14.471: Public Economics

Tax Enforcement

Emmanuel Saez

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Tax Enforcement Problem

Most models of optimal taxation (income or commodity) assume away enforcement issues. In practice:

1) Enforcement is costly (eats up around 10% of taxes collected in the US) both for government (tax administration) and private agents (tax compliance costs)

2) Substantial tax evasion (15% of under-reported income in the US federal taxes). Tax evasion much worse in developing countries

Two Recent surveys:

Andreoni, Erard, Feinstein JEL 1998

Slemrod and Yitzhaki Handbook of PE, 2002

ALLINGHAM-SANDMO JPUBE'72 MODEL

Seminal in the theoretical tax evasion literature. Uses the Becker crime model

Individual taxpayer problem:

$$\max_{\bar{w}} \ (1-p)u(w-\tau\cdot\bar{w}) + pu(w-\tau\cdot\bar{w}-\tau(w-\bar{w})(1+\theta)),$$

where w is true income, $\bar{w}$ reported income, τ tax rate, p audit probability, θ fine factor, $u(.)$ concave.

Let $c^{No\,Audit} = w-\tau\cdot\bar{w}$ and $c^{Audit} = w-\tau\cdot\bar{w}-\tau(w-\bar{w})(1+\theta)$

FOC in $\bar{w}$: $-\tau(1-p)u'(c^{No\,Audit}) + p\theta\tau u'(c^{Audit}) = 0 \Rightarrow$

$$\frac{u'(c^{Audit})}{u'(c^{No\,Audit})} = \frac{1-p}{p\theta}$$

SOC $\Rightarrow \tau^2(1-p)u''(c^{No\,Audit}) + p\tau^2\theta^2u''(c^{Audit}) < 0$

ALLINGHAM-SANDMO JPUBE'72 MODEL

Result: Evasion $w - \bar{w} \downarrow$ with p and θ

Proof of $d\bar{w}/dp > 0$: Differentiate FOC with respect to p and $\bar{w}$:

$$-dp \cdot \tau u'(c^{No\ Audit}) - d\bar{w} \cdot \tau^2 (1-p) u''(c^{No\ Audit}) = dp \cdot \theta \tau u'(c^{Audit}) + d\bar{w} \cdot p\theta^2 \tau^2 u''(c^{Audit})$$

$$\Rightarrow d\bar{w} \cdot [-\tau^2 (1-p) u''(c^{No\ Audit}) - p\theta^2 \tau^2 u''(c^{Audit})] = dp \cdot [\theta \tau u'(c^{Audit}) + \tau u'(c^{No\ Audit})]$$

Similar proof for $d\bar{w}/d\theta > 0$

Huge literature built from the **A-S** model [including optimal auditing rules]

Why is tax evasion so low in OECD countries?

Key puzzle: US has low audit rates ($p = .025$) and low fines ($\theta = .2$). With reasonable risk aversion (say CRRA $\gamma = 1$), tax evasion should be much higher than observed empirically

Two types of explanations for puzzle

1) **Unwilling to Cheat:** Social norms and morality [people dislike being dishonest and hence voluntarily pay taxes]

2) **Unable to Cheat:** Probability of being caught is much higher than observed audit rate because of **3rd party reporting**:

Employers double report wages to govt (W2 forms), companies and financial institutions double report capital income paid out to govt (US 1099 forms)

DETERMINANTS OF TAX EVASION

Large empirical literature studies tax evasion levels and the link between tax evasion and (a) tax rates, (b) penalties, (c) audit probabilities, (d) prior audit experiences, (e) socio-economic characteristics

Early literature relies on observational [ie non-experimental] data which creates serious identification and measurement issues:

(1) Evasion is difficult to measure

(2) Most independent variables [audits, penalties, etc.] are endogenous responses to evasion and also difficult to measure

$\Rightarrow$ Requires to use experimental data or to find good instruments: (a) IRS Tax Compliance Measurement Studies (TCMP), (b) lab experiments, (c) field experiments

TCMP: IMPACT OF THIRD PARTY REPORTING

IRS Tax Compliance Measurement Study (TCMP) (thorough audit of stratified sample of tax returns done periodically, most recent is 2001) shows that:

1) Tax Gap is about 16%

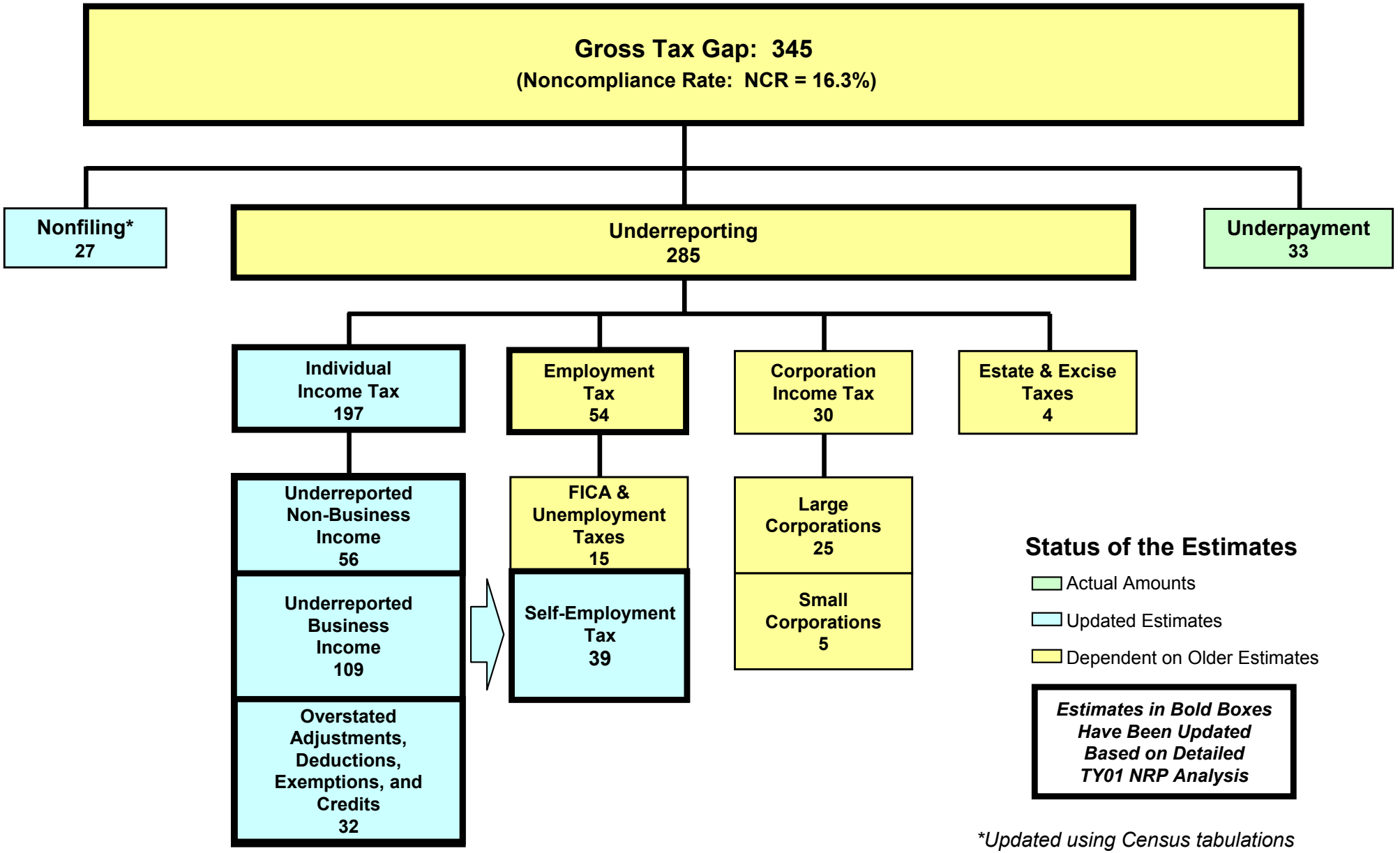
2) Tax Gap concentrated among income items with no 3rd party reporting (such as self-employment income)

- tax gap over 50% when little 3rd party reporting [consistent with Allingham-Sandmo]

- Tax Gap very small ($< 5\%$) with 3rd party reporting

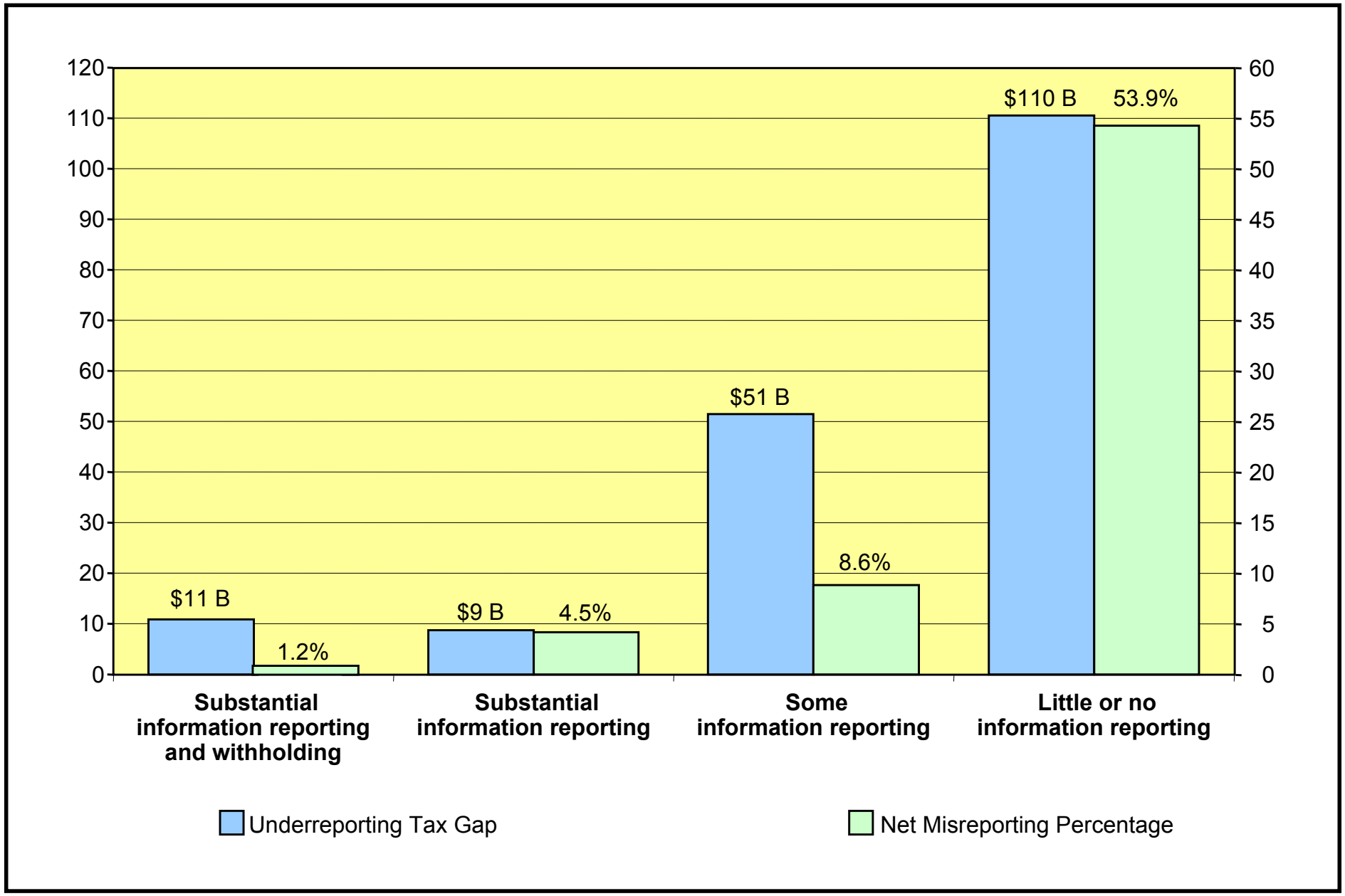
Tax Year 2001 FEDERAL TAX GAP

(in Billions of Dollars)



**Updated using Census tabulations*

Individual Income Tax Underreporting Gap



TCMP: IMPACT OF TAX WITHHOLDING

3) Tax Withholding further reduces tax gap: liquidity constraint effect is most likely explanation: some taxpayers can never produce the tax due unless it is withheld at source

$\Rightarrow$ wage income withholding is critical for enforcement of broad based income tax and payroll taxes

Numbers from TCMP are rough estimates because audits cannot uncover all evasion [IRS blows up uncovered evasion by factor 3-4] $\Rightarrow$ Thorough audits detect only about 4% evasion

TCMP cannot be used to study convincingly causal impact of audits or fines on evasion

LAB EXPERIMENTS

Multi-period reporting games involving participants (mostly students) who receive and report income, pay taxes, and face risks of being audited and penalized

1) Lab experiments have consistently shown that penalties, audit probabilities, and prior audits increase compliance (e.g., Alm, Jackson, and McKee, 1992)

2) But when penalties and audit probabilities are set at realistic levels, their deterrent effect is quite small [Alm, Jackson, and McKee 1992] $\Rightarrow$ Laboratory experiments tends to predict more evasion than we observe in practice

Issues: Lab environment is artificial, and therefore likely to miss important aspects of the real-world reporting environment [3rd party information and social norms]

FIELD EXPERIMENTS

1) Blumenthal, Christian, Slemrod NTJ'01 study the effects of normative appeals to comply: treatment group receives letter encouraging compliance on normative grounds "support valuable services" or "join the compliant majority", control group [no letter]

$\Rightarrow$ No (statistically significant) effect of normative appeals on compliance overall

2) Slemrod, Blumenthal, Christian JPubE'01 study the effects of "threat-of-audit" letters

$\Rightarrow$ Statistically significant effect on reported income increase, especially among the self-employed ["high opportunity group"] but very small sample size

	Either Letter					
	Federal Taxable Income			MN Tax Liability		
	Treated	Control	Treated–Control	Treated	Control	Treated–Control
1994	$26,927	$26,940	$–14	$1,946	$1,954	$–8
1993	$26,346	$26,449	$–103	$1,919	$1,934	$–15
1994–1993	$580	$491	$89(270)	$27	$20	$7(22)
% with 94–93 increase	54.3	53.9	0.4	52.8	52.3	0.5
n	31,149	15,624		31,149	15,624	

Notes:
Number in parentheses is the standard error.
The mean of "Treated–Control" may differ from the mean of "Treated" minus the mean of "Control" due to rounding error.

Table 4
Average reported federal taxable income: differences in differences for the whole samp

Whole sample (weighted)

	Treatment	Control	Difference
1994	23,781	23,202	579
1993	23,342	22,484	858
94−93	439	717	−278
S.E.			464
%w/increase	54.4%	51.9%	2.5%***
n	1537	20,831	

Low income

	High opportunity		
	Treatment	Control	Difference
1994	7473	3992	3481
1993	971	787	183
94−93	6502	3204	3298
S.E.			2718
%w/increase	65.4%	51.2%	14.2%*
n	52	123	

TAX AUDIT EXPERIMENT FROM DENMARK

Kleven-Knudsen-Kreiner-Pedersen-Saez '09 analyze bigger Danish income tax auditing experiment [stratified sample 40,000]

Overall detected evasion [with no adjustment] is around 2% but:

1) Evasion rate for self-reported items is almost 40%

2) Evasion rate for third party reported items is only 0.3%

3) Overall evasion rate is so low because 95% of income is third party reported

Role of 3rd party reports [information structure] seem to trump social factors and economic factors:

$$Evade_i = \alpha + \beta Self\ Reported\ Income_i + \gamma Social\ Factors_i + \varepsilon_i$$

I.B Self-reported vs. third-party reported income

	A. Pre-audit net income			B. Under-reporting of income		
	Total	Third party	Self-reported	Total	Third party	Self-reported
Amount	**206,038**	**195,969**	**10,070**	**4,255**	**536**	**3,719**
	(2,159)	(1,798)	(1,380)	(424)	(80)	(416)
Percent	**98.38**	**98.57**	**38.18**	**8.39**	**1.72**	**7.28**
	(0.09)	(0.08)	(0.35)	(0.20)	(0.09)	(0.19)

I.C Socio-economic vs. tax return factors

Probability of audit adjustment

	Social factors		Socio-economic factors		Tax return factors		All factors	
Constant	**12.81**	(0.42)	**11.74**	(0.44)	**2.49**	(0.26)	**3.71**	(0.44)
Female dummy	**-5.83**	(0.43)	**-5.29**	(0.44)			**-2.40**	(0.42)
Married dummy	**1.56**	(0.46)	**1.52**	(0.46)			**-1.65**	(0.43)
Copenhagen dummy	0.08	(0.66)	0.50	(0.66)			**2.00**	(0.61)
Age > 45 dummy	-0.46	(0.45)	-0.19	(0.45)			0.56	(0.43)
Firm size < 10 dummy			**4.34**	(0.82)			**3.49**	(0.77)
Informal sector dummy			**3.80**	(0.86)			-0.91	(0.81)
Self-reported income dummy					**11.26**	(0.53)	**11.40**	(0.54)
Self-reported income>20,000DKK					**20.68**	(0.92)	**20.02**	(0.93)
Self-reported income<-10,000DKK					**17.08**	(0.73)	**17.00**	(0.73)
R-square	**1.01%**		**1.31%**		**14.26%**		**14.61%**	
Adjusted R-square	**0.99%**		**1.28%**		**14.25%**		**14.57%**	

TAX AUDIT EXPERIMENT FROM DENMARK

Kleven et al. '09 also provide experimental causal effects of:

1) Prior-audit effects: compare next year outcomes of 100% audit group and a 0% audit group [as audited tax filers may update upward beliefs on p]

$\Rightarrow$ Find significant effects on reported income increases, concentrated among self-reported items [nothing on 3rd party income]:

Extra tax collected through this indirect effect is about 50% of extra taxes collected due to base year audits

2) Threat-of-audit letters: Find significant effects on self-reported income increases [as in Slemrod et al.]

II.A Effects of prior audits on future reporting

Amount of income change from 2006 to 2007

	Baseline	Total income	Self-reported income	Third-party reported income
	Audit adjustment in 100% audit group	Difference 100% audit vs. 0% audit	Difference 100% audit vs. 0% audit	Difference 100% audit vs. 0% audit
Net income	**5261**	**2826**	**2409**	417
	(503)	(784)	(663)	(694)
Total tax	**2367**	**1368**		
	(158)	(470)		

II.B Effects of threat-of-audit letters

Probability of adjusting reported income (in percent)

	No letter group	Letter group	Differences letter group vs. No letter group		
	Baseline	Baseline	Any adjustment	Upward adjustment	Downward adjustment
Net income	**27.55**	**29.71**	**2.17**	**1.28**	0.88
	(0.47)	(0.38)	(0.62)	(0.35)	(0.57)
Total tax	**28.05**	**30.02**	**1.98**	**1.27**	0.70
	(0.47)	(0.38)	(0.62)	(0.35)	(0.57)

ADDING THIRD PARTY REPORTING IN A-S MODEL: KLEVEN-KREINER-SAEZ '09

Income $w = w_t + w_s$ where w_t is third party reported (observed by govt at no cost) and w_s is self-reported (as in standard Allingham-Sandmo model). Individual reports $\bar{w}_t$ and $\bar{w}_s$

1) $\bar{w}_t = w_t$ because audit rate is 100% for this income category

2) Government audits $\bar{w}_s$ with probability $p < 1$ (costly):

$$\max_{\bar{w}_s} (1-p)u(w-\tau w_t-\tau\bar{w}_s)+pu(w-\tau w_t-\tau\bar{w}_s-\tau(w_s-\bar{w}_s)(1+\theta))$$

$$\Leftrightarrow \max_{\bar{w}=w_t+\bar{w}_s} (1-p)u(w-\tau\bar{w})+pu(w-\tau\bar{w}-\tau(w-\bar{w})(1+\theta))$$

$\Rightarrow$ **3rd Party Irrelevance:** If no constraints on $\bar{w}_s$, 3rd party reporting does not help enforcement

Note: irrelevance result remains true if $p(\bar{w})$

BREAKING THE IRRELEVANCE RESULT

Irrelevance result depends on 2 strong assumptions:

(1) Self-reported losses are allowed

(2) Audit rate does not depend on (sign of) $\bar{w}_s$

More realistic models where irrelevance breaks down:

(1) Disallow self-reported losses [or schedular tax]

(2) Audit rate p depends (negatively) on $\bar{w}_s$

$\Rightarrow$ 3rd party reporting helps government enforce taxes

EXPLAINING ACTUAL TAX POLICIES

Incorporating 3rd party in **Allingham-Sandmo** model solves puzzles:

1) Evasion rates are high in s sector (consistent with **AS**) and low in t sector

2) p higher when $\bar{w}_s < 0$ (small business losses, undocumented deductions, etc.)

3) $\bar{w}_s$ losses not allowed against w_t (example: US limits capital gain losses and passive business losses)

4) Use of schedular (instead of general) income tax: Earliest income taxes (1800-1900) are **schedular**

SIMPLER MODEL OF TAX EVASION

$$u = (1 - p(\bar{w}))[w - \tau\bar{w}] + p(\bar{w})[w(1-\tau) - \theta\tau(w - \bar{w})]$$

FOC $du/d\bar{w} = 0 \Rightarrow [p(\bar{w}) - p'(\bar{w})(w - \bar{w})](1 + \theta) = 1$

Introduce the elasticity of the detection probability with respect to undeclared income: $\varepsilon = -(w - \bar{w})p'(\bar{w})/p(\bar{w}) > 0$

$$1 = p(\bar{w}) \cdot (1 + \theta) \cdot (1 + \varepsilon)$$

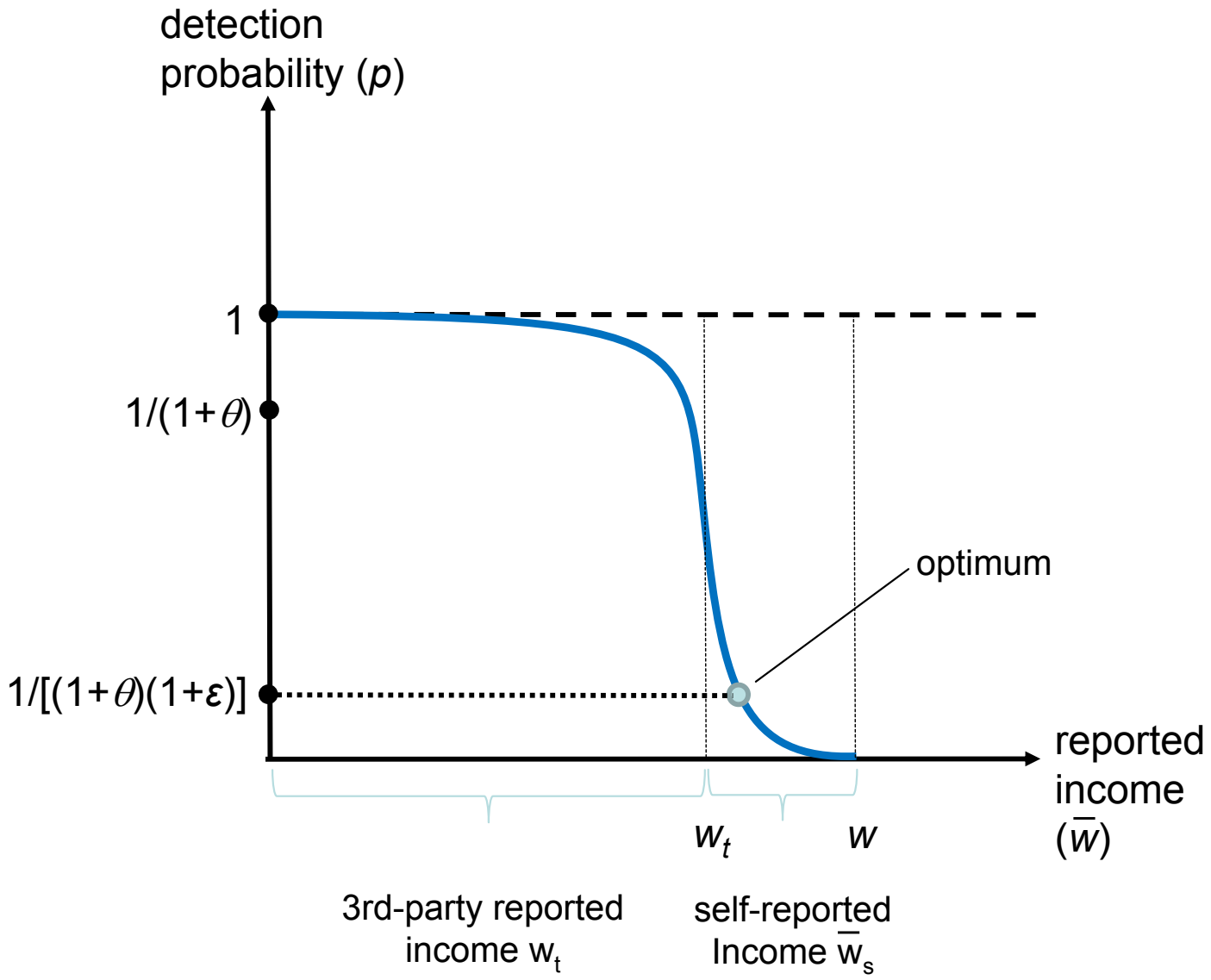
Marginal benefit of evading \$1 extra = Marginal cost of evading \$1 extra

If $\varepsilon = 0$, then always evade if $1 > p \cdot (1 + \theta)$

If $\varepsilon > 0$, then evading more increases risk of being caught on all infra-marginal evaded taxes $\Rightarrow$ Even with $\theta = 0$, full evasion is not always optimal

Shape of $p(\bar{w})$ depends crucially on 3rd party income

Figure 1: Probability of Detection under Third-Party Reporting



WHY DOES THIRD PARTY REPORTING WORK?

In theory, employer and employee could collude to evade taxes $\Rightarrow$ third-party does not help (Yaniv 1992)

In practice, such collusion is fragile in modern companies because of combination of:

1) Accounting and payroll records that are widely used within the firm [which need to report true wages in order to be useful to run a complex business]

2) A single employee can denounce collusion between employer and employees by showing true records to government. Likely to happen in a large business [disgruntled employee, honest newly hired employee, mistake, whistle blower seeking govt reward]

$\Rightarrow$ Taxes can be enforced even with low penalties and low audit rates [Kleven-Kreiner-Saez, 2009]

FORMAL MODEL OF 3RD PARTY

1) Firm has N employees where wages=marginal productivity $w = (w_1, .., w_N)$ (assume away profits).

2) Firm and employees cooperatively report $\bar{w} = (\bar{w}_1, .., \bar{w}_N)$ to govt which applies constant tax rate τ

3) If firm uses **accounting records** then $w, \bar{w}$ known within firm by all employees

4) If $w \neq \bar{w}$, any employee can show **accounting records** to govt and denounce cheating

5) Govt cannot observe w if all employees collude

6) Govt applies fine at rate $\theta > 0$ for evaded taxes

FORMAL MODEL OF 3RD PARTY

Firm and all employees can **collude** to report $\bar{w} = (0, .., 0)$ and evade taxes entirely

But collusive equilibrium is fragile as a single employee can reveal cheating. Can happen because of:

1) Random Shocks: Work conflict, Moral Concerns, Mistake

2) Whistle blowing reward: Govt offers fraction δ of unpaid taxes to whistle blowers

$\Rightarrow$ Collusive equilibrium harder to sustain in large firms

FORMAL MODEL OF 3RD PARTY: RANDOM SHOCKS

If $w \neq \bar{w}$, each employee denounces firm with probability ε (iid) $\Rightarrow$ Firm successfully evades with prob. $(1-\varepsilon)^N$

Firm/workers set $\bar{w}$ to maximize ex-ante expected surplus (assuming risk neutrality):

$$S = \sum_n [w_n - \tau \cdot \bar{w}_n - (1-(1-\varepsilon)^N) \cdot \tau \cdot (1+\theta) \cdot (w_n - \bar{w}_n)]$$

$$\partial S / \partial \bar{w}_n = \tau \cdot [-1 + (1+\theta)(1-(1-\varepsilon)^N)]$$

Firm/workers evade (fully) iff $(1-\varepsilon)^N > \theta/(1+\theta)$

Large firms do not evade even for small ε and θ

FORMAL MODEL OF 3RD PARTY: WHISTLE BLOWER MODEL

Govt offers reward fraction δ of uncovered taxes to whistle blowers ($\delta < \theta$).

Audit probability is 0 if nobody whistle blows and 1 if anybody whistle blows. Whistle blowers share fraction δ of unpaid taxes $\tau \sum_{n'}(w_{n'} - \bar{w}_{n'})$

If $w \neq \bar{w}$, nobody whistle blows iff

$$w_n - \tau\bar{w}_n \geq w_n - \tau\bar{w}_n - (1+\theta)\tau(w_n - \bar{w}_n) + \delta\tau \sum_{n'}(w_{n'} - \bar{w}_{n'})$$

iff $(1+\theta)(w_n - \bar{w}_n) \geq \delta \sum_{n'}(w_{n'} - \bar{w}_{n'})$ for all $n \Rightarrow 1 + \theta \geq N\delta$

$\Rightarrow$ No collusive tax cheating is sustainable iff $\delta > (1+\theta)/N \Rightarrow$ Large firms do not evade even with small δ and θ

HISTORY OF TAX COLLECTION

Most interesting to understand why taxes develop the way they do [Webber-Wildavsky '86 book, Ardant '68 book in French]

During most of history, governments were under the tax enforcement constraint: they were collecting as much taxes as possible given the economic / informational conditions

Many developing countries today still face such tax enforcement constraints

Earliest taxes are tributes: conquerors / rulers realize that it is more lucrative to raise periodic tributes than outright stealing

ARCHAIC TAXES

Governments try to extract revenue through rules without destroying economic activity and without generating tax revolts

Colbert (17th century France) famous expression: "plucking the goose while minimizing hissing"

Direct taxes: taxes on property, businesses, or people

Indirect taxes: taxes on transactions and exchanges

Classification is no longer very meaningful: [estate tax is direct, inheritance tax is indirect but economically equivalent]

ARCHAIC DIRECT TAXES

Poll tax (fixed amount per person). Cannot raise much revenue as poor cannot pay much [people flee or rebel, serfdom is a way to prevent fleeing behavioral response]. Later differentiated by class (nobility, peasants, professions).

Land tax (amount per lot), later differentiated by quality. Cannot raise much unless carefully differentiated with expensive land registry [otherwise marginal lands abandoned]

Product taxes (such as tithe = fraction of gross agricultural product): Tax requires monitoring production. Tax on gross product can be overwhelming for marginal lands

$\Rightarrow$ Archaic direct taxes can hardly raise more than 5% of total product in primitive economies. Hard to collect in barter economies. Only minimal govt can be supported.

ARCHAIC INDIRECT TAXES

Indirect taxes require exchange economies

Tolls for use of roads, rivers, entering towns, crossing borders, harbors, mountain pass. Initially based on people, later based on goods transported [overused when no coordination across jurisdictions]

Excise and Sales Taxes on exchanged goods. In early economies, only few goods are traded: salt, metal, alcohol beverages. Fairs where exchanges are concentrated also allow governments to impose sales taxes

Govt Monopoly Some economic activities require use of heavy equipment (grinding wheat, pressing grapes) $\Rightarrow$ Can be controlled/monitored by govt

$\Rightarrow$ Archaic indirect taxes can raise substantial additional revenue in jurisdictions with substantial trading activity

MODERN TAXES

Modern taxes exploit **accounting information** that is required in large and complex business activities and **withholding at source**

Shift from differentiated capitation and presumptive taxes (on businesses and individuals) toward modern income taxation

Shift from excise taxes toward general sales taxes and then Value Added Tax

Modern taxes can collect over 50% of GDP without destroying growth

Modern taxes in rich countries today are threatened primarily by (a) tax havens [enforcement difficult], (b) international tax competition [requires international coordination], (c) marginally the informal sector

EMPIRICAL PATH OF GOVERNMENT GROWTH

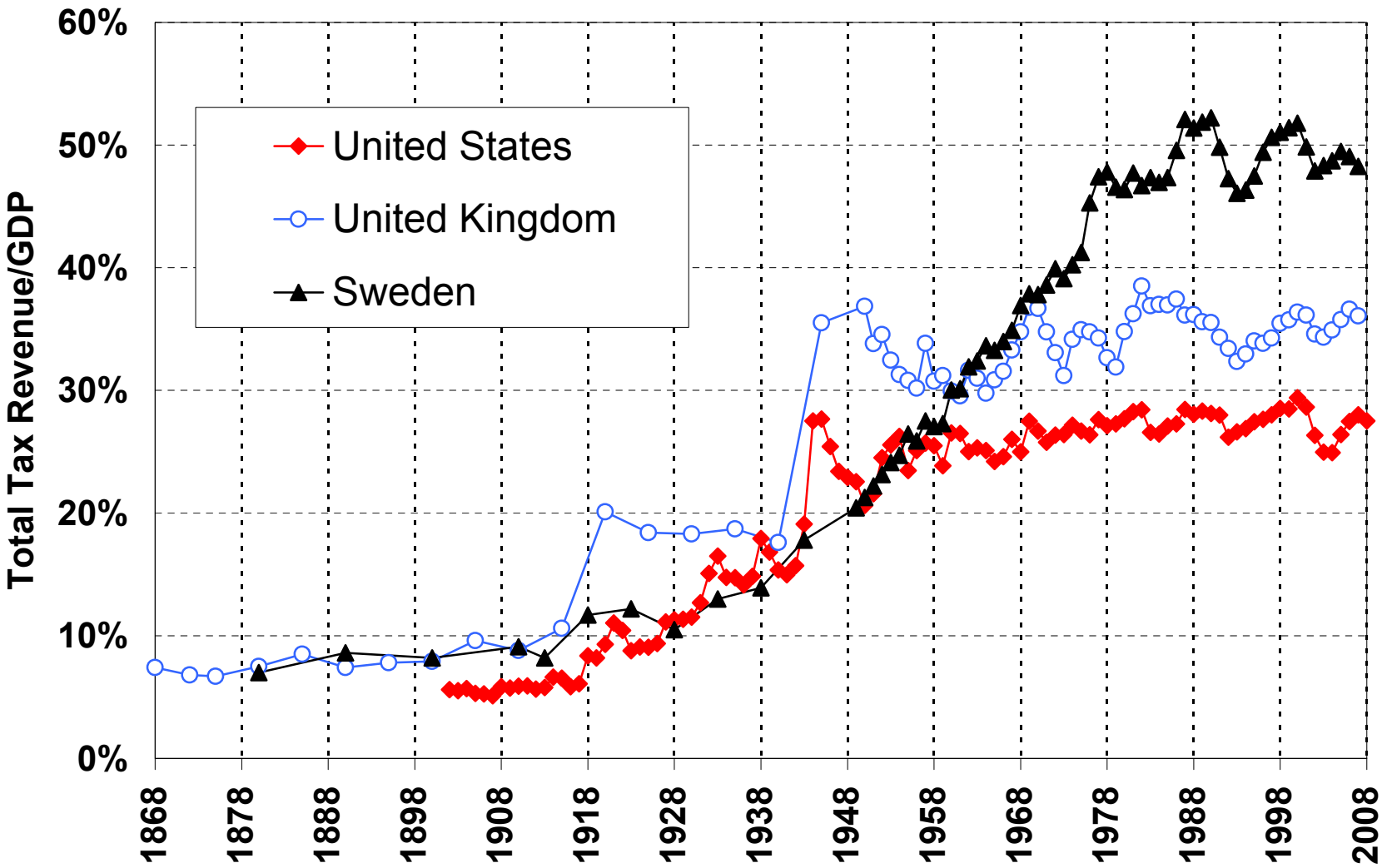
1) Govt size is small (typically $<$ 10% of GDP) in Western countries before industrialization (Flora '83). Use **archaic** taxes: [poll taxes, land-property taxes, product taxes, excise taxes, tolls, tariffs]

2) Govt size increases sharply in all advanced economies during 20th century. Increase corresponds to the development of **modern** taxes enforced using business records [income taxes, payroll taxes, value added taxes]

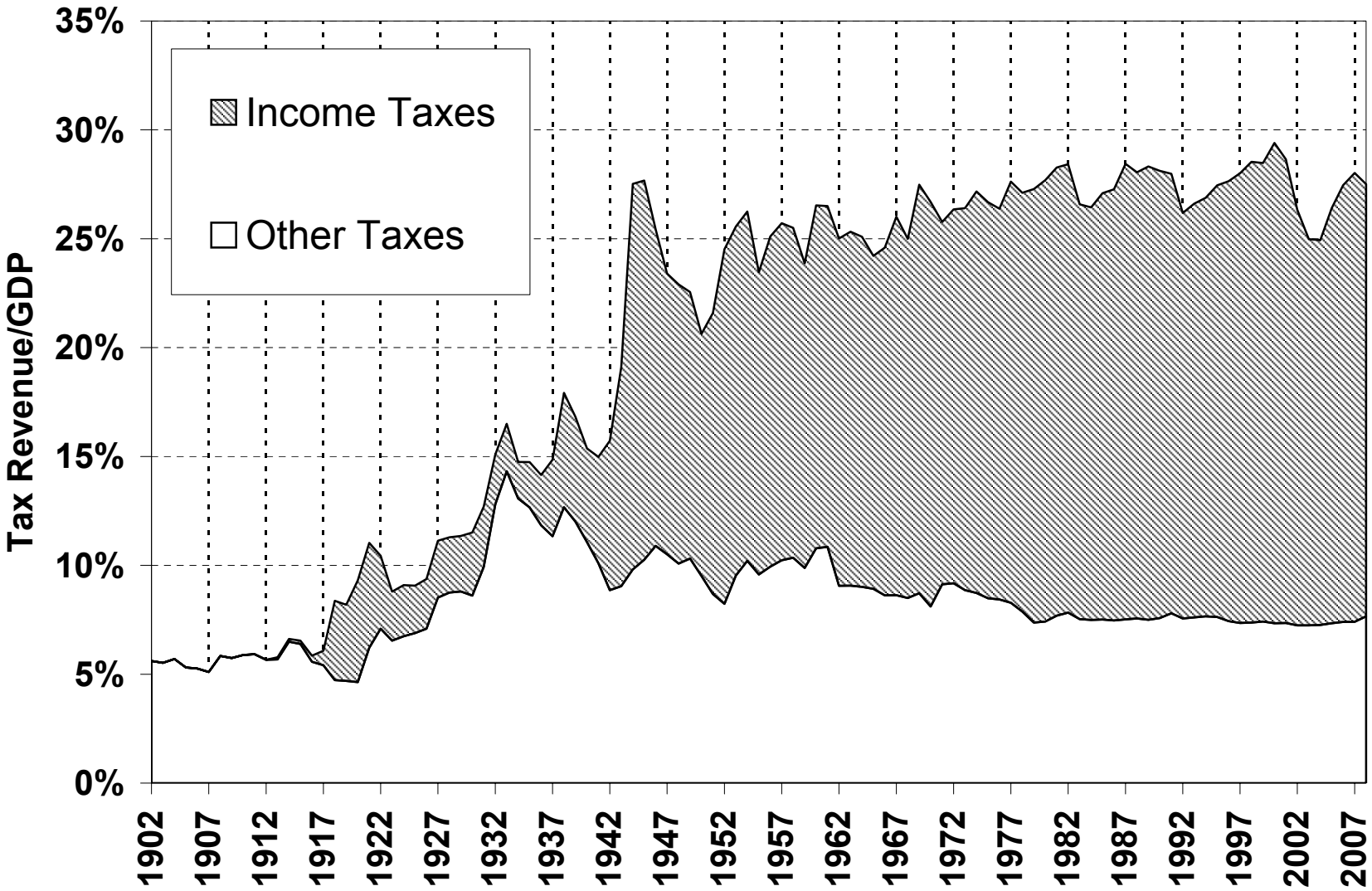
3) Govt growth has slowed or stopped in most advanced economies over last 3 decades

This general historical pattern applies to almost all rich countries although timing and final govt size varies across countries

2A. Tax revenue/GDP in the US, UK, and Sweden



2B. US Tax Composition, 1902-2008



EXPLAINING PATTERN OF GOVT GROWTH WITH TAX ENFORCEMENT

Kleven-Kreiner-Saez NBER'09

1) Early development: economy is rudimentary and business are small / do not need business records: government cannot use modern taxes and is constrained by limited fiscal capacity $\Rightarrow$ Government size is too small relative to tastes of citizens

2) Middle development: businesses grow in size and start using records $\Rightarrow$ Government can start using modern taxes and grows (still constrained by fiscal capacity as too high taxes would make businesses go back to informality)

3) Late development: economy is largely formal $\Rightarrow$ Government no longer constrained, govt size is optimal given tastes of citizens $\Rightarrow$ Government size (as a fraction of GDP) is stable

ALTERNATIVE THEORIES OF GOVT GROWTH

1) Demand elasticity for public goods has income elasticity above one [**Wagner's law** $\sim$ 1900]

2) Supply side: Stagnating productivity in the government sector [Baumol's '67 **Cost Disease Theory**]

3) **Ratchet effect theory**: temporary shocks (e.g., wars) raise government expenditures, which do not fall back after the shock because of changed social norms [Peacock-Wiseman '61, Besley-Persson '08] (can't explain Sweden and pre-20th century wars)

4) **Political economy** theories based on voting, democratization, lobbying, corruption, inequality, etc.

5) **Leviathan theory** Bureaucrats maximize govt size subject to fiscal capacity and political constitution constraints

VARIOUS SALES TAXES

Turnover taxes used to tax all sales: business to consumer (B-C) and business to business (B-B):

Creates multiple layers of taxes along a production chain $\Rightarrow$ Higher total tax when B-B-C than B-C

Retail Sales Tax is imposed on B-C sales only [B-B exempt]: difficult to distinguish B-B and B-C (shifting), strong evasion incentive for B-C

Value-Added-Tax (VAT) taxes only value added [sales-purchases] in all transactions (B-B and B-C): equivalent to retail sales economically but easier to enforce

VAT invented in France in 1950s, has spread to most countries since [US is only rich country without VAT]

NO EVASION: VAT $\Leftrightarrow$ RETAIL SALES TAX

(1) Supplier S produces material using only labor inputs and sells it for s, pays VAT $\tau \cdot s$

(2) Manufacturer M buys material for s and sells product for m, pays VAT $\tau \cdot (m - s)$

(3) Retailer R buys product for m and sells good to consumers for r, pays VAT $\tau \cdot (r - m)$

Total VAT is $\tau \cdot r$

Retail sales tax paid only by R: $\tau \cdot r$

VAT $\Leftrightarrow$ Retail sales tax

INTRODUCING EVASION

Government matches the purchases and sales VAT reports: need to be consistent: $\bar{s}$, $\bar{m}$, $\bar{r}$

If M and R truthfully report $\bar{m} = m$, $\bar{r} = r$: if S decides to evade $\bar{s} < s$, M has to pay $\tau \cdot (m - \bar{s})$, M will only purchase at lower price $\Rightarrow$ No gain for S to evade

Similarly, if R truthfully reports $\bar{r} = r$, then M (and hence S) cannot evade

VAT compliance down the chain forces compliance upstream [even if upstream businesses are informal]

If R is big and uses business records (Walmart) then R cannot misreport $\bar{r} \Rightarrow$ VAT will work well [but retail sales tax would also work]

WHY VAT WORKS BETTER?

If R is small / informal, it can evade but needs to report at least $\bar{r} = \bar{m}$ [otherwise VAT credit would attract tax audit]

If M is small / informal and if R evades and sets $\bar{r} = \bar{m}$, then M can evade VAT by colluding with R: both R and M can decide to lower both $\bar{r}$ and $\bar{m}$ equally

... S can also evade if M and R evade

If all firms are small / informal, VAT enforcement is impossible

If bottom firm R is small / informal $\Rightarrow$ Retail sales tax breaks down entirely but VAT does not:

If bottom firm R is small / informal but M is large / formal, VAT enforcement will work from M and upstream

PREDICTIONS ON VAT VS RETAIL SALES TAX

1) Large retail chains are **critical** for successful implementation of a retail sales tax, and useful for VAT enforcement $\Rightarrow$ The government prefers to favor large retail chains over mom and pop retail stores.

2) Presence of a large / formal firm in the chain is necessary for (partial) successful VAT enforcement. Imports often play this role as they are easy to observe and tax [Keen '07]

3) Small retailers prefer sales taxes (that they can evade) to VAT (that they can only partially evade) $\Rightarrow$ large retail chains (which cannot evade either) like VAT better than sales taxes

4) VAT Issues: (a) VAT evasion easier with international transactions [carousel fraud], (b) VAT cannot tax easily financial services.