

Enlisting Employees in Improving Payroll-Tax Compliance: Evidence from Mexico

Todd Kumler, Cornerstone Research

Eric Verhoogen, Columbia University

Judith Frías, Consejo de la Judicatura Federal

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How Does This Paper Fit the Conference?

- ▶ Big question for this conference: how to improve tax compliance.
- ▶ Most papers are on how to reduce informality — an *extensive* margin of compliance for firms.
- ▶ This (old) project is about an *intensive* margin — compliance by formal firms with payroll taxes for registered workers.
- ▶ I think it also carries some implications for how to reduce informality, which I'll come back to.

A New Measure of Evasion

- ▶ To measure evasion, we compare reported wages from two sources:
 - ▶ Administrative records of Mexican social security agency for private-sector workers (IMSS).
 - ▶ Household labor-force survey (ENEU, now ENOE)
 - ▶ Asks if covered by IMSS.
 - ▶ Asks take-home pay.
- ▶ Links not available at individual or firm level. We compare cells defined by:
 - ▶ Industry.
 - ▶ Metropolitan area.
 - ▶ Sex.
 - ▶ Age group.
 - ▶ Firm size.

Point #1: Mexican Establishments Under-Report Wages

- ▶ Literature from developed countries suggests that firms' reports of employees' wages are pretty accurate.
 - ▶ Kleven, Knudsen, Kreiner, Pedersen and Saez (2011).
 - ▶ Saez (2010).
 - ▶ "Tax gap" estimates: Internal Revenue Service (2006), Slemrod (2007)
- ▶ We document substantial wage under-reporting by Mexican establishments.
 - ▶ Compliance is better in larger firms, but still incomplete.

Point #2: Pension Reform Improved Compliance

- ▶ Grandfathering in 1997 pension reform led to differential effects by age on employees' incentive to monitor, with stronger effects for younger cohorts.
- ▶ Evasion declined more for younger age groups.

Institutional background

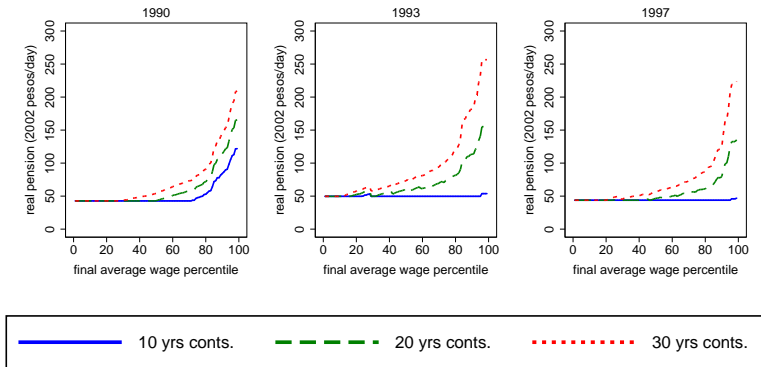
- ▶ *Instituto Mexicano del Seguro Social (IMSS)* is main source of social insurance for private-sector employees.
 - ▶ Public-sector workers, PEMEX workers have separate systems.
- ▶ Employer contribution 18-23%, employee contribution 2-5% for most workers.
- ▶ Health care, child care, disability, worker's compensation are available to all covered workers, spouses and dependents, *independent of wage reported.*

Institutional background (cont.)

- ▶ Pension benefits, pre-1997 reform (PAYGO pension):
 - ▶ Individuals vested (and eligible for pension) after 10 years of contributions. Guaranteed at least minimum pension.
 - ▶ Pension calculated based on average *nominal* wage in 5 years prior to retirement.
 - ▶ Before 1991, not adjusted for inflation.
 - ▶ Beginning in 1991, final average wage indexed to minimum wage (in Mexico City).
 - ▶ Inflation was extremely high in 1982-1988, moderately high in 1989-1992. [▶ Inflation rate](#)
 - ▶ Under pressure to do something about eroding value of pensions, congress increased value of minimum pension.
 - ▶ 70% of minimum wage in 1989.
 - ▶ Gradually raised to 100% of minimum wage in 1995.

Fig. 1C: Value of PAYGO pension, men ages 60-65

C. Value of pension by ENEU wage percentile, ages 60-65




- ▶ Many retirees near minimum 10 years of contributions.
- ▶ Upshot: 80+% of retirees were getting minimum pension prior to 1997 reform (Grandolini and Cerda, 1998).

Institutional background (cont.)

- ▶ 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.
- ▶ Pension benefits, post-reform:
 - ▶ Individuals guaranteed minimum pension only after 25 years of contributions (although they have access to account balance if contribute fewer years.)
 - ▶ Employer, employee contributions similar to pre-reform.
 - ▶ Accounts managed by investment institutions known as AFOREs.
 - ▶ Employees also have access to voluntary savings account.
 - ▶ AFOREs required to send statement tri-yearly to account holder.
- ▶ “Transition generation” (in system June 30, 1997) retained right to choose between pre-reform and post-reform pensions.

Fig. A3: Account Statement (Estado de Cuenta)



ESTADO DE CUENTA / CUENTA INDIVIDUAL

Periodo que comprende este Estado de Cuenta

01MAY2011 AL 31AGO2011

Cuanto largo es mi cuenta individual?

\$ 95,330.04

Ten acceso autorizado a la cuenta individual solo durante un mes de prueba y se requiere hacer un depósito con un mínimo de \$100.00 para confirmar que se trata de un ahorro (ver reglas).

MI DATOS

CURP [REDACTED]

RFC [REDACTED]

NSS¹ [REDACTED]

¿CÓMO SE CUBRE?

Tarjetas: 1500-0400-147 D.F. y Llave de crédito

en C.F. y Llave Transmisiones en C.F. (C.F.)

Operaciones de la UCAF: Paseo de la Reforma 500 P.B. de Santa Fe, México, D.F. C.P. 06600.

En Llave e Internet en C.F. (C.F.)

Cuenta de Ahorro Transmision, de Llave y Seguro de Vida en C.F. (C.F.)

www.afm.banamex.com.mx

SARTEL: 1500-0400-147 D.F. y Llave de crédito

Transmisiones en C.F. (C.F.)

CONSUMEP: 1500-0400-147 D.F. y Llave de crédito

SAFETE: 1500-0400-147 D.F. y Llave de crédito

¡IMPORTANTE!

¡RECUERDA QUE SEGURO DE VIDA Y SEGURO FIDUCIARIO DE CUENTA INDIVIDUAL SE DA A LO AJORE!


¹ Incluye tu fecha de nacimiento, dirección, CURP y NSS, entre otros datos.

El IVA Aguarda Reconocimiento Inicialmente a la Afm.

Resumen general	Incorporación	Retiros	Retiro	Retiro	Comisión	Saldo final
Mi ahorro para el retiro	40,896.00	11,868.00	0.00	2,004.01	201.02	54,933.00
Mi ahorro voluntario	0.00	0.00	0.00	0.00	0.00	0.00
Mi ahorro para la vivienda*	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DE MI AHORRO	40,896.00	11,868.00	0.00	2,004.01	201.02	54,933.00

* Mi ahorro para la vivienda no está autorizado por las Afm, sino por las entidades de crédito. Los AFM autorizan retiros con autorización, a sus clientes para su gestión, cuando se haya alcanzado el monto máximo autorizado (máximo de \$10,000.00 al día o \$10,000.00 al mes) y el 7.7% del saldo de la cuenta.

A mayor RENDIMIENTO NETO, mayor pensión.




Trabajadores importantes que pagan que el rendimiento 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.

ÍNDICE DE RENDIMIENTO NETO			
AFORES	RENDIMIENTO ¹	COMISIÓN ²	RENDIMIENTO NETO ³
PROFUTURO GAP	13.30%	1.03%	11.95%
IND	13.15%	1.40%	11.55%
BANAMEX	12.41%	1.40%	10.90%
XDI	12.00%	1.40%	10.50%
METLIFE	12.13%	1.60%	10.44%
PRINCIPAL	11.75%	1.03%	10.20%
BANCOMER	11.00%	1.40%	9.99%
HSBC	11.18%	1.03%	9.96%
AZTECA	10.90%	1.07%	9.32%
BANORTE GENERAL	10.41%	1.40%	8.93%
APPRI-BAJO	10.30%	1.01%	8.94%
INVERCAP	10.40%	1.70%	8.77%
PENSIONSSSTE	9.36%	1.00%	8.36%
COPEL	9.51%	1.70%	7.81%
INSURDA	7.27%	1.17%	6.10%

RENDEIMIENTO - COMISIÓN = RENDEIMIENTO NETO




CONSAF
CORPORACIÓN FINANCIERA

1 - Rendimiento neto de los últimos 36 meses a 28 de Julio de 2011.

2 - Comisión UCAF.

3 - El Rendimiento Neto resulta de la resta del rendimiento neto a comisión.

PROFUTURO APPRI-BAJO IND HSBC AZTECA BANORTE GENERAL APPRI-BAJO INVERCAP PENSIONSSSTE COPEL INSURDA



SB4
SEFORE BÁSICA 4

Fig. A3: Account Statement (Estado de Cuenta)

¡ IMPORTANTE !

Recuerda que tienes derecho a solicitar Estados de Cuenta adicionales a tu Afore.

* Verifica que tus datos (nombre, dirección, CURP y NSS) estén 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	40,085.88	11,888.80	0.00	2,804.61	231.62	54,508.48
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		8,641.37		41,809.68
TOTAL DE MI AHORRO						96,338.04

* 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.

Table 1: Pension wealth simulation, by age in 1997

Age in 1997	Years of Expected PRA Contributions	Plan	Real Daily Wage					
			43	100	200	300	500	1079
25	35	PRA	398.6	<i>815.0</i>	<i>1626.2</i>	<i>2437.3</i>	<i>4059.7</i>	<i>8751.9</i>
		PAYGO	398.6	<i>398.6</i>	<i>603.8</i>	<i>890.2</i>	<i>1483.6</i>	<i>3200.1</i>
30	30	PRA	398.6	<i>523.4</i>	<i>1044.3</i>	<i>1565.3</i>	<i>2607.1</i>	<i>5620.5</i>
		PAYGO	398.6	<i>398.6</i>	<i>603.8</i>	<i>890.2</i>	<i>1483.6</i>	<i>3200.1</i>
35	25	PRA	398.6	398.6	<i>659.1</i>	<i>987.8</i>	<i>1645.3</i>	<i>3546.9</i>
		PAYGO	398.6	398.6	<i>603.8</i>	<i>890.2</i>	<i>1483.6</i>	<i>3200.1</i>
40	20	PRA	398.6	398.6	403.9	605.4	1008.4	2173.9
		PAYGO	398.6	398.6	603.8	890.2	1483.6	3200.1
45	15	PRA	398.6	398.6	398.6	398.6	586.6	1264.7
		PAYGO	398.6	398.6	603.8	890.2	1483.6	3200.1
50	10	PRA	398.6	398.6	398.6	398.6	398.6	662.6
		PAYGO	398.6	398.6	603.8	890.2	1483.6	3200.1
55	5	PRA	398.6	398.6	398.6	398.6	398.6	398.6
		PAYGO	398.6	398.6	603.8	890.2	1483.6	3200.1

Notes: Values are real present discounted value of the future stream of pension benefits in thousands of 2002 pesos, for a male worker who began contributing at age 25 and expects to continue until age 60.

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 for June 30.
 - ▶ Reports for temporary workers not captured electronically prior to 1997; we drop them.
 - ▶ "Permanent" legally defined as having written contract of indefinite duration, but employers have latitude.
- ▶ *Encuesta Nacional de Empleo Urbano (ENEU)*
 - ▶ CPS-like household survey, households surveyed quarterly for 5 quarters.
 - ▶ 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.

Data (cont.)

- ▶ Goal: samples that are as comparable as possible.
- ▶ Sample selection (both sources):
 - ▶ Years: 1988-2003
 - ▶ Ages: 16-65
 - ▶ Cities: 16 cities in original ENEU sample
 - ▶ Sectors: manufacturing, construction, retail/hotel/restaurant (sectors in which IMSS is only social security agency.)
 - ▶ Main (highest-wage) job, if more than one.
 - ▶ Impose 1991 IMSS topcode (lowest real value).
- ▶ Focus on men.
 - ▶ Reasons:
 - ▶ Women's labor-force participation changing.
 - ▶ Women often covered through husband. (Incentive to remain informal? Topic for future.)
 - ▶ 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.

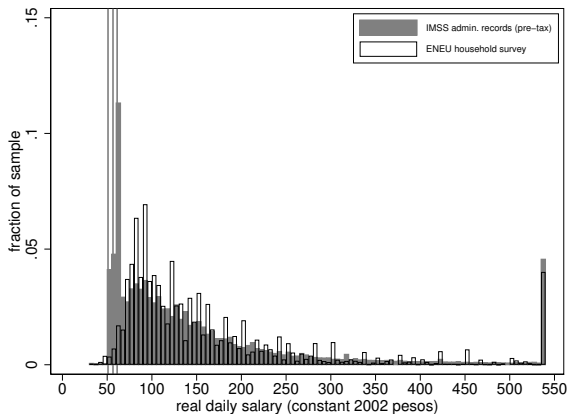
Table 2: Comparison of IMSS and ENEU, men

	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 post-tax wage	121.02 (0.07)	163.88 (1.58)	172.98 (1.94)	143.88 (2.62)		166.73 (1.85)
age	31.75 (0.01)	31.46 (0.15)	32.13 (0.17)	29.98 (0.29)		32.22 (0.17)
fraction employed in ests >100 employees	0.52 (0.00)	0.43 (0.01)	0.55 (0.01)	0.18 (0.01)		0.55 (0.01)
N (raw observations)	1691417	16169	11592	4577		10978
N (population, using weights)	1691417	2578847	1772523	806324		1645229
B. 2000						
real avg. daily post-tax wage	123.60 (0.07)	148.20 (1.31)	161.15 (1.60)	120.78 (2.16)	166.42 (1.80)	155.80 (1.59)
age	32.70 (0.01)	32.22 (0.14)	32.82 (0.16)	30.94 (0.28)	33.22 (0.17)	32.88 (0.16)
fraction employed in ests >100 employees	0.58 (0.00)	0.44 (0.01)	0.59 (0.01)	0.10 (0.01)	0.63 (0.01)	0.59 (0.01)
N (raw observations)	2420307	19171	14063	5108	11918	13246
N (population, using weights)	2420307	3509828	2384267	1125561	2042988	2225318

Table A6: Age composition by firm size, 1990, men

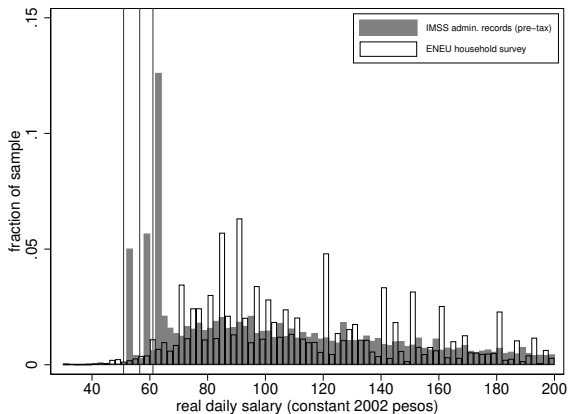
	Age category (employment as % of row)					employment as % of column
	16-25	26-35	36-45	46-55	56-65	
A. IMSS						
1-10 employees	29.9	32.6	19.8	11.9	5.8	14.5
11-50 employees	33.6	32.2	18.7	10.6	4.9	22.6
51-100 employees	35.0	32.5	18.5	9.8	4.2	10.8
101-250 employees	36.3	33.3	17.8	9.0	3.5	14.7
> 250 employees	37.7	34.8	17.5	7.6	2.5	37.5
all firm sizes	35.1	33.4	18.3	9.3	3.8	
B. ENEU						
1-10 employees	35.9	28.3	18.0	12.5	5.3	12.4
11-50 employees	33.5	33.3	18.4	10.3	4.5	21.0
51-100 employees	35.6	33.4	15.2	10.7	5.1	11.6
101-250 employees	30.2	31.2	21.5	12.4	4.7	10.5
> 250 employees	34.0	33.4	21.5	8.5	2.7	44.5
all firm sizes	33.9	32.5	19.7	10.1	3.9	

Fig. 2: Wage histograms, men, 1990



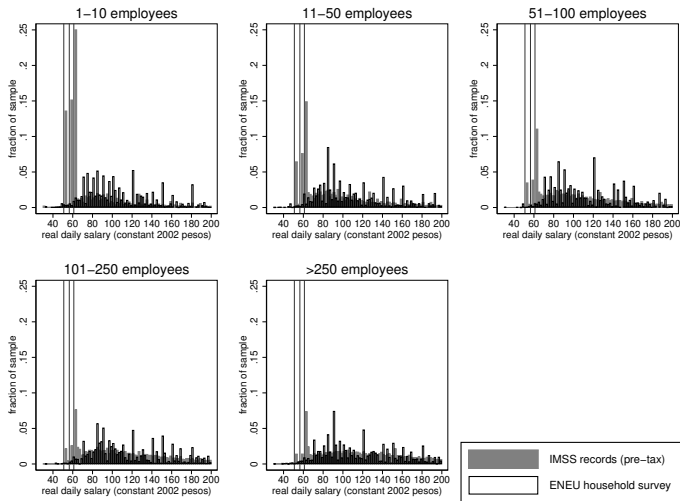
Notes: Bins are 5 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar. Vertical lines represent the three region-specific minimum wages. IMSS reported wage is pre-tax.

Fig. 3: Wage histograms, men, 1990, low wages



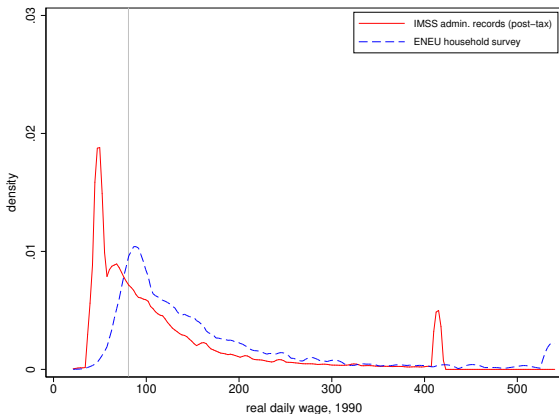
Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar. Vertical lines represent the three region-specific minimum wages. IMSS reported wage is pre-tax.

Fig. 4: Wage histograms, men, 1990, by firm size



Notes: Bins are 2 pesos wide. Average 2002 exchange rate: 9.66 pesos/dollar. IMSS reported wage is pre-tax.

Fig. A6: Excess mass calculation



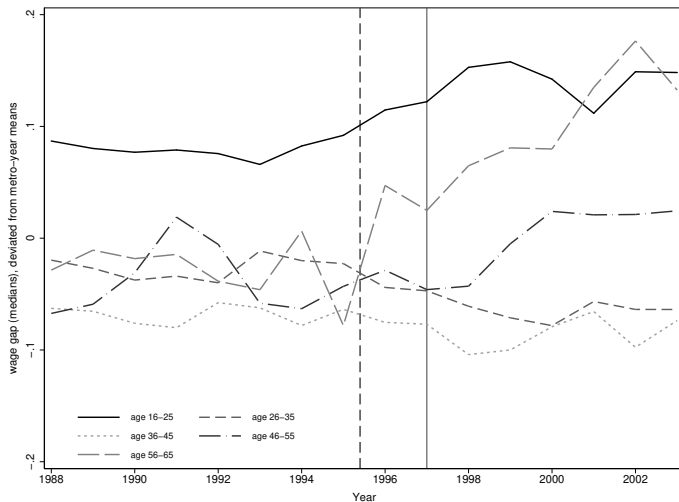
Notes: IMSS wage is post-tax. Densities estimated using 1990 Q2 data and an Epanechnikov kernel with bandwidth 3 pesos for IMSS data and 6 pesos for ENEU data. Vertical line is at 25th percentile of the ENEU wage distribution. Excess mass for 25th percentile defined as (area under red, left of vertical line) - (area under blue, left of vertical line).

Table 3: Cross-sectional patterns of evasion, 1990, men

	wage gap (medians)			wage gap (means)			exc. mass (15th percentile)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
age 26-35	-0.131** (0.059)		-0.113*** (0.019)	-0.142*** (0.041)		-0.127*** (0.014)	-0.213*** (0.048)		-0.200*** (0.015)
age 36-45	-0.164** (0.075)		-0.150*** (0.027)	-0.181*** (0.047)		-0.169*** (0.019)	-0.252*** (0.052)		-0.241*** (0.016)
age 46-55	-0.166** (0.083)		-0.177*** (0.033)	-0.220*** (0.055)		-0.223*** (0.027)	-0.238*** (0.052)		-0.244*** (0.017)
age 56-65	-0.176* (0.094)		-0.208*** (0.046)	-0.224*** (0.050)		-0.240*** (0.025)	-0.201*** (0.053)		-0.224*** (0.021)
11-50 employees		-0.307*** (0.053)	-0.315*** (0.032)		-0.121*** (0.042)	-0.138*** (0.025)		-0.135*** (0.030)	-0.146*** (0.016)
51-100 employees		-0.420*** (0.050)	-0.426*** (0.035)		-0.203*** (0.044)	-0.226*** (0.028)		-0.216*** (0.036)	-0.231*** (0.019)
101-250 employees		-0.440*** (0.053)	-0.447*** (0.038)		-0.248*** (0.042)	-0.280*** (0.027)		-0.258*** (0.039)	-0.277*** (0.020)
> 250 employees		-0.563*** (0.055)	-0.582*** (0.034)		-0.294*** (0.046)	-0.337*** (0.025)		-0.348*** (0.044)	-0.385*** (0.019)
construction			0.171*** (0.033)			0.095*** (0.035)			0.074*** (0.016)
retail/services			-0.063** (0.025)			-0.104*** (0.016)			-0.044*** (0.012)
constant	0.445*** (0.040)	0.741*** (0.041)	0.737*** (0.033)	0.427*** (0.024)	0.514*** (0.033)	0.582*** (0.026)	0.466*** (0.030)	0.542*** (0.018)	0.655*** (0.022)
metro area effects	N	N	Y	N	N	Y	N	N	Y
R-squared	0.06	0.37	0.69	0.13	0.20	0.65	0.27	0.33	0.82
N	1062	1062	1062	1062	1062	1062	1062	1062	1062

Notes: Data are from IMSS and ENEU baseline samples, collapsed to metro area/age group/firm-size category/sector level for 1990. The omitted category for age is 16-25, for firm size is 1-10 employees, and for sector is manufacturing. The wage gap (medians) is log median real daily take-home wage from the ENEU minus log median real daily post-tax reported wage from IMSS, calculated. Wage gap (means) is analogous, using mean in place of median.

Wage gaps (medians) by age group, men, deviated from metro-year means



Notes: Wage gap (medians) = \log median net wage (ENEU) - \log median post-tax reported wage (IMSS). ENEU data pooled across quarters within year.

Table 4: Differential effects on evasion, men

	wage gap (medians) (1)	wage gap (means) (2)	excess mass (15 th perc.) (3)
1(age <= 45)*1988	0.015 (0.033)	0.034 (0.040)	0.011 (0.011)
1(age <= 45)*1989	0.025 (0.027)	0.036 (0.025)	0.018 (0.016)
1(age <= 45)*1990	0.033 (0.035)	0.018 (0.031)	0.016 (0.013)
1(age <= 45)*1991	-0.011 (0.031)	0.027 (0.026)	0.001 (0.012)
1(age <= 45)*1992	-0.011 (0.028)	-0.015 (0.026)	0.010 (0.012)
1(age <= 45)*1993	0.027 (0.027)	0.033 (0.023)	0.003 (0.009)
1(age <= 45)*1994	-0.005 (0.027)	-0.035 (0.026)	0.011 (0.009)
1(age <= 45)*1995	-0.025 (0.031)	0.002 (0.022)	-0.006 (0.014)
1(age <= 45)*1996	-0.020 (0.022)	-0.028 (0.030)	-0.007 (0.009)
1(age <= 45)*1998	0.001 (0.034)	0.019 (0.039)	-0.023** (0.009)
1(age <= 45)*1999	-0.014 (0.028)	-0.021 (0.026)	-0.023** (0.010)
1(age <= 45)*2000	-0.062** (0.028)	-0.051** (0.022)	-0.027*** (0.010)
1(age <= 45)*2001	-0.065** (0.025)	-0.030 (0.024)	-0.023** (0.011)
1(age <= 45)*2002	-0.073*** (0.026)	-0.081*** (0.022)	-0.023** (0.010)
1(age <= 45)*2003	-0.087*** (0.025)	-0.046 (0.028)	-0.025** (0.012)
age group-metro area effects	Y	Y	Y
metro-year effects	Y	Y	Y
R-squared	0.96	0.95	0.99
N	1280	1280	1280

Conclusion

- ▶ Two basic points:
 1. There is substantial under-reporting firms. Third-party reporting does not eliminate evasion.
 2. The extent of under-reporting responds to economic incentives, in particular to change in employees' incentives to ensure accurate reporting and information about employers' reports.
- ▶ Paper presents theoretical model of heterogeneous firms that can rationalize these patterns.

Conclusion (cont.)

- ▶ Parallel to enforcement advantages of VAT:
 - ▶ VAT gives firms incentives to correct reporting of trading partners.
 - ▶ Here we make a similar argument for payroll taxes.
- ▶ Best way to increase compliance?
 - ▶ Theoretical model suggests that reducing payroll taxes ($\tau \downarrow$) would have same effect on compliance as increase in benefit rate ($b \uparrow$).
 - ▶ But increasing sensitivity of benefits to contributions may be preferable on revenue grounds.

Conclusion (cont.)

- ▶ Open questions:
 - ▶ Were employees colluding with employers, or were they just uninformed?
 - ▶ Pension reform changed both incentives and information, so we are not able to separate their effects.
 - ▶ Does greater compliance on intensive margin (less under-reporting by registered firms) reduce compliance on extensive margin (fewer firms registering)?

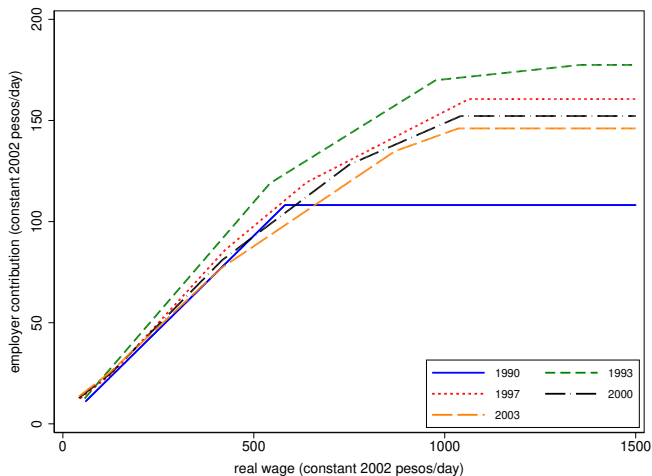
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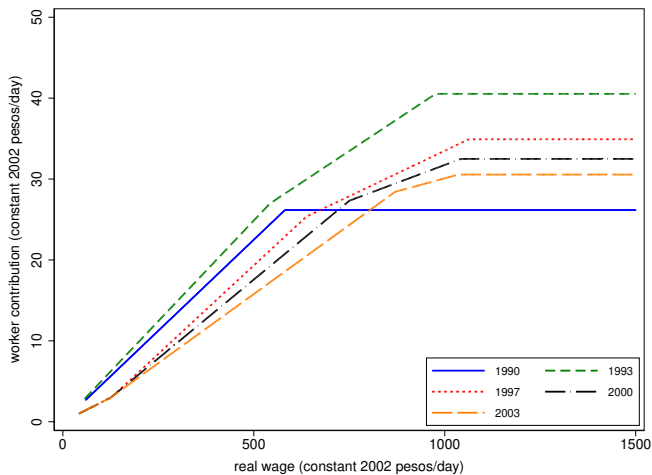
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Fig. A1: Employer contribution schedule



- ▶ Employer contribution: 18-23% of wage, for most workers. 2002 exchange rate ~ 10 pesos/USD.

Fig. A2: Employee contribution schedule



- ▶ Employee contribution: 2-5% of wage, for most workers.

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.

Other dimensions of tax system

- ▶ VAT: 15% for 1988-2003 period.
- ▶ Corporate income taxes:
 - ▶ 39.2% in 1988, 34% in 2003
 - ▶ Widespread 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 ≤ 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.