

Measuring the Effect of Tax Systems on Economic Behavior Using New Cross-Country Data

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Motivation

- Tax systems are multi-dimensional; e.g., rates and bases as stated may, or may not be, well administered and enforced.
- Existing cross-country studies of the impact of tax systems on behavior use measures of tax rates, and (sometimes) recognize the importance of administration and enforcement using rough proxies.
- Leaving out important aspects of tax systems may bias estimated partial effects of tax rates, and/or miss entirely the effects of other tax system features.

Overview

- We construct 38 measures of tax system aspects for 44 countries based on OECD (2006) and in this paper we examine 10 measures in 1 important context.
- We analyze the relation between new and existing proxies for tax administration and enforcement.
- We re-examine the tax system as a determinant of the size of the informal economy (in the process we search for exogenous variation in our measures).

Existing Measures

Finance and Accounting Literature

- Tax enforcement has spillover effects on corporate governance; **WEF SURVEY** (Dyck and Zingales -JF 2004)
- Governance (but not tax enforcement) effects the relation between corporate tax rates and corporate tax revenues; **WEF SURVEY** (Desai et al. -JFE 2007)
- Tax enforcement constrains earnings management; **WEF /IMD SURVEY** (Haw et al. -JAR 2004, Wysocki -JAR 2004)

Existing Measures

Economics Literature

- Tax rates are negatively associated with unofficial activity, while the tax burden is positively associated; **WEF SURVEY** (Johnson et al -AER 1998)
- Tax rates are not associated with unofficial activity after controlling for better-run administrations; **GDP and LEGAL INDEX** (Friedman et al -JPE 2000)
- Tax rates are positively associated with unofficial activity, while tax enforcement is negatively associated; **SEIGNIORAGE and LEGAL INDEX** (Ihrig and Moe -JDE 2001 -AEJ 2004)

Existing Measures

Economics Literature

- Tax administration has a positive association with the number of new business registrations; **TAX PAYMENTS AND HOURS** Djankov et al. (working paper, 2008)
- Tax rates have a negative association with self-employment when tax enforcement is strong and no association when tax enforcement is weak; **CORRUPTION INDEX** (Torrini -LE 2005)

New Measures (OECD, 2006)

Table 1

1. **Use of Withholding**
 - for 6 payment types
2. **Tax System (for individuals)**
 - 4 classifications
3. **Collect Power**
 - out of 15 types of powers
4. **Maximum Penalty**
 - for failure to correctly report tax liability
5. **Administrator Coverage**
 - revenue agent per 1,000 workers
6. **Use of Reporting**
 - for 7 payment types
7. **Self-Assessment**
 - who computes tax liability?
8. **Use of Matching**
 - for 6 payment types
9. **Bank Access**
 - strength of bank secrecy laws and revenue agents' ability to overcome them
10. **Verification Power**
 - search and seizure powers

Correlations

Table 2 (top)

| | <i>Per Capita Income</i> |
|---------------------------|----------------------------------|
| | 1 |
| <i>Per Capita Income</i> | 1.0000 |
| <i>Tax Hours</i> | -0.5371 |
| <i>Tax Payments</i> | -0.4371 |
| <i>Corruption</i> | 0.8154 |
| <i>Bribery</i> | 0.7543 |
| <i>Law and Order</i> | 0.7399 |
| <i>Seigniorage to GDP</i> | -0.5827 |
| <i>Seigniorage</i> | -0.7281 |
| <i>Tax Compliance</i> | 0.5944 |
| <i>Tax Burden</i> | 0.2682 |

Correlations

Table 2 (bottom)

| | <i>Per Capita Income</i> | <i>Tax Hours</i> | <i>Tax Payments</i> | <i>Corruption</i> | <i>Bribery</i> | <i>Law and Order</i> | <i>Seigniorage to GDP</i> | <i>Seigniorage</i> | <i>Tax Compliance</i> | <i>Tax Burden</i> |
|-------------------------------|--------------------------|------------------|---------------------|-------------------|-----------------|----------------------|---------------------------|--------------------|-----------------------|-------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| <i>Per Capita Income</i> | 1.0000 | (0.5371) | (0.4371) | 0.8154 | 0.7543 | 0.7399 | (0.5827) | (0.7281) | 0.5944 | 0.2682 |
| <i>Use of Withholding</i> | (0.4399) | 0.4317 | 0.2278 | (0.5533) | (0.4796) | (0.3090) | 0.3258 | 0.5713 | (0.4351) | (0.0654) |
| <i>Administrator Coverage</i> | 0.3078 | (0.3174) | (0.1245) | 0.2642 | 0.2505 | 0.4718 | (0.3198) | (0.6254) | 0.0358 | 0.0886 |
| <i>Tax to GDP</i> | 0.4902 | -0.3114 | -0.3161 | 0.4268 | 0.4112 | 0.4519 | -0.3634 | -0.5586 | -0.0075 | -0.2133 |
| <i>Self Assessment</i> | -0.2851 | 0.2833 | 0.0205 | -0.4015 | -0.2907 | -0.3010 | 0.3845 | 0.3532 | -0.0622 | -0.1618 |
| <i>System1</i> | -0.3466 | 0.3305 | 0.0255 | -0.3965 | -0.2651 | -0.2699 | 0.1374 | 0.2001 | -0.1856 | 0.0140 |
| <i>System2</i> | 0.0198 | -0.0062 | 0.1208 | -0.0415 | -0.1388 | 0.0150 | 0.1137 | 0.1240 | -0.0641 | -0.1727 |
| <i>System3</i> | 0.3365 | -0.2653 | -0.1752 | 0.4364 | 0.4111 | 0.3414 | -0.2188 | -0.3677 | 0.0996 | 0.0177 |
| <i>System4</i> | 0.1869 | -0.2626 | -0.0110 | 0.2603 | 0.2025 | 0.0426 | -0.1469 | -0.0840 | 0.3292 | 0.2339 |
| <i>Use of Reporting</i> | -0.2928 | 0.4461 | 0.0272 | -0.3449 | -0.3103 | -0.1453 | 0.2246 | 0.6906 | -0.0906 | -0.0350 |
| <i>Collect Power</i> | -0.3733 | 0.1880 | -0.0016 | -0.3161 | -0.3319 | -0.2930 | 0.1237 | 0.2143 | -0.4962 | -0.3489 |
| <i>Max Penalty</i> | -0.3059 | 0.3612 | 0.1380 | -0.1812 | -0.2114 | -0.2130 | 0.2642 | 0.3331 | -0.0339 | 0.2123 |

Correlations

- Countries with strong legal systems /less corruption:
 - Less self-assessment of tax liabilities
 - Less use of withholding and information reporting
 - Less power to enforce collection of tax debts
 - More tax administrators per worker
- Why should we characterize these countries as having strong tax administration and enforcement or low tax burdens?

| MAXIMUM PENALTY RATE | | ADMINISTRATOR COVERAGE | | PER CAPITA INCOME | |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <p>LOWEST QUARTILE (1)</p> <p>Cyprus Finland <u>Iceland</u> Japan <u>Luxembourg</u> Russia South Korea Sweden</p> | <p>(2)</p> <p>Australia Canada France Hungary Norway USA</p> | <p>(1)</p> <p><u>Chile</u> <u>China</u> Japan Mexico <u>Singapore</u> <u>South Africa</u> South Korea USA</p> | <p>(2)</p> <p>Argentina Austria Cyprus Italy Lithuania New Zealand Spain Turkey</p> | <p>(1)</p> <p>Argentina <u>Chile</u> <u>China</u> Latvia Mexico Russia <u>South Africa</u> Turkey</p> | <p>(2)</p> <p>Cyprus Hungary Italy Lithuania New Zealand <u>Singapore</u> South Korea Spain</p> |
| <p>(3)</p> <p>Argentina Latvia Lithuania Mexico Netherlands New Zealand Spain Turkey UK</p> | <p>HIGHEST QUARTILE (4)</p> <p>Austria Belgium <u>Chile</u> <u>China</u> Denmark Ireland Italy <u>Singapore</u> <u>South Africa</u></p> | <p>(3)</p> <p>Australia Canada Finland France Hungary Russia Sweden UK</p> | <p>(4)</p> <p>Belgium Denmark <u>Iceland</u> Ireland Latvia <u>Luxembourg</u> Netherlands Norway</p> | <p>(3)</p> <p>Australia Belgium Finland France Japan Netherlands Sweden UK</p> | <p>(4)</p> <p>Austria Canada Denmark <u>Iceland</u> Ireland <u>Luxembourg</u> Norway USA</p> |

| WITHHOLDING | | REPORTING | | PER CAPITA INCOME | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>LOWEST QUARTILE (1)</p> <p>Australia Canada Denmark France <u>Luxembourg</u> <u>Netherlands</u> Norway Singapore South Africa USA</p> | <p>(2)</p> <p>Austria Cyprus Finland Germany Iceland Malta New Zealand Sweden Switzerland</p> | <p>(1)</p> <p>Argentina Austria Belgium <u>Luxembourg</u> <u>Netherlands</u> Slovak Republic Switzerland</p> | <p>(2)</p> <p>Australia Canada Estonia France Germany Ireland Malta New Zealand Norway South Africa Sweden</p> | <p>(1)</p> <p>Argentina Chile <u>China</u> Estonia Mexico Poland Slovak Republic South Africa <u>Turkey</u></p> | <p>(2)</p> <p>Cyprus Czech Republic Greece Hungary Malta New Zealand Portugal Slovenia South Korea <u>Spain</u></p> |
| <p>(3)</p> <p>Argentina Belgium Chile Czech Republic Estonia Greece Poland Portugal Slovak Republic Slovenia UK</p> | <p>HIGHEST QUARTILE (4)</p> <p><u>China</u> Hungary Ireland <u>Japan</u> Mexico South Korea <u>Spain</u> <u>Turkey</u></p> | <p>(3)</p> <p>Denmark Finland Greece Hungary Iceland Mexico Poland Singapore Slovenia South Korea UK</p> | <p>(4)</p> <p>Chile <u>China</u> Cyprus Czech Republic <u>Japan</u> Portugal <u>Spain</u> <u>Turkey</u> USA</p> | <p>(3)</p> <p>Australia Belgium Finland France Germany <u>Japan</u> <u>Netherlands</u> Singapore Sweden UK</p> | <p>(4)</p> <p>Austria Canada Denmark Iceland Ireland <u>Luxembourg</u> Norway Switzerland USA</p> |

| WITHHOLDING | | REPORTING | | CORRUPTION | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>LOWEST QUARTILE (1)</p> <p>Australia Canada Denmark France <u>Luxembourg</u> <u>Netherlands</u> Norway Singapore South Africa USA</p> | <p>(2)</p> <p>Austria Cyprus Finland Germany Iceland Malta New Zealand Sweden Switzerland</p> | <p>(1)</p> <p>Argentina Austria Belgium <u>Luxembourg</u> <u>Netherlands</u> Slovak Republic Switzerland</p> | <p>(2)</p> <p>Australia Canada Estonia France Germany Ireland Malta New Zealand Norway South Africa Sweden</p> | <p>HIGH (1)</p> <p>Argentina <u>China</u> Czech Republic Greece Mexico Poland Slovak Republic South Africa <u>Turkey</u></p> | <p>(2)</p> <p>Cyprus Estonia Hungary <u>Japan</u> Malta Portugal Slovenia South Korea <u>Spain</u> UK</p> |
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| SELF-ASSESSMENT | TAX SYSTEM (INDIVIDUAL TAX) | | CORRUPTION | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center; color: red;">DO NOT USE</p> <p style="text-align: center;"> <u>Austria</u> <u>Belgium</u> <u>Denmark</u> <u>Finland</u> <u>Germany</u> Greece <u>Iceland</u> <u>Luxembourg</u> <u>Netherlands</u> <u>Norway</u> <u>Singapore</u> Slovenia South Africa <u>Sweden</u> </p> | <p style="text-align: center; color: red;">SYSTEM 1</p> <p> Argentina <u>Austria</u> Brazil <u>Chile</u> China Cyprus Czech Republic <u>Germany</u> <u>Ireland</u> Italy Japan South Korea Latvia Lithuania <u>Luxembourg</u> Mexico <u>Netherlands</u> <u>New Zealand</u> Russia Slovak Republic Slovenia South Africa Turkey UK </p> | <p style="text-align: center; color: red;">SYSTEM 2</p> <p> <u>Australia</u> <u>Belgium</u> <u>Canada</u> Greece Hungary India Malta Poland Portugal Spain <u>USA</u> </p> | <p style="text-align: center; color: red;">HIGH (1)</p> <p> Argentina China Czech Republic Greece Mexico Poland Slovak Republic South Africa Turkey </p> | <p style="text-align: center; color: red;">(2)</p> <p> Cyprus Estonia Hungary Japan Malta Portugal Slovenia South Korea Spain UK </p> | | |
| <p style="text-align: center; color: red;">USE</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> Argentina <u>Australia</u> <u>Canada</u> <u>Chile</u> China Cyprus Czech Republic Estonia <u>France</u> Hungary <u>Ireland</u> Japan </td> <td style="width: 50%; vertical-align: top;"> Malta Mexico <u>New Zealand</u> Poland Portugal Slovak Republic Slovenia South Korea Spain <u>Switzerland</u> Turkey UK <u>USA</u> </td> </tr> </table> | Argentina <u>Australia</u> <u>Canada</u> <u>Chile</u> China Cyprus Czech Republic Estonia <u>France</u> Hungary <u>Ireland</u> Japan | Malta Mexico <u>New Zealand</u> Poland Portugal Slovak Republic Slovenia South Korea Spain <u>Switzerland</u> Turkey UK <u>USA</u> | <p style="text-align: center; color: red;">SYSTEM 3</p> <p> <u>Denmark</u> Estonia <u>Finland</u> <u>Iceland</u> <u>Norway</u> <u>Sweden</u> </p> | <p style="text-align: center; color: red;">SYSTEM 4</p> <p> <u>France</u> <u>Singapore</u> <u>Switzerland</u> </p> | <p style="text-align: center; color: red;">(3)</p> <p> <u>Austria</u> <u>Belgium</u> <u>Canada</u> <u>Chile</u> <u>France</u> <u>Germany</u> <u>Ireland</u> <u>Luxembourg</u> <u>Netherlands</u> <u>USA</u> </p> | <p style="text-align: center; color: red;">LOW (4)</p> <p> <u>Australia</u> <u>Denmark</u> <u>Finland</u> <u>Iceland</u> <u>New Zealand</u> <u>Norway</u> <u>Singapore</u> <u>Sweden</u> <u>Switzerland</u> </p> |
| Argentina <u>Australia</u> <u>Canada</u> <u>Chile</u> China Cyprus Czech Republic Estonia <u>France</u> Hungary <u>Ireland</u> Japan | Malta Mexico <u>New Zealand</u> Poland Portugal Slovak Republic Slovenia South Korea Spain <u>Switzerland</u> Turkey UK <u>USA</u> | | | | | |

Informal Economy – Prior Analysis

Johnson et al (AER 1998)

- Johnson et al (1998) regressed the level of IE against a measure of tax rates and an executive assessment of the tax burden, interpreted as “the way the tax system is administered.”
- **Finding:** High IEs are associated with low tax rates, and high tax burdens. The two RHS variables are, however, not entered into the regression at the same time.

Freidman et al (JPE 2000)

- Freidman et al (2000) regressed the level of IE against a measure of tax rates, a “law and order” index and (sometimes) GDP per capita.
- **Finding:** Tax rates have a negative affect on IE, but have no effect once one controls for “law and order” or GDP (which have a negative effect on IE).

IV Regressions

Table 4

| Independent Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------------|------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|
| | FJKZ | | | | RS | | | |
| <i>Intercept</i> | 0.3573 *** (0.0875) | 0.4531 *** (0.0783) | 0.4772 *** (0.0636) | 0.5046 *** (0.0654) | 0.4185 *** (0.0893) | 0.5690 *** (0.0740) | 0.5717 *** (0.0653) | 0.6218 *** (0.0666) |
| <i>Tax Rate</i> | -0.3654 * (0.2012) | 0.0789 (0.2170) | 0.3002 (0.2149) | 0.3481 (0.2137) | -0.4786 ** (0.2193) | -0.0866 (0.2876) | -0.1690 (0.2607) | -0.0871 (0.2732) |
| <i>Log GDP Per Capita</i> | | -0.0932 *** (0.0243) | | -0.0377 (0.0232) | | -0.1027 *** (0.0344) | | -0.0547 * (0.0298) |
| <i>Law and Order</i> | | | -0.0492 *** (0.0097) | -0.0410 *** (0.0110) | | | -0.0349 *** (0.0118) | -0.0247 ** (0.0118) |
| First stage F | 4.13 | 3.71 | 5.28 | 4.58 | 8.75 | 8.42 | 10.99 | 8.29 |
| Adj R-sq | 0.0690 | 0.3732 | 0.5391 | 0.5564 | 0.0881 | 0.3912 | 0.4467 | 0.4808 |
| N | 32 | 32 | 32 | 32 | 40 | 40 | 40 | 40 |

- Columns 1-4

- IVs are *legal origin, religion, latitude and ethnic fractionalization* from La Porta et al (1999)

- Columns 5-8

- IVs are *conflict and democracy* from Besley and Persson (2007)

Informal Economy – New Analysis

- Tax rates have no significant effect on IE, while new tax system measures have significant positive *and* negative effects.
- In some specifications, per capita income and the legal environment have no significant effect.
- Suggests that the relationship between income and IE may result from tax system choices shaped by other institutional factors that are correlated with income.

IV Regressions

Table 5

| | | | | | |
|-------------------------------------|--------------------------------------|-------------------------------------|------------------------------------|------------------------------------|-------------------------------------|
| Intercept | 0.7708 *** (0.0918) | 0.6972 *** (0.0622) | 0.0574 (0.3332) | 0.3286 (0.1981) | 0.4761 *** (0.1256) |
| Tax Rate | -0.3494 (0.2173) | 0.0287 (0.2167) | -0.4263 (0.4220) | -0.3712 (0.3253) | -0.2507 (0.2590) |
| Log GDP Per Capita | -0.0860 ** (0.0330) | -0.0986 *** (0.0317) | 0.0074 (0.0666) | -0.0085 (0.0212) | -0.0294 (0.0317) |
| Law and Order | -0.0093 (0.0108) | -0.0355 *** (0.0123) | -0.0133 (0.0137) | -0.0103 (0.0444) | -0.0248 ** (0.0109) |
| Max Penalty | -0.0524 ** (0.0204) | | | | |
| Administrator Coverage | | 0.0710 ** (0.0267) | | | |
| Collection Power | | | 0.0396 * (0.0228) | | |
| Use of Withholding | | | | 0.0389 * (0.0210) | |
| System1 | | | | | 0.1580 * (0.0874) |
| System2 | | | | | 0.1034 (0.0829) |
| System3 | | | | | 0.1928 ** (0.0850) |
| 1st stage F - System Measure | | | | | 1.87 2.29 13.97 |
| 1st stage F - Tax Rate | 3.97 | 4.96 | 3.20 | 2.44 | 4.32 |
| Adjusted R-sq | 0.5644 | 0.6210 | 0.4157 | 0.3753 | 0.5171 |
| Sample | 30 | 39 | 37 | 32 | 40 |

Conclusion

- Tax system aspects – other than rates – matter.
- Ignoring them skews one's view of the influence of tax rates on behavior.
- Unexplored variables await the attention of future research.