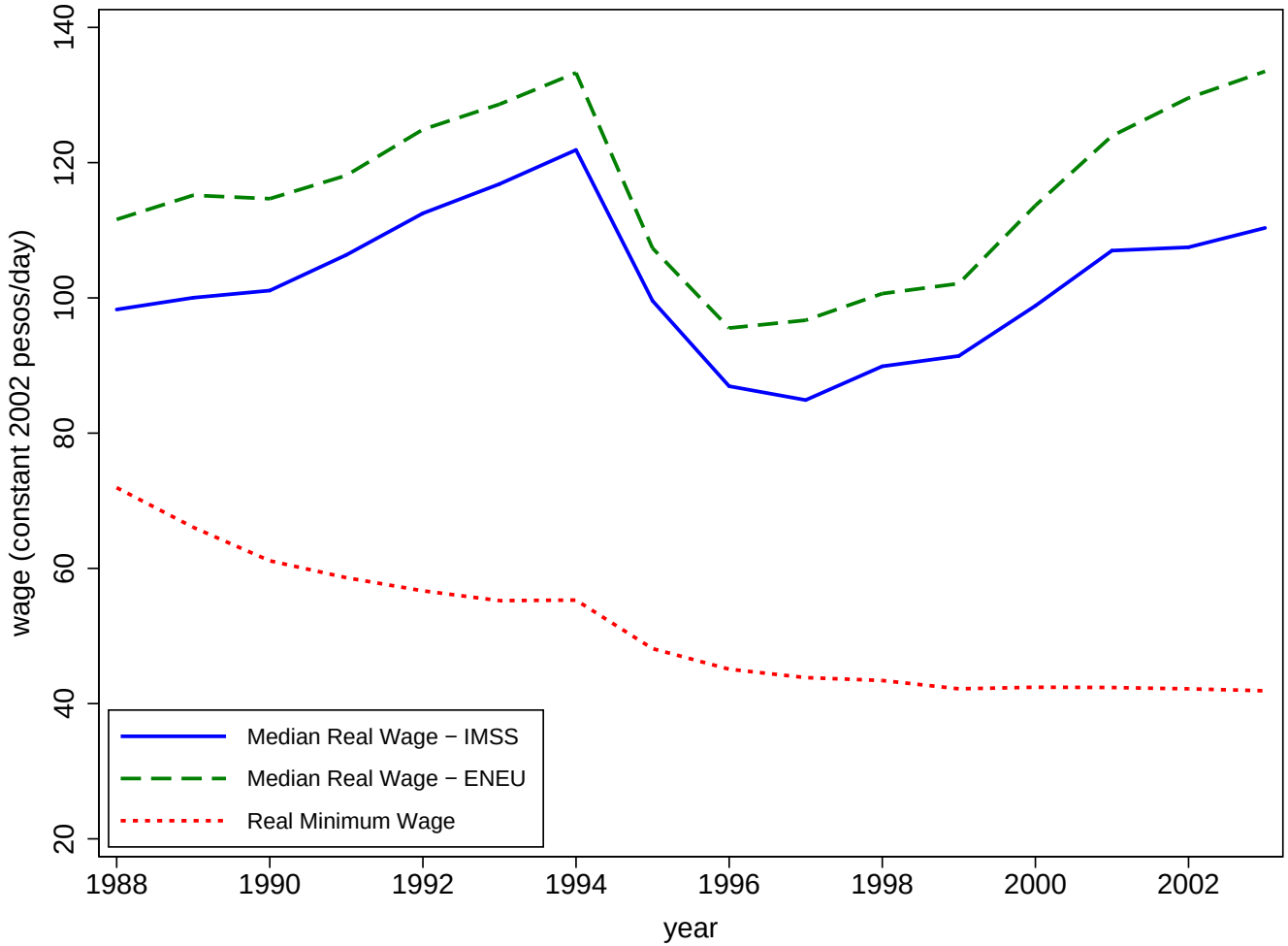
Employment, IMSS vs. EIA



Wages, IMSS vs. EIA

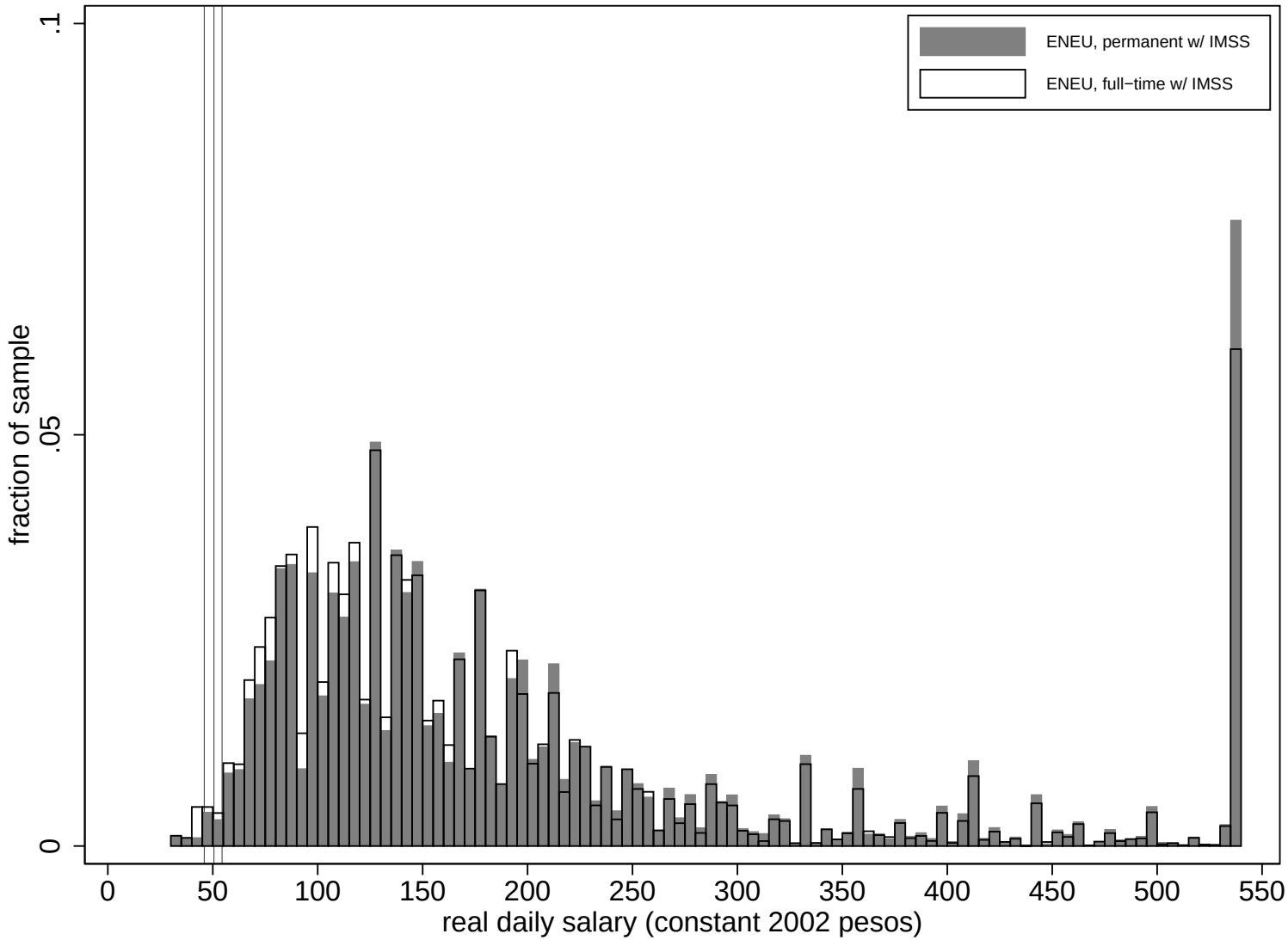


Mean, median, minimum wages

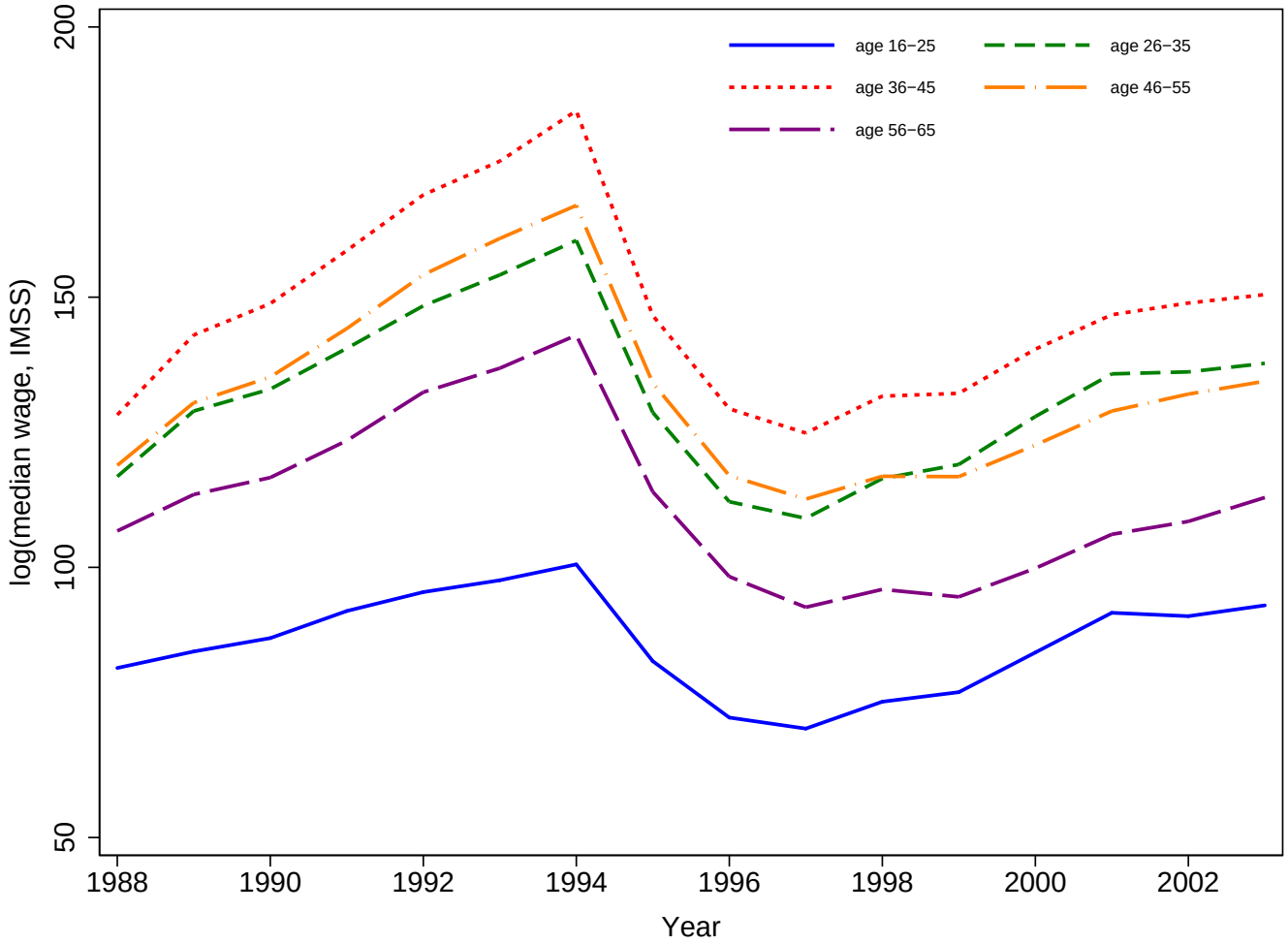


▸ Return

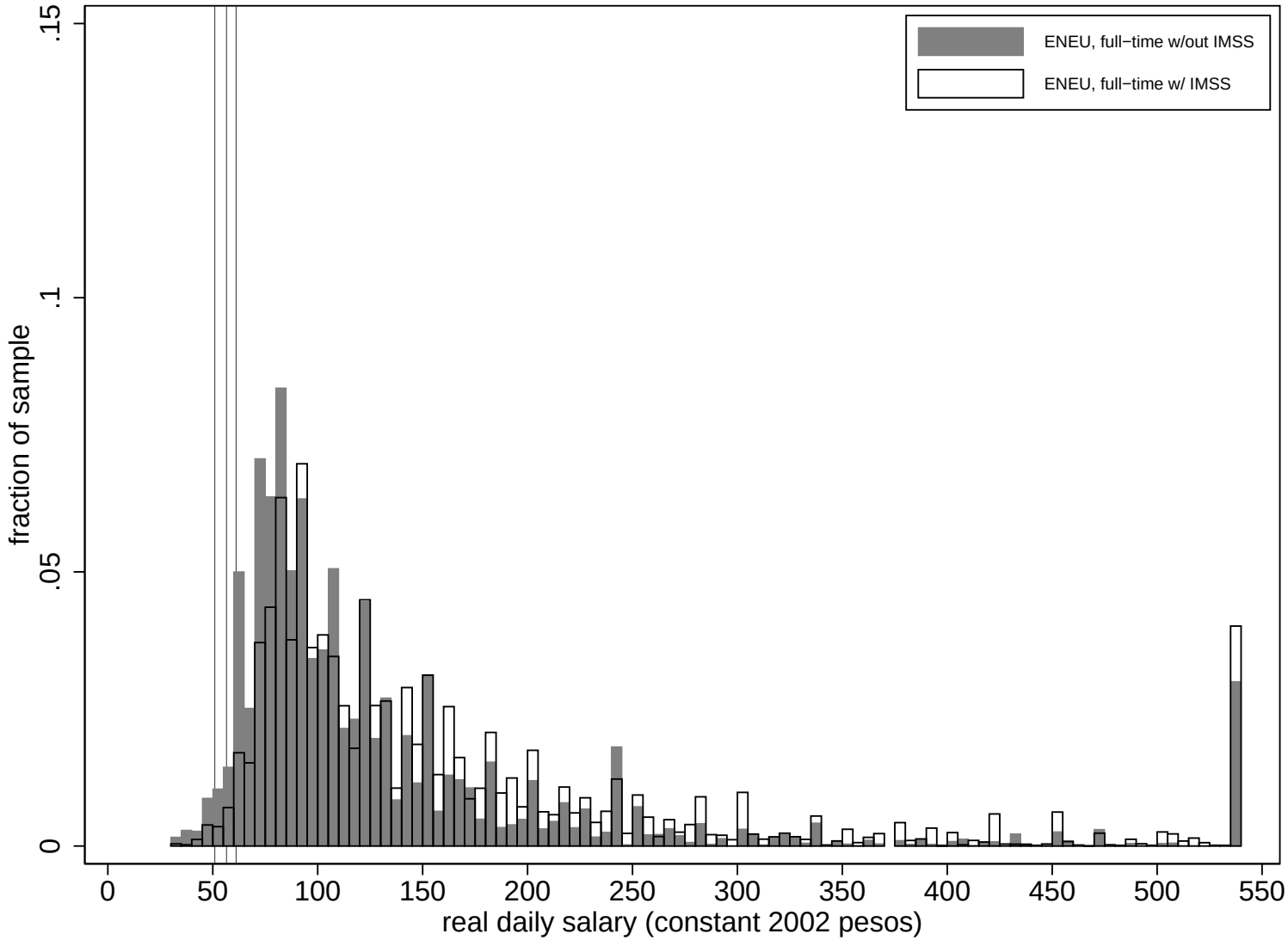
ENEU wage distributions, full-time vs. permanent w/ IMSS, men, 1994



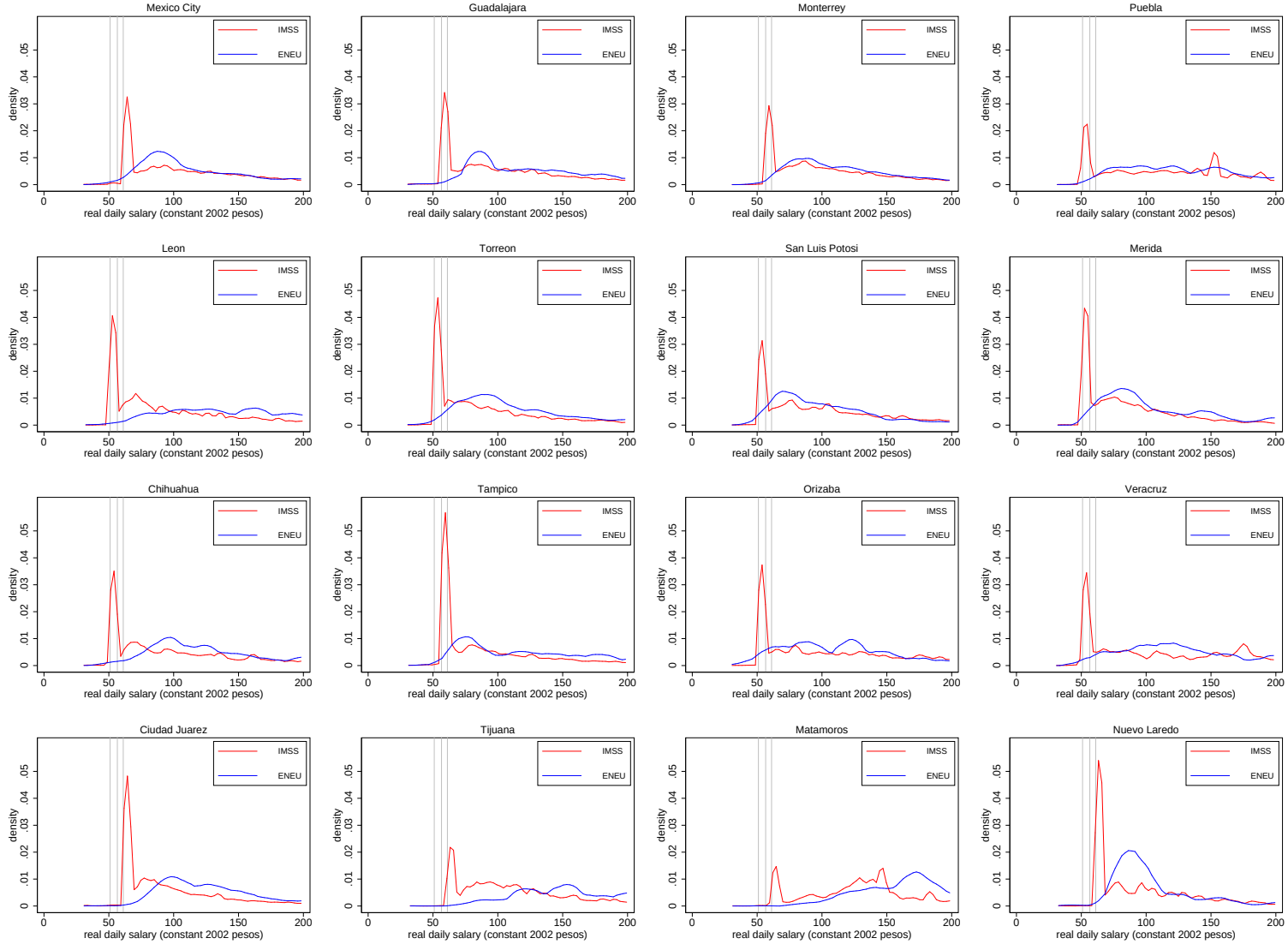
Log median daily wages, men, IMSS data, by age group



Wage histograms, covered vs. not covered by IMSS, men, 1990



Wage distributions, by metro area, men, 1990



Wage gaps (in means) by age group, men

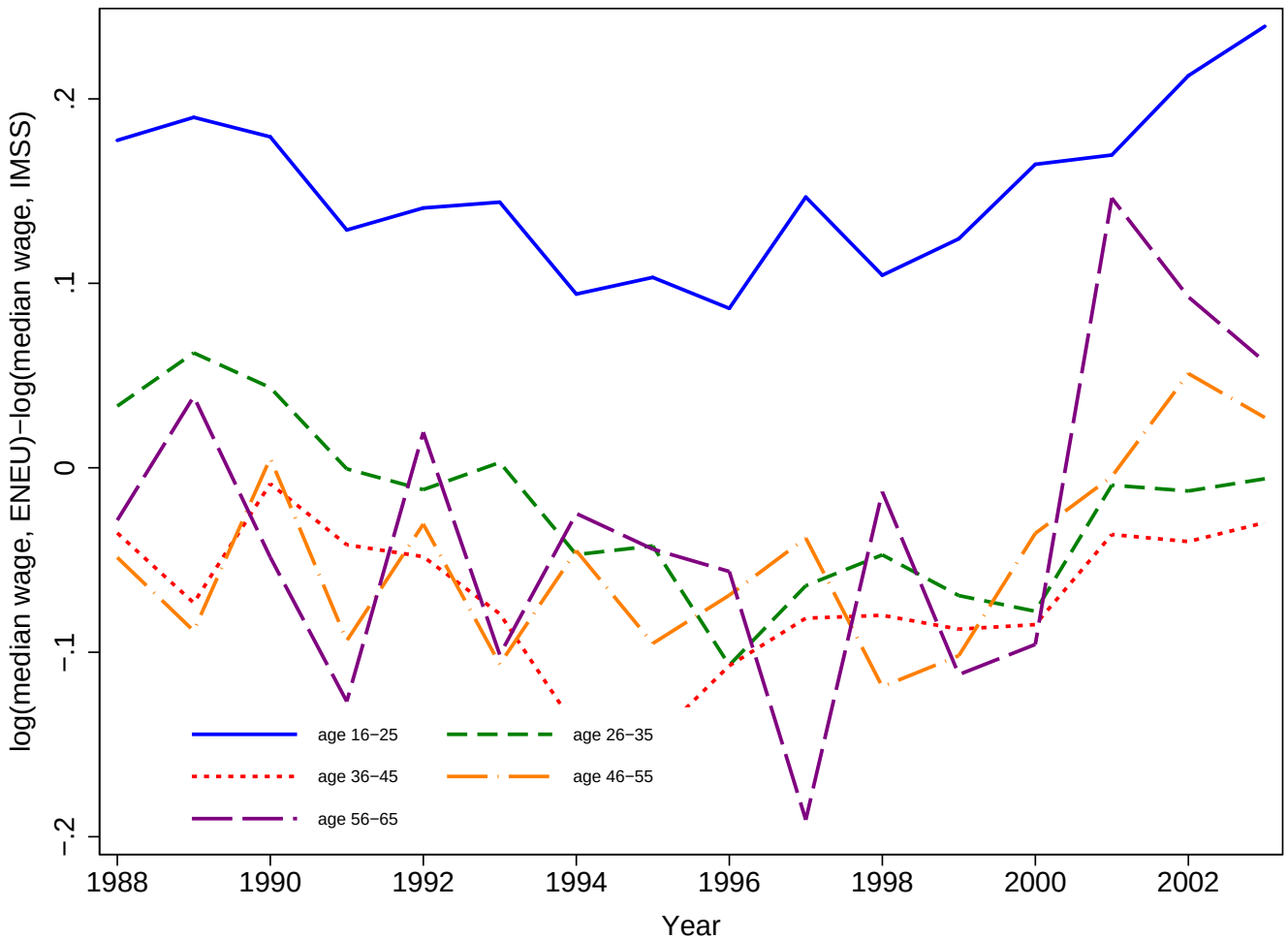


Table 1: Tenure in IMSS system, 1997 Q2, baseline sample

	Men					Women				
Years in IMSS	16-25 (%)	26-35 (%)	36-45 (%)	46-55 (%)	56-65 (%)	16-25 (%)	26-35 (%)	36-45 (%)	46-55 (%)	56-65 (%)
0	27.9	6.7	4.4	4.4	6.1	29.6	10.0	8.0	5.9	6.3
1	23.0	8.0	4.6	4.4	5.8	24.0	11.2	8.4	5.8	6.1
2	14.1	7.4	4.1	3.7	4.4	14.4	9.4	6.8	4.7	4.4
3	11.7	8.0	4.4	3.7	4.1	11.5	9.5	7.1	5.3	5.5
4	8.9	8.3	4.6	3.9	4.3	8.3	9.2	6.9	5.3	5.3
5	6.7	9.1	5.2	4.3	4.5	5.9	9.4	7.1	5.6	5.1
6	4.5	10.5	7.3	6.3	6.1	3.7	9.8	8.3	7.8	7.6
7	2.3	9.4	6.4	5.5	5.2	1.8	8.6	7.0	6.8	6.1
8	0.8	8.6	6.5	5.4	4.9	0.7	7.1	6.4	6.4	5.9
9	0.1	7.3	9.0	9.7	10.1	0.1	5.4	6.9	8.1	8.8
10	0.0	5.6	7.4	6.3	4.8	0.0	3.7	5.4	5.5	4.3
11	0.0	5.2	9.8	8.7	6.8	0.0	3.2	6.2	7.0	5.7
12	0.0	5.9	26.5	33.5	32.9	0.0	3.5	15.7	25.8	29.2
N (000s)	646.3	767.3	412.3	198.2	71.8	425.1	355.6	165.0	63.1	17.9