Employment Structure and the Rise of the Modern Tax System*

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[Job Market Paper - most recent version here]

Abstract

This paper studies how the transition from self-employment to employee-jobs over the long run of development can explain growth in income tax capacity. I construct a new database which covers 90 household surveys across countries at different income levels and 140 years of historical data within the US (1870-2010). Using these data, I first establish three new stylized facts: 1) within country, the share of employees increases over the income distribution, and increases at all levels of income as a country develops; 2) the income tax exemption threshold moves down the income distribution as a country develops tracking employee growth; 3) the employee share above the income tax threshold remains high and constant at 80-85 percent. These findings are consistent with a model where a high employee share is a necessary condition for taxation and where the rise in income covered by information trails through increases in employee shares drives expansion of the income tax base. To provide a causal estimate of the impact of employee share on the exemption threshold, I study a state-led US development program implemented in the 1950s-60s which shifted up the level of employee share. The identification strategy exploits within-state changes in court-litigation status which generates quasi-experimental variation in the effective implementation date of the program. I find that the exogenous increase in employee share is associated with an expansion of the state income tax base and an increase in state income tax revenue.

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1 Introduction

Tax capacity grows as economies develop. This is true across today's developing countries, and historically within today's advanced countries. In this paper, I show how the transition from self-employment to employee-jobs explains growth in tax capacity. This increase in employee share is a defining characteristic of changes to employment structure over the long run of development. Micro evidence shows that transitions into employee-jobs are associated with improved compliance at the individual level by creating third-party information trails (Kleven et al., 2011), but this evidence has little to say about state tax capacity over the long run. Macro evidence provide correlations between employee shares and tax take (Besley & Persson, 2014; Kleven, 2014; Kleven et al., 2015), but this evidence lacks clearly identified empirical channels. To build a bridge between the micro and macro contributions, I propose a research design which combines descriptive evidence and quasi-experimental evidence. In this design, I empirically identify a new channel through which employee share impacts tax capacity along the development path. To implement the design, I construct a new dataset with microdata for 90 countries at all levels of development and 140 years within the US (1870-2010).

The novel channel explains decreases in the income tax exemption threshold through increases in employee share that occur further and further down the income distribution. To motivate the channel, Panel A of Figure 1 shows four countries at increasing levels of development [India, Indonesia, Mexico, US]. Within each country, it plots employee share across deciles of the income distribution and the location of the exemption threshold above which earned income becomes liable for taxes. In India, the exemption threshold is located in the top decile of the income distribution, the only one where employee share is high. As countries reach higher levels of development, the threshold gradually moves down as the employee-share goes up in deciles further down the income distribution. This close co-movement is also observed within the US over time (Panel B, Fig 1). This paper explains the co-movements as the impact of increases in employee share on the exemption threshold.

Figure 1 shows that the statutory income tax base in US is 30 times larger than in India (Panel A). This large variation suggests the statutory threshold may be an important determinant of tax capacity. This observation complements previous papers that document a weak or zero correlation between statutory instruments and income tax capacity. While those studies have focused on variation in statutory tax *rates*, I study variation in the statutory tax *threshold*. This directly addresses the extensive margin of compliance of moving workers into the tax base. The focus on the threshold is

consistent with development tax policy which emphasizes the extensive margin of compliance as an important driver of tax capacity (Keen, 2012)

I construct a new micro database containing information on type of work and income from nationally representative household surveys across 90 countries at all income levels and within the US between 1870 and 2010. This collection effort offers two main advantages. First, it allows me to shed new light on employment structures in countries at medium and lower levels of development (below $4000 per capita), where I source 83 percent of surveys directly from national statistics offices or government ministries. These surveys have a larger sample size and contain income data for a wider range of work-types than pre-existing surveys from public access licensed databases or external repositories. Second, it allows me to provide new evidence on long run changes to employment structure in the US pre 1900, where I draw on previously unexploited microdata produced by a joint effort between economic historians and IPUMS USA (Lindert & Williamson, forthcoming). My micro survey data offer the key advantage, relative to administrative records, that they permit studying employment structure for all types of work both above and below the exemption threshold.

In a first part of the paper, I provide three new stylized facts on employee shares and taxation. Stylized fact #1 shows that within country the employee-share is increasing through the income distribution, and over development the employee share is increasing in deciles locally further down the income distribution. I characterize stylized fact #1 in a quantitative exercise. I show that for each decile of the income distribution, there exists a level of per capita income beyond which employee growth in the decile stops and employee share reaches a steady state level. I estimate these per capita income levels for all deciles to find that: the income levels are decreasing in the deciles; and, the steady state employee share is constant across deciles at 80-85 percent.

The second stylized fact shows that the exemption threshold moves gradually down the income distribution in close co-movement with increase in employee share in the deciles locally to its left. The third stylized fact shows that the employee-share above the threshold remains constant and high at 82-85 percent at all levels of development. All three stylized facts are remarkably similar *in levels* when I compare a given US historical profile to a synthetic profile constructed from countries at similar levels of development. This robustness suggests a causal impact of employee share on the tax threshold.

In a second part of the paper I estimate the causal impact of employee share on the exemption threshold. Identification is based on exogenous timing in implementation dates of a US state-led development program. Through the Industrial Development Bonds program (IDB), states facilitated

the transition into manufacturing employee-jobs by constructing debt-financed leasable industrial facilities in rural areas. Implementing IDB required the state House to vote in a legal amendment to exempt IDB from the constitutional 'public purpose' provision whereby the state may only enter the debt market for a public purpose. But the lack of historical precedent to the IDB amendment meant the program was considered legally uncertain until the highest state court would litigate to uphold it.

The estimation strategy uses within-state changes in court litigation status as identifying variation. It assesses impact by comparing changes in outcomes before and after the upholding event, relative to counterfactual changes before and after the vote in event within the same state. I provide two pieces of evidence to support this identification strategy. First, I confirm graphically that the effects I find are driven by sharp "on impact" changes around the upholding event with clear break from the vote in pre-trend. Pretrends are stable regardless of the length between vote in and upholding ($\geq$10 years in 40 percent of cases). Second, I show that, conditional on vote-in, the only significant predictor of faster timing to upholding is a time-invariant dummy for civil law origins. As an improvement upon cross sectional specifications, my empirical strategy remains identified even under time varying unobservable shocks *within state* to willingness or capacity to tax that coincide with the potentially endogenous policy period of vote in. Ultimately however, the causal interpretation of the results is driven by the exogenous timing of the upholding event, which I support by finding identical estimates in cross-sectional specifications (including paired synthetic matching) between IDB and non-IDB states.

I use changes in IDB court litigation status as an instrument to estimate the impact of employee share on the exemption threshold. I provide evidence to support the exclusion restriction that changes in IDB court litigation status impact the exemption threshold only through changing employee share. I first show changes in litigation status had no impact on proxies for other threshold determinants, including earnings structure, tax rate structure, enforcement capacity, demand for redistribution. Second, I find no impact of the upholding event on any other source of state tax revenue apart from income tax. Third, the program had no impact on labor force participation, migration, and sectoral spillovers. Fourth, I show that the impact on exemption threshold is sharp and occurs with a precise lag to the impact on employee share. Variation which violates the exclusion restriction would have to produce an immediate break from trend; occur with precise time lag to upholding event; not be captured by proxies; not impact any other tax instrument nor any other tax revenue.

In the first stage, I find that the program led to a large transition from self-employed to employee-jobs but had no impact on earnings structure, overall employment, rural migration, industry spillovers.

I find that the IDB program led to a large reduced-form decrease in the tax exemption threshold and increase in (income tax/GDP). The instrumented estimates suggest that a one standard deviation increase in length of IDB program through exogenous changes in IDB court litigation status led to increase in employee share which account for 24 percent of the expansion of the income tax base and 10 percent of the rise in (income tax/GDP).

The US instrumented estimate is a weighted average of the causal impact of employee share on the tax policy over complier states at different initial levels of employee-share. It has predictive value in the cross-development setting for three reasons. First, the mechanisms underlying the instrumented estimate closely match the cross-development stylized facts: the IDB impact on employee-share led to a shift leftward of the employee-share profile in the income distribution (consistent with fact #1); the IDB decrease in threshold was driven by employee-share increases occurring locally to its left (fact #2); the employee-share above the threshold remained constant at 80-85 percent before and after IDB (fact #3). Second, I find that complying states' labor markets were characterized by large underemployment amongst self-employed in rural areas - thus matching a key characteristic of rural labor markets in developing countries (ILO, 2009). Third, growth in US states' tax take over time has been driven by the rise of personal income tax - thus matching the key cross-development tax fact. State-led industrial financing programs similar to IDB have been implemented in India, Mexico and South Africa, and are considered elsewhere in developing countries (UN Financing for Development, 2009)

The results can be rationalized in a model where government maximizes revenue from setting the income tax exemption threshold. Employees and self-employed differ in evasion cost due to differences in information trail coverage. An exogenous increase in employee-share around the threshold lowers the fiscal costs of a local threshold decrease. I predict the threshold location in the 90 countries of the cross-section in the database, allowing only the employee shares over the income distribution to vary across countries, and holding constant values of enforcement and administrative capacity, earnings, demand for redistribution and public goods. The predicted tax base can account for 62 percent of the observed growth in tax base size across the 90 countries.

The following section discusses related literatures. Section III describes the micro database and provides new stylized facts on employment structure and tax structure. Section IV identifies the impact of employee share on the exemption threshold. Section V provides a model to rationalize the results and quantify the importance of the employee-share channel. Section VI concludes.

2 Related literature

This paper is related to the micro and macro studies on information trails as a determinant of individual compliance and state tax capacity. Kleven et al. (2015) show theoretically that collusive behavior between employees and the employer is hard to sustain when there exist business records, making third-party information reporting by firms a powerful tool of tax enforcement. Gordon & Li (2009) show how information reporting by financial institutions can also improve tax enforcement. These models are supported by a large set of empirical studies in both developed and developing countries that show tax enforcement is affected by information reporting. Kleven et al. (2011) use Danish random audits to show that increases in information coverage associated with employee jobs dramatically improves income tax enforcement. Best (2014) shows, using matched employer-employee data from Pakistan, that third-party reporting also limits income tax evasion in a developing country. But third-party reporting coverage of transactions remains much less prevalent in developing countries. Carillo, Pomeranz and Singhal (2014) use a natural experiment from Ecuador to show limits to third-party information effectiveness when taxpayers can adjust on non verifiable margins. Kumler, Verhoogen and Frias (2015) show that third-party enforcement of Mexican payroll taxes works better in larger firms and when employees have stronger incentives to monitor employer wage reports. Naritomi (2015) uses a Brazilian reform to show that increased incentives and improved technology of firm monitoring by consumers leads to a a large increase in firms' reported revenues. In Chile, Pomeranz (2015) shows that randomized audit threats have less impact on transactions that are subject to double reporting from both buyers and sellers, indicating increased deterrence of evasion through double reporting. Finally, Bachas (2015) and Best et al. (2015) show, respectively in Costa Rica and Pakistan, that taxes based on turnover can be a useful alternative to corporate profit taxation because sales are easier to observe than profits. This paper provides micro evidence on changes in information trails related to employment-structure along the full development path.

The paper also relates to the literature on the determinants of government growth over development (see Cage and Gadenne (2015) for a comprehensive study of tax revenues in developing and developed countries). Demand side determinants of this growth include 'Wagner's law' whereby public goods have a income elasticity above one (see e.g. Musgrave, 1966); and, democratization and increased political power of the poor (Acemoglu and Robinson, 2000). Besley and Persson (2011, 2014) model investments in fiscal capacity as a response to demand for public goods and increased cohesive-

ness of institutions. This paper is more closely related to supply side studies that show how changes in economic structure impact the capacity to supply tax revenue (Bird and Oldman, 1964; Hinrichs, 1966; Kleven et al., 2015). I contribute by providing descriptive and identified evidence on a new tax policy channel through which economic structure affects the capacity to raise taxes.

The paper is related to the literature on changes in employment structure over development. Current evidence focuses on the cross-country stylized fact that self-employment declines over increasing levels of per capita income (Banerjee and Duflo, 2007; Gollin, 2008; 'Jobs' World Development Report, 2013; La Porta and Shleifer, 2014) Studies of structural transformation exploit both cross country and within country patterns, but focus on sectoral changes (review in Herrendorf et al., 2014). The exception is McNaig and Pavcnik (2014, 2015), who show that structural transformation in Vietnam 1990-2008 was accompanied by transitioning out of household businesses. This paper provides new evidence on the decline of self employment over development in larger cross-country and longer time series samples; and, at disaggregated levels over a country's income distribution. Using a previously unexploited US development program, I also contribute with identified evidence on an industrial policy's impact on sectoral and employment changes. I define self-employment versus employee-job based on whether the job generates an information trail relevant for tax enforcement. My self-employment category captures the informality category used by ILO (2009). Thus, this paper complements the literature on informality and development (La Porta and Shleifer, 2014), with micro based evidence on changes to informality over the income distribution along the development path. Finally, this paper's methodology relates to studies of macro economic changes using newly constructed micro evidence (Gollin, Waugh and Lagakos, 2013; Bick, Fuchs-Schundeln and Lagakos, 2015).

The paper also relates to studies of US states as laboratories in development and taxation. (Dincecco & Troiano, 2015; Gillitzer, 2013) While these papers study introductions of new tax instruments, I analyze determinants of state income tax exemption thresholds. I provide evidence on a previously unexploited state led development program, which differs from previous studies of US development programs, including Moretti & Kline (2013) in two dimensions. First, the program was narrow in scope as a stand-alone policy of industrial financing. Second, it was unique in its revenue-neutral funding scheme through issuance of revenue bonds. This type of state-led industrial financing is considered potentially important in developing countries, but there is little empirical evidence on its impacts (Platz, UN Financing for Development, 2009).

3 Descriptive evidence on employment structure and tax structure along the development path

I provide new stylized facts on changes to employee share and tax structure along the development path. I first describe the microdata and methodology. I then present descriptive and quantitative results.

3.1 Data and methodology

Data I construct the micro database from nationally representative household surveys. This represents two key advantages over alternative data sources. First, using household surveys allows a systematic study of changes to employee share over the income distribution which does not depend on the location of tax exemption threshold. This is in contrast to administrative records which typically measure earnings and type of work only for those above the exemption threshold. Second, using household surveys as opposed to firm surveys allows measures of types of work which are not restricted to activities for which individuals receive a wage, but cover all forms of self-employment and unpaid family work. This is especially important in less-developed countries where I document that the share of the workforce below the exemption threshold engaged in non-employee jobs is substantial.

I collected recent household surveys from 90 countries around the world at all levels of per capita income. I searched for surveys based on two main criteria: information on type of work and continuous measures of total gross earnings (as opposed to expenditure proxies) at the individual level; nationally representative coverage of all types of work. The first criteria allows construction of an income-distribution that is defined consistently across all countries. The second criteria ensures that all types of work are covered.

Many household surveys which are available as licensed data or through public access external repositories do not measure non-wage income.[1] This is the case, per example, for a significant number of Living Standards Measurement Surveys (LSMS). The absence of non-wage income measures in public access surveys is also more pronounced in least developed countries. Consequently, in these countries I sourced the surveys directly with the country's national statistics office, or in some cases, the Department for Planning. I collected 83 percent of surveys in countries below $4000 per capita

[1] Some datasets do contain step-function measures of non-wage income. I do not include such surveys in the database.

from such direct sources. These surveys have an average sample size 6.5 times larger on average than the country's LSMS (and are on average much more recent). I chose a living conditions survey over a labor force survey whenever possible. This is because the latter sometimes exclude certain types of work such as casual daily wage labor or family businesses.

The result is 90 surveys in countries ranging from $125 per capita to $80250 per capita. In 2 cases, I rely on expenditure to measure income. In another 2 cases, the sample is only representative of the urban population. In all other cases, the survey is nationally representative and contains continuous measures of earned income from all types of jobs. Full description of all surveys is in appendix B2.

I construct the within country dimension of the database by combining new and previously used micro sources from the US. I collect data between 1950 and 2010 from Census microdata extracted via IPUMS USA. Before 1950, the Census did not record work type and continuous measures of income at the individual level.[2] I use the 1935-36 Study of Consumer Purchases, which was jointly conducted by Bureau of Labor Statistics, the Bureau of Home Economics and the Department of Agriculture. Considered the precursor to the Census methodology of data on income at the individual level, the survey was meant to "ascertain for the first time in a single national survey the earning and spending habits of inhabitants of large and small cities, villages, farms." (ICPSR study 8908, 2009) 300,000 households were interviewed based on sampling units chosen to represent the "demographic, regional, and economic characteristics of the United States." (ICPSR, 2009) Both the work type and income categories in the 1935 survey are consistent with the later Census-based definitions. In particular, the gross income variable contains continuous measures of wage-earnings, business income, and farm income. I provide further details on the ICPSR dataset in the appendix.

All national surveys carried out in the late 19th century and the end of the 1920s focused on sampling the work and living conditions of employed wage-earners.[3] To construct a historical pre-1900 profile of employment structure, I rely on previously unexploited data resulting from a collective effort between Williamson & Lindert (forthcoming) and IPUMS USA. Unlike previous pre-1900 estimates of US wealth which are built up from production or expenditure approaches (Berry, 1968; Gallman, 2000), Williamson & Lindert build their data from local personal income and work type records. To build the dataset, the authors used local tax assessments and occupational directories for

[2]Several US historical cross-sections of individual-level data contain binary measures indicating whether an individual earns non-wage income in excess of a given amount. These variables appear hard to map into a continuous measure of individual gross income, and for that reason I choose not to use such datasets.

[3]Such as the "Cost of living in the United States, 1917-1919" (ICPSR 7711, 1986) and the "Cost of Living in the United States and Europe, 1888-1890" (Haines, 2006).

'registered occupations' and local censuses for 'unregistered occupations'. Labor force counts using the 1 percent US Census sample were provided specifically for the data-project by IPUMS USA. I use the Williamson & Lindert computations of gross earned income, which include wage income, farm income and non-farm business income. However, unlike the surveys from 1935 onwards which contain harmonized employee and self-employed variables, the 1870 data required building types of employment categories. I use a text search algorithm which exploits the highly detailed work titles from the enumerator instructions to the 1870 Census in order to construct self-employed and employee categories. Per example, the 1870 enumerators were explicitly instructed to "not call a man a 'shoemaker', 'bootmaker', unless he makes the entire boot or shoe in a small shop. If he works in a boot and shoe factory, say so (...) Cooks, waiters, etc., in hotels and restaurants will be reported separately from domestic servants." I discuss the US historical data in the appendix.

Methodology For each survey, I construct a nationally representative distribution of earned gross income over the subsample of respondents who declare being active in the labor force (ILO definition). I partition the distribution into ten deciles $s = 1, ..., 10$. Within each decile, I compute the agricultural share of total employment, ι_s, based on ISIC industry classification. Within non agriculture $1 - \iota_s$, I compute the self-employed and employee shares of non-agriculture employment, denoted respectively $(\varphi \mid 1 - \iota)_s$ and $(1 - \varphi \mid 1 - \iota)_s$. I define self-employed and employee shares such that φ and $1 - \varphi$ are mutually exclusive of $1 - \iota_s$. Together with ι_s , the three categories are jointly exhaustive and mutually exclusive in employment in decile s.

I focus on self-employed and employee shares outside the agricultural sector in order to study changes in employment structure amongst workers whose earnings are subject to income tax. The predominant practice in lower and middle income countries is to exclude agricultural earnings from the liable income tax base. I maintain the non-agriculture categories in high income countries where agriculture earnings are subject to income tax. I do this to ensure that variables studied remain the same across countries throughout the analysis of this section. Although in principle this is inconsistent with the definition of the relevant employment base for income tax in high income countries, in practice it has no impact. That is because agricultural employment is very small in high income countries. But importantly, as I document in the appendix, it is also because agricultural employment-share in

high income countries is spread uniformly across all deciles.[4]

I code employment as self-employed versus employee on the basis of whether the work generates derivative information trails that can be used for income tax enforcement. In advanced countries, such information trails are mainly generated through third party reporting of employee wages by employers. In less developed countries where third-party coverage is limited, such information includes paper trails generated by contractual arrangements such as labor contract. This information trails definition of employees is conceptually consistent with the contractual definition of employees in Banerjee & Newman (1993).

Following this classification, I code an agent as self-employed if she responds working in a business without a registered employer. This category is mainly composed of small family businesses and domestic workers. I also code as self-employed any respondent who reports working as a casual daily-wage laborer. Naturally, I also include in the self-employment category all respondents who report working 'on their own account' or in a firm of size 1. This information trails classification produces a self-employment category which encompasses all work categories in the ILO (2002) classification of informal employment: "self-employment in informal enterprises such as unregistered enterprises, employers and unpaid family workers; and paid employment from informal jobs such as casual or day labor and unregistered help for informal and formal enterprises, households or temporary employers."

A compelling feature of the methodology is that industry and type of employment categories are defined in a fully consistent way across all surveys in the cross-section and the within-section. In all surveys, I only code the type of work reported in the first job. This is usually defined as the the job defined towards which the largest number of working hours is used. In doing so, I omit variation in type of work status especially among respondents who may be best considered as having a portfolio of jobs (Banerjee & Duflo, 2007).

The interpretation is that employee work generates an information trail that can be used for income tax enforcement. To the extent that increases in enforceability is driven by movements into large firms, my employee category represents a consistent but 'fuzzy treatment' proxy for enforceable income.[5] If

[4]It is interesting to consider why agricultural earnings are exempt from personal income tax at lower levels of development. One possibility would be that most agricultural production in less developed countries is carried out by self employed and very small units of production. According to the logic of this paper, the absence of information trails on the earnings in these units would make it worthwhile to exempt agricultural sources of income from taxation.

[5]Kleven et al. (2015) provide audit evidence from Denmark, which shows dramatic decrease in evasion rates on the 'extensive margin' between self-employed and employee groups, and on the 'intensive margin' between large and small firms.

transition into employee jobs is associated with increases in gross income, then my employee share measure represents a lower bound on actual increase in enforceable income. On the other hand, if there is systematic under-reporting of earnings in the survey by self-employed, then the employee-share is an upper bound measure of enforceable mass in a given decile.[6] In the household surveys, I find no salient evidence of excess earnings mass locally below the threshold. I regard this as evidence that large misreporting of income the survey in response to location of the threshold is not a first order concern. This observation comes with the caveat that the sample sizes in the surveys do not have the power to fully rule out the existence of such underreporting behavior.

Finally, note that unobservable increases over development in the capacity to detect under-reporting of self-employment earnings would appear as a decrease in the employee share. Underlying growth in enforcement capacity thus works against my finding of gradual increases in employee share along the development path.

3.2 Results

I first document on changes to employee share using the cross-section of 90 countries. To build profiles of employee share representative at incremental development levels, I partition the sample of surveys into ten equal sized bins. The bins are based on the constant per capita income of the country-year in which the survey was collected. At each 'development level', I construct the profile of self employed share $(\varphi \mid 1-\iota)_s$, and employee share$(1-\varphi \mid 1-\iota)_s$, in each decile s of the income distribution as the weighted average over shares in decile s of countries that belong the the development bin. The country-weights are constructed as the country-survey representative sample share in the total sum of representative country samples in the development bin. These weights only vary across countries, not across country-decile. The resulting profile represents employee and self employed shares across the income distribution of the representative country at given development level.

Stylized fact #1: Within country employee share increases over the income distribution, and at all levels of income as a country develops

The results are reported in Figure **??**. At the initially lowest level of development ($277 per capita), employee-share is concentrated in the top decile. Profiles for individual countries, such as India, suggest that even within the top percentiles, there is an extremely steep increase in the employee-

[6] Or if there is systematic under-reporting in both categories, but self-employed under-report a larger fraction of true income.

share. As the first stylized fact, the panels show how transitions into employee jobs occurs in stages of development. Indeed, at each successive development level, the increase in employee share is concentrated in deciles gradually further down the income distribution (stylized fact #1). At low levels of development ($730 to $3286), increase in employee share is concentrated in the top third deciles. At middle levels of development, ($4638 to $13512), the increase in employee share is concentrated in the middle third deciles. Finally, at higher levels of development ($27596 to $53234), the increase in employee share is concentrated in the bottom third deciles.

The distributional patterns of increase in employee share are strikingly similar when comparing the long run historical evolution of the US to 'synthetic' profiles from the cross-section at similar levels of development. In Figure 3, I pool the historical US profiles and the cross-country profiles using the Maddison dataset. This results in a loss of 33 surveys from the cross-section for which the year is more recent than the latest Maddison year. For each historical US profile, I construct a paired synthetic country. This synthetic country is the average over countries for which the real per capita income in the survey-year lies within 10 percent of the per capita income of the historical US survey-year. Per example, India is included in the synthetic country that is paired with the US 1870 survey year. Remarkably, the US profile of employee share in 1870 on the eve of its second industrial revolution, matches closely the synthetic Indian-based profile in levels. Over the long run from 1870 to 2010, the US profiles systematically match the synthetic cross-country profiles in levels of employee share, and in trends of growth in employee share gradually further down the income distribution.

Stylized fact#2: Tax exemption threshold moves down the income distribution as a country develops in co-movement with increases in employee share

For all countries in the micro database, I extract the nominal value of the personal income tax exemption threshold from the tax code in the year of the survey. I locate it in the gross income distribution, as illustrated in Figure 1 using four different countries (panel A), and four points over time within the US (panel B). In all countries, I compute the size of the income tax base as 1 minus the percentile location of the exemption threshold. The size of the income tax base thus describes what fraction of the income distribution is liable in statutory terms to pay taxes. I calculate the employee share above the threshold as the employee-share over all percentiles that lie above the threshold. The second stylized fact describes the tight co-movement over development between increase in employee share occurring gradually further down the income-distribution and decreases in the exemption threshold (stylized fact #2). At lowest levels of development, the exemption threshold is systematically located

in the top percentiles of the income distribution. At increasing levels of development, the increase in employee share to the left of the tenth decile is associated with decreases in the threshold. At highest levels of development, growth in employee share is concentrated in the bottom deciles where the threshold moves down. Through this co-movement with employee share, the threshold gradually decreases such that the size of the income tax base progressively increases over development. This is shown across 90 countries in the LHS of Panel B. Remarkably, the RHS of panel B shows that for a given level of development, the size of the income base is very similar when comparing US historical variation to cross country variation.

Stylized fact #3: Employee share above the tax exemption threshold remains constant and high at 80-85 percent as a country develops

The third stylized fact shows how despite large increases in the size of the income tax base, the employee-share on the income tax remains constant and high around 85 percent. In the LHS of Panel C, I cannot reject with statistical confidence that the employee share above the exemption threshold are the same in India and the US. This constant employee share on the tax base occurs despite the tax base being 30 times larger in the US than in India. The RHS of Panel C shows that, for a given level of development, the employee share on the tax base is the same in historical US and across countries.

These stylized facts are suggestive of the impact of employee share on the exemption threshold along the development path. In the appendix, I show that the three stylized facts also hold within Brazil between 1970 and 2010. They are consistent with a mechanism where employee-share proxies for enforceable income, and growth in enforceable income through increases in employee share drive expansions of the income tax base.

The tight match in the stylized facts provides a bridge of external validity between the suggestive cross country patterns and a within country identified estimate. In Section 4, I provide a within country identified estimate of the impact of the employee share on the exemption threshold.

Quantitative exercise To complement the descriptive facts, I quantify the relationship between employee share and levels of development, separately for each decile of the income distribution. I adapt a regression method used to quantify 'development-stages' of structural processes (Imbs & Wazciarg, 2003)

In order to quantify a fully flexible relationship, I attempt to impose as little structure on the functional form as possible. This motivates the use of a non-parametric regression method, which is locally

robust[7] and allows me to recover the estimated coefficients that I use to for later estimation.[8]

The method is adapted from robust locally weighted scatterplot smoothing ('lowess'). In the cross country sample, I partition the data into S subsamples according to overlapping constant per capita income intervals of size $J = \$1,000$, with an overlap of size $\triangle = \$250$. Each interval thus has a midpoint which is \$250 away from the following midpoint. For each decile, I run a regression on each subsample of the decile-specific measure of employee-share on per capita income. I use the estimated coefficient on per capita income and constant values to plot the fitted value against the income midpoint of each estimation subsample.

The resulting curve for a given decile j yields a robust non-identified shape of the evolution of employee-share in every decile j over development. I plot the curves for all deciles in the Appendix. I can statistically confirm stylized fact #1. At low levels of development, growth in employee share is stronger in the top decile and is significantly different from growth in other deciles. Over increasing levels of per capita income, the statistically significant growth in employee share occurs in deciles gradually further down the income distribution.

More interestingly, the curves suggest that beyond a real per capita income level which is specific to each decile, growth of employee share in a given decile has come to a halt and employee-share in the decile has reached a steady-state level. The regression technique allows me to robustly estimate these decile-specific per capita income points. I calculate the decile-specific per capita income point by setting to 0 the derivative of the predicted decile-specific employee-share with respect to per capita income. Per example, at real \$7500 per capita, employee growth is estimated to have come to a halt in the 6th decile. At this per capita income level, the employee share predicted by the statistical curves has reached 85 percent. At higher capita income levels, the predicted employee share remains constant at this steady state level. I estimate the 'steady state' per capita income specific to each decile. I find that the per capita income points are smoothly but steeply decreasing in all deciles (appendix Figure). Remarkably, the fitted curves further suggest that the steady state employee share is constant across deciles, ranging between 80 and 85 percent.

In the appendix, I repeat the exercise for the sample of US states over time. The panel structure allows me to include state fixed effects into the subsample regressions. I can therefore calculate the

[7] This is unlike polynomial/semi-parametric functions where the shape of the curve at one point can be determined by shape of the curve at other extreme points.

[8] Other smoothing methods simply compute the mean of y for subsamples of data centered around x_s. This distinction is important because I am not only interested in the shape of the general relationship between employee share and per capita income (which is delivered by these other smoothing methods), but also in the sign and the statistical significance of the coefficients.

'steady state' real per capita incomes within the average state over time. I find that the estimated real per capita incomes are also smoothly decreasing in the deciles, but they exhibit less curvature than in the cross country setting. This difference in curvature is similar to the findings in Imbs & Wacziarg (2003) who finds that patterns of sectoral concentration are more pronounced across than within countries.

I use the fitted curves and estimated 'steady state' per capita levels in the model section.

4 Direct estimate of impact of employee share on exemption threshold and tax collection

In this subsection, I provide a causal estimate of the impact of employee share on the exemption threshold and income tax revenue. I first provide background information and details of the development program. I then discuss data and identification strategy. Finally, I present graphical and regression results.

4.1 Background and program details

Background US states are a compelling setting to study development of tax systems. Each state defines and enforces a wide range of tax bases. Historically, the large growth in state tax-to-GDP ratios (Wallis, 2000) has been entirely driven by an increase in personal income taxes (Panel A, Figure 5). The rise of the modern income tax system in individual states matches the key tax capacity stylized fact (Besley & Persson, 2014; Kleven et al., 2015).

In parallel to the rise of the modern income tax, individual states also witnessed large changes in employment structure over time. Panel B of Figure 5 shows the non agricultural employee-share of total employment along the income distribution of the average state over time between 1950 and 1980. The employee-share is increasing in the income distribution, and over time the employee share increases in all income deciles. This is consistent with stylized fact #1. Panel B shows the state exemption threshold gradually moves down the income distribution in co-movement with increases in employee share locally to its left, consistent with stylized fact #2. Finally, the employee-share above the threshold remains constant at 85 percent over time, consistent with stylized fact #3.

Throughout this section, employee and self-employed are calculated as shares of total employment

that includes agriculture. I do this in order to follow the same criteria for calculating employee shares as in Section III: in the US, agriculture has never been exempt from state income tax base. I focus, however, on changes in non-agricultural employee share to maximize comparability with employee share in Section III. This choice also highlights that results are not confounded by movements out of agriculture. Indeed, I show that the development program led to no change in volume of agricultural employees, but a large movement out of self-employed farming. Including agricultural employees into the employee share variable does not affect results.

Program details To establish a direction of causality from employee share to the exemption threshold, I exploit exogenous variation in implementation date of the Industrial Development Bonds (IDB) program. Through the IDB program, the state built leasable manufacturing facilities in rural counties characterized by underemployed self-employment. (Area Redevelopment Administration Commission, 1963; Cobb, 1993) The IDB program thus acted as a level-shifter in employee-share.

Financing of the IDB program was directly incompatible with the state 'public purpose' Constitutional provision, whereby government debt may only be issued for public purpose. Implementation therefore required the state House to vote in a legal act which exempted IDB from the public purpose provision. But there was no legal historical precedent to such development program. The voted act and by extension any program funding would therefore remain legally uncertain until the highest state court would litigate to uphold the legality of the IDB program through a specific court case (Pinsky, 1963; Abbey, 1966; Rollinson, 1976; Cobb, 1993).[9]

The time-lag between the vote-in and the upholding events was substantial. The lag has mean of 6.67 years and standard deviation of 6.77. In 40 percent of cases, the time-lag exceeded 10 years. I digitize archived Moody's state financial records on issuance of IDB debt. I use this data in Figure 6 to show that upholding was a necessary condition for any issuance of IDB debt. This observation holds amongst states with the longest time lag. This suggests that timing of IDB implementation cannot be explained by systematic implementation delay since vote in due to constrained administrative capacity.

[9] A large Federal reform in 1968 made large changes to IDB regulations. To maintain comparability, I therefore limit the treatment definition to the set of states that implemented the IDB program prior to the reform. Because my estimation strategy relies only on within-state variation, this sample choice has no bearing on the construction of a counterfactual and hence on the estimates. It does, however, condition results on the sample properties of the pre-reform IDB states.

4.2 Data

I construct employee shares of employment from decennial Census between 1910-2010. I construct counts of the working labor force. I construct counts of non-agriculture and agriculture class of workers using the Census class of worker categories 'self-employed' and 'works for wages' and the Census 1950-based industry classification. I construct the employee share as the ratio of non-agriculture employees to agriculture and non-agriculture workers. The self-employed share is constructed as the ratio of all self-employed workers to agriculture and non-agriculture workers. I interpolate the numerator and denominator between Census years using a natural cubic spline (Herriot & Reinsch, 1973). The main results are robust to collapsing all data to a simple pre-post sample.

Continuous measures of employee counts are retrieved from 'State and Area Employment, Hours and Earnings" collected by the Bureau of Labor Statistics. The series provides number of employees in non-agriculture by industry categories in state-years 1939-2002. Volumes of earnings by industry and type of work (employee, self-employed non farming, and self-employed farming) is from the historical series "SA5H: Personal income by major component and earnings by industry" produced by BEA in all state-years 1929-2005. I use the BEA series to construct continuous measures of employee and self-employed shares of gross individual earnings. Gross earnings excludes all government transfers and taxes, and non-work income (dividends, interest). I combine the historical BEA and BLS series to construct continuous measures of average employee earnings, and average employee earnings by major industries. I combine historical BEA series with interpolated Census data to construct average workforce earnings, and average self-employed earnings.

Tax-to-GDP measures between 1929-2010 are based on state government finances published by US Census. GDP is proxied for by using state personal income. I use US historical state tax calculator 1900-2007, constructed by Bakija (2009), to construct measures of the state PIT-base and the state PIT-rate structure. I am grateful to Bakija for providing me input from the calculator. I calculate the state income tax exemption-threshold, K, for an individual earner who files as being single, reports having one dependent, and claims the standard deduction.

I measure dates of vote in and upholding of IDB-program independently across legal reviews and Federal administrative records. I define the year of IDB-upholding as the year where the highest court-instance in the state upholds IDB through a particular court case. Leading cases cited are consistent across legal reviews.

I digitize the full set of Book of the States 1935-2010 (Council of State Governments). I record the

number of agencies administering major taxes: this ranges between 1 and 6. I construct the ratio of annual administrative salary in revenue-taxation relative to annual salary as Treasurer; as Attorney General; and, as average state government administrator. I uses these variables to proxy for investments in enforcement capacity. I use political outcome variables from Besley et al. (2010). I use the Democratic vote-share across all state elections, the Democratic seat share in the state Houses, the existence of a Democratic Governor as measures of increasing demand for redistribution. I use the Besley et al. (2010) measure of political competition.

I construct the distribution of average income across deciles of the state income-distribution by combining Census data 1950-2010 and the 1935-36 Consumer Survey. The income by decile is interpolated across missing years. I digitize the series of significant provisions of state unemployment insurance laws (Department of Labor, 1937-2009) to construct a measure of firm size coverage of state UI.

The sample used for the main set of regressions is a panel of the 48 continental states, between 1939 and 2005. A more detailed description of all variables and the data-sources can be found in the appendix.

4.3 Identification strategy

Identifying variation The estimation strategy exploits institutional features of IDB implementation. I use changes in court upholding litigation status as identifying variation, and assess program impact by comparing changes in outcomes before and after the upholding event, relative to counterfactual changes before and after the vote in event within the same state.

This specification estimates the causal impact of the IDB program on employee share under the identifying assumption that the vote-in period represents a valid counterfactual for the upholding period. That is, absent the IDB program, the outcome of interest would have been on parallel trends throughout the vote in and upholding periods within the same state. I provide two main pieces of evidence to support this identifying assumption.

First, I find that the only significant predictor of the time lag is a state specific time invariant dummy for civil law origins. Table 1 reports the results from non-parametric Cox proportional hazards models. These models use state time-varying and time-invariant regressors to predict the conditional probability of the upholding event occurring, conditional on the vote in event having occurred. The

civil law dummy significantly predicts a higher conditional probability of upholding. None of the economic variables (manufacturing share of labor force, employee share of labor force, 'redevelopment'-share of the labor force, log per capita income, log population), political variables (political competition measure, existence of a poll tax and or literacy tests as voting restrictions), taxation variables (size of exemption threshold, share of income tax to GDP, share of total tax to GDP), geographical variables (dummy for Southern region) predict significant changes in the conditional probability, once the civil law origins dummy has been included. This variable is drawn from Berkowitz & Clay (2005), and codes a state with civil law origins if, by the time of American acquisition, its colonizers had a civil law legal system (as opposed to a common law system).[10] The faster time to uphold associated with civil law states is consistent with studies across US states (Berkowitz & Clay, 2005) and across countries (La Porta et al., 2008). [11] In the appendix, I show that the civil law residual time lag, and the civil law dummy, are both uncorrelated with outcomes in a pre-IDB cross-section.

Second, I plot changes in outcomes before and after the upholding event and confirm that the effects I find are driven by sharp on-impact changes. I show that the outcome of interest is trending in a stable manner over the full pre-event interval regardless of the length of the time-lag between vote in. I show there is no discernible change in the years immediately preceding the upholding event. Any secular trends are largely eliminated by the inclusion of a state-specific linear trend in the empirical specification.

Using within state identifying variation alleviates identification issues related to cross-sectional estimates in the current setting where vote in is likely endogenous to the economic and political environment. Centering treatment around the upholding event also overcomes issues of fuzzy treatment due to legal uncertainty during vote in. The within-state specification in 1 controls for any state-time varying unobservable shocks to political and economic environments which occur at time of vote in and which are common to vote in and upholding periods. Estimates are lower bound on the causal impact if there was any program impact during vote in.

[10]Ten of the continental American states were settled by France, Mexico or Spain and had civil law legal systems by the time of the American Revolution. These ten states are: Alabama, Arizona, Arkansas, California, Florida, Louisiana, Mississippi, Missouri, New Mexico, Texas. The 38 other had a common law system or were unsettled. Note that an additional five states - Illinois, Indiana, Michigan, Ohio, Wisconsin - were also originally settled by a civil law country, but were acquired by Great Britain prior to the American Revolution.

[11]One interpretation of this result, drawing on Berkowitz & Clay, is that civil law produces a Constitution with more statutory components, rather than framework provisions, and that the existence of statutory laws created more frequent demand for constitutional change among affected groups as the political and economic climates change over time. This explanation is consistent with the difference in IDB-litigation procedures observed across states: civil law origins states were more likely to vote in statutes, as opposed to Acts, which was likely to being revised more quickly.

Exclusion restriction The objective of this section is to obtain an estimate of the effect of employee share on the exemption threshold which is not affected by simultaneity or omitted variables. To achieve that goal, I instrument for employee share using changes in court IDB litigation status.

I show in the following subsection that court IDB litigation status has a large impact on employee share, with an break from trend immediately 'on impact'. The previous subsection showed that the only significant predictor of change in litigation status was a dummy for civil law origins. This evidence suggests changes in employee share caused by exogenous change in IDB litigation constitute a valid first stage.

In order for changes court IDB litigation status to be a valid instrument, it must also satisfy the exclusion restriction. That is, changes in court IDB litigation must only affect location of the exemption threshold through changes in the employee share. I provide several pieces of evidence to support this claim. First, I show that change in litigation status is not correlated with proxies for enforcement capacity, tax rate structure, earnings structure, demand for redistribution, political competition. These variables are chosen based on the exemption threshold model derived in the following section. I show that these proxies are meaningful confounders, in the sense that they strongly correlate with location threshold and tax revenue collections. Second, I show the program has no impact on revenue from any other tax base apart from the income tax. This suggests court litigation status did not lead to any change in revenue requirements from the issuing of IDB debt, which could also have caused a decrease in threshold. This is consistent with the nature of the IDB debt, which was issued as revenue bonds that only pledged repayment of principal and interest against the future income derived from the leasing of the IDB facilities, not against the 'full faith and credit' of the state. Third, the program had no impact on economic outcomes which are closely associated with changes in employment structure and correlate with tax capacity, including overall labor force attachment, migration rates, sectoral spillovers. Fourth, I show in the following subsection that the change in litigation status led to a sharp change in exemption threshold, with a consistent lag in timing relative to the impact on employee share.

Together, these pieces of evidence narrow the possible variation that could violate the exclusion restriction. Such variation would have to produce an immediate and sustained break from trend; impact the exemption threshold and income tax revenue with precise sequential time lags to the upholding event; not be captured by any of the proxies; have no impact on any other tax instrument nor any other tax revenue.

Baseline specification The baseline empirical specification is

$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st} \tag{1}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ is a dummy indicating whether the state has voted in the constitutional amendment, and $\mathbf{1}\left(\text{Upheld}\right)_{st}$ is a dummy indicating whether the state-court has upheld the legality of the constitutional amendment. All main results reported include a state-specific linear trend, $\phi_s \cdot t$, and a set of political controls (dummies for the existence of voting rights restrictions and for election years), policy environment (dummy for the existence of right-to-work laws and continuous measure of the firm-size coverage of state unemployment insurance schemes) and log per capita income. Results are fully robust to replacing the state linear trend with interactions between three cross-sections of structural determinants calculated in 1930 and a linear trend.

All standard errors are clustered at the state level to allow for correlation over time within a state. I confirm that a block-bootstrap at the state level yields similar significance levels. I also implement non parametric tests of significance levels using permutation tests, and find similar results. Bertrand et al. (2004) Significance is also robust to ignoring all time series information by collapsing data to a two-period pre-post DiD specification.

The causal interpretation of the results is based on the exogenous timing of the upholding event. I confirm this interpretation by showing that results are identical in cross-sectional specifications, both standard and paired synthetic matching, which estimate program impacts off a non-IDB counterfactual.

In the main results, I use the full sample of years and states to allow precise estimation of covariates in 1. Results are robust in a sample of IDB states in a small interval around vote in and upholding.

4.4 Employment results

In this subsection, I show that court upholding of the IDB program led to an increase in the non-agriculture employee share, but had no impact on earnings structure. This provides the first stage of the IV.

Graphical evidence I begin with some some graphical evidence. Figure 7 provides evidence on an immediate and large increase in employee-share upon upholding. The full set of IDB states have been grouped according to the time-lag between vote in and upholding: 0 to 5 years; 5 to 10 years; 10 to 15 years; in excess of 15 years. Relative to a normalized outcome value of 1 in the year of vote in, I calculate the average within state change in trend before and after the event, across the four groups. Centering the trend graphically around the year of vote in both provides a test for any endogenous impact around the vote in event where my data suggests the IDB program was not active. It also provides a simple but real test of any impact around the upholding event which is free from visual bias. In these graphs I use the employee-share of earned income.[12] I do this because it is available on a continuous basis before and after vote in and upholding. In the regressions, I find no impact of upholding on continuous measure of average employee earnings. This suggests an increase in employee share of earnings can be interpreted as increase in employee share of employment.[13]

Within each group, there is a systematic break in trend and increase of employee-share immediately following the upholding event. In contrast, within each group the employee-share is smoothly trending through the vote in event - with the exception of the the group for whom vote in and upholding coincide. There is no visible change in pretrend in the years immediately preceding the upholding event. This is neither the case when comparing the same group to itself over successive intervals of the vote in period, nor when comparing across groups in given years since vote in. Finally, the trend since vote in is small and almost identical across groups up to ten years after the vote, prior to upholding. This suggests confounding differences between early and late upholding groups in initial employee-share at time of upholding is not a first order concern.

In Figure **??** I provide a direct graphical equivalent of the estimation strategy in 1. I assess changes in outcome before and after the upholding event and compare them to changes before and after the vote in event within the same state. I focus on the subset of states in which the time-lag is in excess of 15 years, and define a post vote period of 10 years and a (non overlapping) pre upholding period of 5 years.[14] I make these choices in order to construct visually long periods around each event. I show in the appendix that the results hold when constructed using a subsample with smaller time lag (and

[12]This variable excluded all transfers received from Federal and state government. The denominator contains all sources of earned income: employee farming, employee non farming, self employed farming, self employed non farming. The denominator excluces all sources of non earned income, such as dividends and interest payments.

[13]In the regressions, I also find that the increase in employee share of employment and the increase in employee share of earnings are almost identical. This further suggests that the impact on employee share uncovered in the graphs is driven by a change in employment rather than average earnings.

[14]Which represents around 20 percent of the sample of IDB states according to appendix Figure.

hence a larger set of states). Panel A shows an immediate increase in employee share upon upholding. The pre-trend is stable up until the upholding event.

Regression results The first 9 columns of Panel A of Table 2 present results from studying changes in log volume of total employment in specific employment-industry categories, using 1. The program led to no change in overall employment levels, but a large transition from self employment into manufacturing. I find no impact of the program on volume of employee jobs in construction, trade, government, and employee agriculture. I uncover a marginally significant decrease in volume of services, suggesting a small switch between industries within the employee share. These results suggest the specification is precisely picking up the program impacts with a movement out of self-employed into manufacturing. The results are inconsistent with secular sectoral changes due to structural transformation, which would also predict movement into construction, retail and services. In the appendix I show that the the program did not lead to any changes in net migration rates, also consistent with the characteristics of the program. The last two columns of Panel A show that these changes in employment volumes map into a 3.6 percentage point increase in the non-agricultural employee share of total employment. The increase is entirely accounted for by a corresponding decrease in self-employment share. Given the specification, note that these are lower bounds on the true program impact.

Panel B of Table 2 shows that the program was not accompanied by any discernible change to the gross earnings structure. It did however lead to an increase in volume of employee employee-related amenities. The program led to no change in gross overall earnings, nor in total volume neither per member of the workforce. The program led to an increase in volume but not in average earnings of employee-jobs, and a mirrored decrease in volume but not in average self-employment earnings. The program increased employee-related amenities, but had no impact on other state transfers. The historically relevant employee-specific amenities included state unemployment insurance.[15] Such employee-targeted amenities are consistent with current practices in developing countries (Gerard & Gonzaga, 2014). The last columns of Panel B show changes to volume and average earnings sources translate into a 4.29 percentage point increase in the employee-share of gross resident earnings.

[15] At its onset in 1938, UI extended only to private firms employing eight or more persons at least 20 weeks a year. By 1958, coverage was broadened to include firms employing one to three employees. Only in 1978 was coverage extended to agricultural firms employing a minimum of 10 workers in at least 20 weeks a year or having a $20,000 quarterly payroll, and to employers paying a quarterly minimum of $1,000 to domestic workers (Bureau of Labor Statistics Handbook of Methods, 1997).

Discussion The employment and earnings results are consistent with a classical Lewis model (1954) in a setting of a local rural labor market. In this setting, the IDB program can be interpreted as an exogenous positive shock to available capital which shifts out initially constrained demand for manufacturing employee jobs. The setting is characterized by existence of large cohorts of potential workers relative to constrained capital stock. This generates 'underemployed' individuals who are self-employed in order to satisfy subsistence needs. The workers have infinitely elastic supply to the manufacturing sector. These characteristics fits the description of the the typical IDB-targeted areas. In this model, self-employed make the transition into employee-jobs even if the newly offered wage is no higher than pre-existing earnings. This is because the transition is associated with monetary gains due to available employee-specific (non taxable) amenities. It can also be due to non-monetary utility gains from moving to a more secure income stream. Consistent with my results, the model predicts that the IDB program will lead to a large movement from self-employment to low-skilled employee-jobs; have no impact on average earnings in manufacturing nor overall earnings; and, increase employee specific amenities. [16] Accounting for the equalization of average earnings, my employment and income results are fully consistent with other findings on development programs in the US, noticeably Kline & Moretti (2013) on the Tennessee Authority program.[17]

I find no change to overall volumes of total employment, suggesting the transition was not driven by movements into the labor force of initially unemployed. The finding of no significant spill over to other sectors, both in terms of employment and earnings, suggests limited importance of general equilibrium effects. This finding is consistent with Federal and academic reports which document that IDB spurred local plant expansion of pre-existing firms which operated in low-skill industries such as textile and food-processing. These low-skill firms mainly exported goods to out of state consumer markets. Finally, the simple model outlined above abstracts from effects due to income accruing to IDB plant owners. If owners consume outside local markets (perhaps because they physically reside elsewhere), one would expect no such impact. I find no impact on retail and services at the state

[16] One key test of the model is whether earnings in employee and self-employment jobs are equalized prior to the IDB program. I use county level data between 1940 and 1950 to confirm this to be the case. I discuss in the Appendix the details of this exercise, including the assumptions made to calculate average earnings of self-employed. To fit the test of equal earnings as closely as possible to the model, I compare earnings in counties likely to be treated under the IDB program. I rely on Federal administrative reports (Area Redevelopment Administration, 1963), which coded all counties in the US as 'redevelopment areas' if they satisfied the two IDB criteria: excess under-employment of self-employed, farmers; lack of private credit supply. Using the 'redevelopment counties' as proxy for IDB counties, I find that in IDB counties a t-test cannot reject equality of average self-employed and average employee earnings.

[17] In particular, they also uncover a large movement from agriculture into manufacturing. They find that aggregate income does increase, arguing that this occurs because manufacturing paid higher wages than agriculture. Differences in income results between their study and mine could arise from underlying differences in types of counties studied - indeed, I find that in non-redevelopment counties, the equalization of earnings across self-employment and employee-jobs does not hold.

level. This is consistent with anecdotal evidence that the IDB-program was dominantly taken up by firms whose headquarters were located outside the IDB state. The local labor market model seems to account for effects of IDB at the level of the IDB state, but not at the national level.

4.5 Tax exemption threshold results

In this subsection, I study impacts on the exemption threshold. I first show a reduced form relationship between the IDB program and the threshold. I then estimate the impact of employee share on exemption threshold where I instrument for employee share using changes in IDB court litigation status (from Section 4.4)

Graphical evidence: reduced form The graphs in panel B of Figure **??** document on a reduced form impact of the program on the exemption threshold. In the LHS graph of Panel B I show that the program led to active tax policy change, through an increased likelihood of passing a legislative reform to the nominal value of the exemption threshold. [18] The break from trend is salient, and occurs with a two year lag relative to upholding. In the RHS graph of Panel B, I find a sharp decrease in the ratio of the exemption threshold to average earnings. This ratio proxies for the relative position of the exemption threshold in the income distribution, where a decrease implies the threshold has effectively moved down the distribution. The decrease in location of threshold could come both from a rightward shift in earnings for a constant nominal value of the threshold,[19] and from a real reform that lowered the nominal value of the threshold. The break from trend in threshold coincides exactly in timing with the year of break from trend increase in the likelihood of a legislative reform. This suggest the upholding event led state policy-makers to actively expand the income tax base through lowering of the exemption threshold. In the regressions, I find that upholding had no impact on earnings.

The break from trend impacts combined with stable pre-trends are simple evidence of a reduced form impact of IDB court upholding on a policy change to the location of the tax exemption threshold. The timing of sequential changes suggests the decrease in exemption threshold was driven in part through increase in employee share.

[18] This normalized likelihood is constructed as state specific empirical cumulative distribution of number of legislative reforms passed over the full sample period. I code a year as legislative reform whenever the nominal value of the exemption threshold breaks from the previous year. This coding is not confounded by inflation-indexing to the exemption threshold, which states started implementing in the late early 1980s, well beyond the average year of IDB upholding.

[19] Similar to the bracket creep phenomenon occurring in periods of inflation with non-indexed threshold values.

Regression results: reduced form I modify the baseline regression specification to include a full set of average incomes z by decile j in state s in year t. The new specification controls in a flexible way for movements in the earnings distribution which may have impacted changes to the threshold. Formally, I estimate the following model

$$[K/y]_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st} \tag{2}$$

where $[K/y]_{st}$ is the ratio of the nominal value of the exemption threshold to the average gross resident earnings. Note that a decrease in the ratio implies a lowering of the threshold location in the income distribution. In Table 3, Col. 1, I find a large, statistically significant decrease of -.7218 in $[K/y]$, which translates into a 18.23 percentile decrease of the location of the threshold in the average IDB state's pre-period income distribution.

Maintaining the reduced-form specification, I provide three pieces of evidence which directly match the cross-development stylized facts from Section 3. I estimate the program impact on employee-share separately for all deciles j in the income distribution using 1 and study the coefficients $\widehat{\theta_j}$. Panel A of Figure 9 plots $\widehat{\theta_j}$. Panel B plots the implied post-IDB employee-shares $\theta_j^{POST} = \widehat{\theta_j} + \theta_j^{PRE}$ where θ_j^{PRE} is the average employee share in decile j calculated in the pre-IDB period in the IDB states. The panels compellingly show that the distributional impact of the program was to shift to the employee-share profile leftwards, resembling closely the stylized fact #1. The panels also locate the implied post IDB percentile location of the threshold calculated as $K^{POST} = K^{PRE} + \widehat{dK}$. $\widehat{dK} = -18.23$ corresponds to the reduced-form estimate. K^{PRE} is the average percentile location in the pre-period in the IDB states. Inspecting θ_j^{POST} relative to K^{PRE} makes clear that the program lead to increase in employee share exclusively *below* the pre-location of the threshold. Combining θ_j^{POST} and K^{POST} provides strong evidence that the threshold tracked growth in employee-share occurring locally to its left, which matches stylized fact #2. Finally, comparing K^{PRE} and $\theta_{j>K^{PRE}}^{PRE}$ with K^{POST} and $\theta_{j>K^{POST}}^{POST}$ suggests that before and after the large changes in employee share and location of the threshold, the employee share above the threshold remains constant, consistent with stylized fact #3. Col 4 of Table 3 confirms in a regression that employee-share above the threshold remained constant upon upholding.

Regression results: instrumental variables Having demonstrated in the previous subsections a relationship between IDB court litigation status and employee share, as well as a reduced form relation-

ship between such litigation changes and the exemption threshold, I now apply instrumental variables to estimate the elasticity of the exemption threshold with respect to employee share.

I assume that changes in exemption threshold and in employee share are determined according to

$$[K/y]_{st} = \beta + \varphi \text{Employee-share}_{st-1} + \sum_{j=1}^{10} \omega_j z_{jst} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st} \tag{3}$$

The first stage estimates changes in employee share from changes in IDB court litigation status according to 1. If changes in employee share predicted by changes in IDB court litigation status provide a valid first stage, and if changes in court litigation status only affect the exemption threshold through employee share, then the IV-estimated φ^{IV} in 3 provides a causal estimate.

Table 3, Cols.2-3 show the instrumented value of employee-share is negative and significant. It is one-third larger in magnitude than non-instrumented employee-share, a sign of simultaneity.

I provide evidence for the exclusion restriction assumption that changes in IDB court litigation only impacted the exemption threshold through changes in employee share. I use the formula for the threshold determinants, derived in the following section, to construct proxies for confounding channels. I show in the appendix that the proxies proxies meaningfully correlate with K and tax revenue. I proxy for changes in enforcement capacity in two ways. First, a decrease in the number of tax departments responsible for collecting distinct sources tax revenues reflects improved administrative capacity to centralize and cross-check information sources in order to enhance enforcement. Second, measures of wages of tax administrators relative to other high ranking administration officials reflects improved incentives for tax collectors. (Khan et al., 2015) I construct approximations to the earnings hazard ratio by using measures of average income by decile of the income distribution and the methodology outlined in Saez (2001). I proxy for demand for redistribution by using measures of democratic vote share at the state level across all types of elections, measures of Democratic seat share in the state House, a dummy for democratic governor, and the political competition measure in Besley et al. (2010). I show in the following subsection that there was no impact of upholding on any other source of tax revenue apart from income tax. This suggest the program did not led to a change in common marginal value of funds. Finally, I show that none of a range of statutory tax rate measures change with upholding.

Cols. (5)-(8) show that the program had no impact on the marginal bottom tax rate, the earnings hazard ratio proxy, the number of tax agencies proxy for enforcement, or the democratic vote share proxy for redistribution. Appendix tables show the change in litigation status did not either corre-

late with any of the other proxies for confounding determinants. I find in the following subsection that there was no impact of the program on any other source of tax revenue apart from income tax, suggesting no change to a marginal value of funds. This combines with findings from the previous section that the program had no non-employment impact on local economic structure as evidence in favor of the exclusion restriction.

Based on the instrumented employee-share value, I derive an elasticity of the exemption threshold with respect to employee share. I find a value of -7.548. This is close in magnitude to the elasticity implied by the ratio of reduced form impacts on employee share and the exemption threshold, which equals -6.678 (Column 1, Table 3).

The φ^{IV} estimate captures the local average treatment effect of employee share on exemption threshold for states that implemented IDB. I use the Federal administration's classification of counties as 'redevelopment areas' (Area Redevelopment Administration, 1962) to calculate the state's share of labor force in the 'redevelopment counties' characterized by underemployment of self-employed in rural areas. The mean 'redevelopment' share in IDB states, 16.5, is three times larger than in non IDB states. This suggests the IV estimates carry external validity in labor markets of less developed countries. Indeed, ILO (2009) considers underemployment as a defining characteristic of labor markets at lower levels of development. Furthermore, ILO documents that in developing countries, underemployment tends to be concentrated in rural areas with large proportions of self employed workers. The IV estimates may also be relevant in developing countries such as India, Mexico and South Africa, which have implemented industrial financing programs like IDB. (Platz, UN Financing for Development, 2009)

I use the instrumented elasticity to understand what extent of observed variation within the average IDB state over time in size of income tax base can be explained by (policy-led) increase in employee share. A one standard deviation increase in length of IDB program due to random changes in court litigation status leads to an increase in size of tax base via an increase in employee share which can account for 26% of the average IDB within-state standard deviation growth in tax base.

4.6 Income tax capacity results

In this subsection, I proxy for tax capacity by using the ratio of tax revenue from a given base to total state GDP. I show graphical and regression evidence of a reduced form impact on income tax capacity.

I then estimate an instrumented elasticity of income tax capacity with respect to employee share.

Panel C of Figure **??** shows a sharp increase in income tax to GDP, with a three year lag to the upholding event. The increase occurs in the year following the legislative reform to lower the exemption threshold (Panel B of Figure **??**). This sequential timing suggests the rise in income tax capacity was in part channeled through the decrease of the exemption threshold.

Using specification 2, I find a large, positive reduced-form impact of the program on personal income tax. Column 1, Table 4) I proceed to estimate the elasticity of [income tax/GDP] with respect to employee-share. I assume the second stage follows 3. Employee-share is again instrumented using variation in court litigation status. I find an instrumented value of employee-share which is one-third larger than the non-instrumented one. The instrumented elasticity of (income tax/GDP) with respect to employee share is .90. The IV-elasticity is smaller than the elasticity implied by the ratio of IDB reduced form impacts on income tax and employee share, which equals 1.292 (Column 1, Table 4)

This elasticity is a consistent estimate under the exclusion restriction that changes in court IDB litigation status only affect (income tax/GDP) through its impact on employee share. To support this claim, Cols.4-7 show that changes in court litigation status had no impact on the four major other sources of state tax revenue: corporate income tax, general sales tax, selected sales tax, and license taxes. This suggests the program did not impact any general marginal value of funds, either per se or through increased revenue requirements following the issuance of IDB debt. As discussed earlier, this is consistent with the type of IDB debt that did not pledge repayment against the state's own revenue. I show in the appendix that for selective sales and license taxes, the null result holds when considering specific categories (motor vehicle, tobacco, public utilities, alcohol).[20] In the previous subsections, I found no impact of change in court litigation status on enforcement and administrative capacity, earnings structure, tax rate structure, demand for redistribution. I also found that the sharp increase in income taxes after the upholding event occurred with consistent time lag to the increase in employee share. Variation which violates the exclusion restriction would have to occur precisely around the time of upholding; produce an immediate and sustained break from trend; not be captured by any of the proxies; impact income tax revenue with precise time lag to employee share impact; have no impact on any other tax revenue.

[20] In the appendix, I show there was a decrease in the relative reliance within state on license taxes levied specifically on occupations and small businesses, which are effectively taxes on self employed. This decrease in revenue is consistent with a behavioural response induced by the IDB program out of self-employment. Relative to GDP, these specific licence taxes represented a trivial amount, with a mean of .0002 at the onset of the IDB program. When the outcome variable is [occupation licence taxes/GDP], the revenue loss estimated from upholding comes out insignificant, and represents 0.00008 percent of the estimated increase in income tax revenue.

This IV-estimate is the local average treatment effect of employee share on (income tax/GD) for those states that implemented the IDB program. The magnitude of the instrumented elasticity suggests a standard deviation increase in exposure to state-led increase in employee share through random court litigation changes can account for just under 10 percent of the average within state change in income tax effort over time.

I argue that the IV estimated effect of employee share on income tax effort was in part channeled through changes in the exemption threshold. Recall that there was no impact on employee-share in deciles of the income distribution that lied above the pre-IDB location of the exemption threshold. (Figure 9). Growth in employee share below the exemption threshold can lead to increase in income tax revenue through two channels. First, the employee share growth can cause the exemption threshold to decrease. Second, the employee share growth can lead to increased ability to collect income tax, conditional on an exogenous decrease in the threshold. I do not rule out the second channel, but interpret the results in Figure 9 as strong evidence of the first channel.

4.7 Robustness

The causal interpretation of the results is driven by the exogenous variation in timing of the court upholding decision. In the appendix, I provide further evidence for this claim by showing that results are nearly identical in cross-sectional specifications which are based on very different counterfactual variation. For the key set of outcomes (employee share, exemption threshold, employee share above threshold, income tax rate, income tax to GDP ratio) and confounders (average earnings, average employee earnings, bottom and top marginal tax rates, political competition, democratic vote share), I find very similar magnitudes and significance in a simple cross-state specification between upholding and non upholding states. The results are also robust to using synthetic matching. In this specification, each IDB state is paired to a synthetic control state which is the weighted average over all non-IDB states that maximizes pre-upholding trends on employee-share. I use the the full set of economic and political covariates to predict the pretrend.

Results are robust to fully ignoring the time dimension of the panel. I do this in a specification which collapses all time series information into pre and post upholding periods. Standard errors block-bootstrapped by state deliver similar patterns of significance. To alleviate concerns in DiD specifications over bias in standard errors and over-rejection of the null of $\theta = 0$ (Bertrand et al., 2004), I

implement a non-parametric permutation test for $\theta = 0$. I construct constructing placebo triplets of [IDB state]-[year of vote in]-[time lag to upholding]. I then re-estimate the main specification 1 using 500 random number generator seeds, for employee share and exemption threshold outcomes. The significance levels are obtained as the cumulative distribution of placebo effects below (above) the main specification employee (threshold) estimate, and remain very similar. [21]

The estimated magnitudes are not driven by events which occur long after the upholding event. Magnitudes remain very similar when I narrow the sample to the IDB states and a time window of 15 years before the vote in and 15 years after after upholding. Results are robust to interacting pre-IDB cross-sections of determinants of structural transformation (illiteracy rate; urbanization rate; population density) with time.

Results are robust to allowing non-parametrically for civil law origin states to be on a different time path.

5 Model

5.1 Setup and empirical prediction

I consider a fixed distribution of income z across workers with pdf $h(z)$ and cdf $H(z)$. I assume exogenous employment shares of self-employed and employees at each income level, denoted respectively φ_z and $1 - \varphi_z$. I do not model the development process that leads to changes in employment shares, but assume it follows the patterns documented in stylized fact #1.

If the agent reports income $z \geq K$, then she is liable to pay $\tau(z - K)$. Otherwise, she is not liable for income tax. K is the exemption threshold and τ is the marginal tax rate. I assume linear utility to abstract from income effects. I assume agents have access to an evasion technology which allows them to pay c in order to report income at K and fully evade taxes. This evasion technology generates 'bunching' of reported income at K, in line with large set of evidence on evasion behavior. The cost is assumed to be infinite for employees: $c^E(z) = \infty$. For self-employed, the cost depends flexibly on total income z (due perhaps to a 'visibility' effect) and on the distance between income and the threshold $z - K$ such that $c^{SE} = c(z, z - K) > 0$. The cost is assumed to be increasing and convex in z. In this setting, there will exist a 'marginal buncher' at income $\bar{z}$ who is indifferent between bunching

[21] The non-parametric significance levels are nearly identical, in a permutation exercise which construct placebo [year of vote in]-[time lag to upholding] but which maintains the observed set of IDB states.

and full compliance: : $\bar{z} - c(\bar{z}, \bar{z} - K) = K + (1 - \tau)(\bar{z} - K)$. All self-employed with income z : $K \leq z \leq \bar{z}$ will under-report and bunch at the threshold. An increase in τ unambiguously leads to more evaders: $\frac{\partial \bar{z}}{\partial \tau} > 0$. An increase in the threshold will lead to less evaders if the marginal gain from compliance is larger than the marginal gain from under-reporting after the threshold decrease, that is

$$\frac{\partial \bar{z}}{\partial K} < 0 \text{ if } \tau > c_K(\bar{z}, \bar{z} - K) \tag{4}$$

I will assume the condition in 4 holds. The revenue base reflects evading self-employed between K and $\bar{z}$:

$$R = \int_{z \geq \bar{z}} \tau(z - K) \varphi_z dH(z) + \int_{z \geq K} \tau(z - K)(1 - \varphi_z) dH(z)$$

Consider a reform which locally decreases the threshold: $dK < 0$. This reform will have two effects on revenue: a mechanical gain and a behavioral loss. The mechanical gain, dM, reflects the marginal increase in revenue collected due to the reform on the inframarginal agents, assuming no behavioral responses

$$\begin{aligned} dM &= -dK\tau \left[\int_{z \geq \bar{z}} \tau(z - K) \varphi_z dH(z) + \int_{z \geq K} \tau(z - K)(1 - \varphi_z) dH(z) \right] \\ &\geq 0 \text{ if } dK < 0 \end{aligned} \tag{5}$$

The behavioral loss, dB, reflects loss in revenue due to behavioral responses of the marginal agents

$$\begin{aligned} dB &= -\frac{\partial \bar{z}}{\partial K} dK \tau(\bar{z} - K) \varphi_K \\ &\leq 0 \text{ if } dK < 0 \end{aligned} \tag{6}$$

where I have used the local approximation that $\varphi_K \approx \varphi_{\bar{z}}$, which is plausible if the last buncher is not located too far above the threshold. At the revenue maximizing optimum, K^{Rev}, it must be that $dB + dM = 0$. This yields the characterization for the location of the threshold

$$\frac{K^{Rev}}{\bar{z}} = \frac{1}{\left[1 + \left[\frac{\text{Mech gain}}{\text{Beh loss}}\right] \cdot \left[\varepsilon_{\bar{z},K} \varphi_K\right]^{-1}\right]} \tag{7}$$

where Mech gain $= \int_{z \geq \bar{z}} \tau(z - K) \varphi_z dH(z) + \int_{z \geq K} \tau(z - K)(1 - \varphi_z) dH(z)$, Beh loss $= h(\bar{z}) \bar{z}$, and where $\varepsilon_{\bar{z},K}$ denotes the elasticity of the marginal buncher with respect to the threshold. By chang-

ing the mass of agents who respond to the local reform, the model predicts the main empirical result of this paper

Empirical prediction: An increase in employee share (self-employed share) locally around the threshold leads to optimally lower (larger) size of threshold

$$\frac{\partial K^{Rev}}{\partial \varphi_K} > 0 \tag{8}$$

Extension: administrative costs A policy literature in developing and developed countries (Tanzi, 1987; OECD, 2015; IMF, 2015) discusses differences in administrative costs between reconstructing information trails for self-employment earnings and aggregation of employee information trails by employers. I model the administrative cost of of taxing an income segment z as an increasing function of the self-employed share on the income segment, $c(z) = c(\varphi_z)$. Revenue net of administrative costs equals

$$\begin{aligned} R = &\int_{z \geq \bar{z}} \tau (z - K) \varphi_z dH(z) + \int_{z \geq K} \tau (z - K)(1 - \varphi_z) dH(z) \\ &- \int_{z \geq K} c(\varphi_z) dH(z) \end{aligned}$$

The local threshold decrease $dK < 0$ will lead to an additional administrative marginal cost $dC = dK \cdot c(\varphi_K) < 0$ if $dK < 0$. The revenue maximizing threshold now equals equal

$$\frac{K^{AdminRev}}{\bar{z}} = \frac{1}{\left[1 + \left[\frac{\text{Mech gain}_{-dC(\varphi_K)}}{\text{Beh loss}}\right] \cdot \left[\varepsilon_{\bar{z},K} \varphi_K\right]^{-1}\right]} \tag{9}$$

where the threshold is now predicted to increase due both to behavioral distortions and administrative costs that increase as the self-employed share goes up.

In the appendix I show that the formula 9 is robust to any general social welfare function.

Discussion: objective functions The full set of empirical results on the impact of employee share on the threshold and income tax revenue are consistent with an objective function of revenue maximization over the exemption threshold. An extension to the objective function which is also consistent with the full set of results is to include a social preference for a 'fair tax base'. Discussed especially

in a setting of low enforcement capacity countries, fairness relates to the idea that the tax base should not discriminate against particular groups in terms of compliance. On the income tax base, such fairness would imply that a group's share in effective contribution to tax revenue should be equal to its share in statutory contribution. I formalize this channel in the online appendix by modeling a 'misrepresentation' index given by the ratio of employee-share of income on the statutory income tax base to the ratio of employee-share of income on the compliant income tax base. Society faces social loss with parameter μ from any deviation of this index from a situation of perfect representation (with index value 1)

$$\text{Horizontal inequity} = \mu \left(1 - \left| \frac{\text{Employee-share on statutory income tax base}}{\text{Employee-share on compliant income tax base}} \right| \right) \tag{10}$$

So long as self-employed evade more than employees, the inequity cost associated with a lowering of the income tax threshold, dE, will always be smaller when the employee-share at the local threshold is larger. In the appendix I extend the formula for the optimal threshold that solves $dM + dB + dC + dE = 0$. This horizontal equity channel delivers a non-trivial prediction for movements in exemption threshold driven by gradual increases in employee share (stylized fact #2) and for constant employee share above the threshold (stylized facts #2 & #3) in the simplest possible setting of costless full evasion by self-employed (unlike the behavioral distortions channel and the administrative cost channel).[22]

The empirical prediction 8 is also consistent with an objective function that minimizes social distortions across tax bases subject to a minimum revenue requirement.[23] But such a model predicts decreases in revenue collected from distortionary tax bases as employee share increases, which is not consistent with the US regression results.

5.2 Model fit and new proxy for fiscal capacity

I use the K^* derived under 9 to perform two simple quantitative exercises. First, I predict the location of the threshold in all 90 countries in the cross-country section of the micro database. I use the calculated distribution φ_j of employee shares across deciles j of the country's income distribution as the only source of cross-country variation, and assume constant values for ε, ω, λ, and the earnings-

[22] In a setting where agents differ in skill level and in cost of avoidance, Kopczuk (2001) derives conditions under which high marginal tax rates can exacerbate horizontal inequity.

[23] In which case individual tax instruments will be set such that their marginal social costs are equalized.

distribution which characterizes the mechanical gain and behavioral loss expressions.[24] I calculate the predicted size of the income tax base as the sum of percentiles that lie above the predicted percentile-location of the exemption threshold. I detail the choice of values for the different parameters in the appendix. I compare the predicted size of tax base to observed size of tax base, calculated as the sum of percentiles above the actual location of the exemption threshold. Panel A of Figure 10 shows results from this exercise. Variation across development in the employee-share predicted exemption threshold can account for 62 percent of the observed cross-country variation in exemption threshold (based on a simple R-squared). The predicted threshold lies within 3-5 percentiles of the actual threshold in countries at levels of development ranging between China, Indonesia and Mexico. At higher levels of income, the predicted threshold is on average ten percentiles lower than the actual threshold, due to the large increase in self-employed in the bottom decile. It is as large as 25 percentiles in countries like Italy and Spain where the self-employed share is prevalent in the the bottom third deciles. At lowest levels of development, the predicted threshold is on average 10 percentiles below the observed threshold. This masks heterogeneity between countries where the model performs very well (Rwanda: 1 percentile gap), fairly well (India: 6 percentile gap) and poorly (Kenya: 25 percentile gap). The average over-prediction in less-developed countries could be closed down by allowing enforcement capacity to exogenously increase over development. This highlights interactions between economic growth processes and investments in state capacity to explain the full variation in tax take along the development path. The gap could also be closed down by varying demand for redistribution or public goods.

In a second exercise, I construct the predicted distribution of employee shares at each of ten estimated steady state per capita income points from Section III. I predict the location of K^* from 9 in these ten constructed income distributions using the formula from 9 . I plot the ten combined minimum income points and associated size of income tax base in Panel B of Figure 10. I interpret these changes as proxies for 'stages' of fiscal capacity to expand the tax base. At per capita income point associated with steady state employee share in decile j, a country has reached a level of development which is associated with an enforceable tax base of size $10 - j$.

[24] The distributions of φ_j in each country were used to construct the profiles for the stylized facts in Section III.

6 Conclusion

This paper has provided evidence and supporting theory to show that transition into employee jobs over development is an important driver of tax capacity. The paper introduces a novel channel, in which increases in employee share occurring gradually further down the income distribution causes broadening of the base through lowering the exemption threshold.

By focusing on the exemption threshold, this paper has provided evidence on the interaction between the extensive margin of income tax compliance and a statutory tax instrument. While this margin of moving agents into the income tax net is potentially an important compliance margin to explain tax capacity, there currently exists no well identified micro evidence on it.[25] Providing an estimate of the extensive margin of income tax compliance is an area for future research (Agostini & Jensen, 2016). The large variation in the location of the tax threshold across development suggests statutory tax instruments may be important determinants of tax capacity. On the other hand, current literature has focused on enforcement technologies and political economy as the main determinants of tax capacity. On-going research (Abramovsky, Bachas & Jensen, 2015) attempts to build new measures of statutory tax instruments to investigate further their relative importance in explaining tax capacity.

The evidence in this paper suggests the importance of studying jointly the drivers of development and their impacts on taxation. A simple but robust finding has been the close match both between less developed countries and currently advanced countries at similar levels of development. This suggests that a small income tax base in a less developed country reflects the same factors which lead to a low employee share. Future research could study factors which explain the patterns of gradual increases in employee share over the income distribution.

The research design of this paper has highlighted the usefulness of building micro evidence to answer macro questions. Such design could be applied to study other questions in taxation and development. There exists compelling micro evidence on the enforcement gains from exploiting sales connections between firms (Pomeranz, 2015). This evidence could be combined with the development-macro evidence on the growth in complexity and interconnectedness of firms (Poschke, 2011) to explain patterns of sales tax structure and revenue collection over development.

[25] Field experiments in developing countries including Sri Lanka, Brazil, and Malawi study the impacts on business registration from varying the costs of formalization, but do not address any impact on labor income taxes (review of evidence in Bruhn and McKenzie, 2014).

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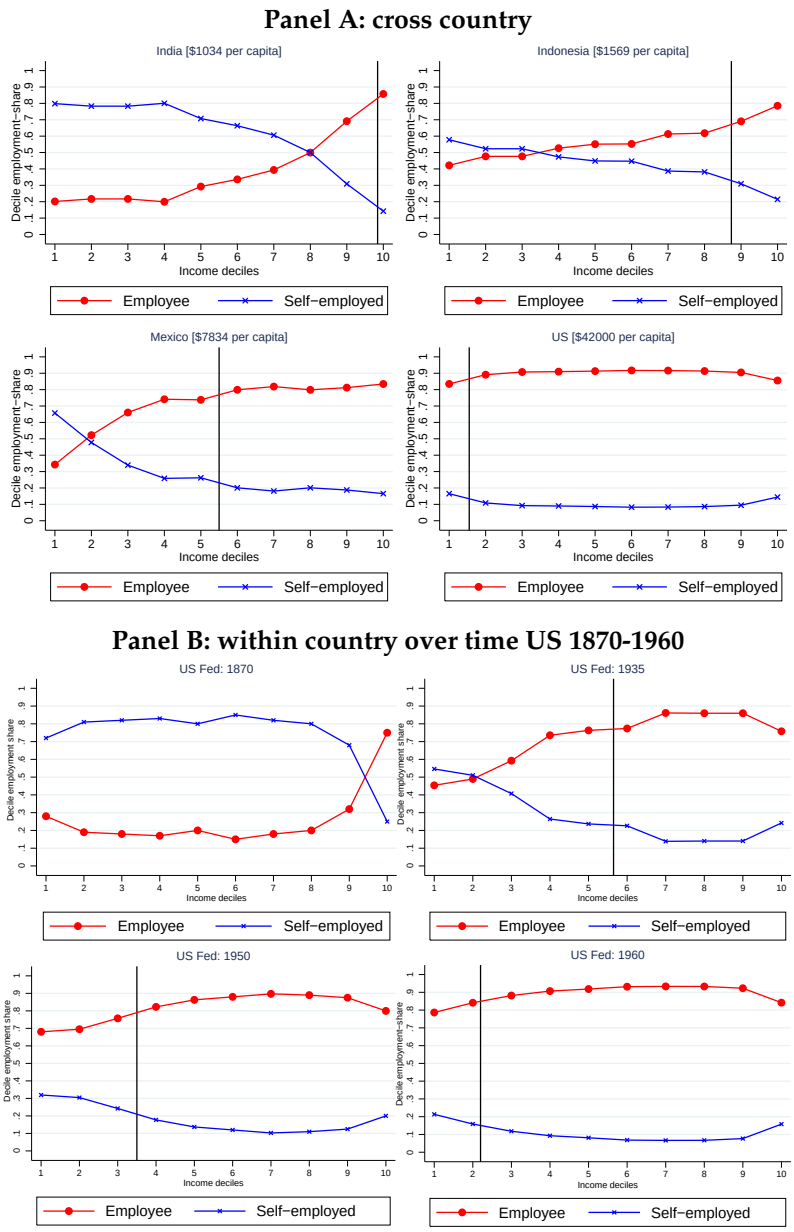
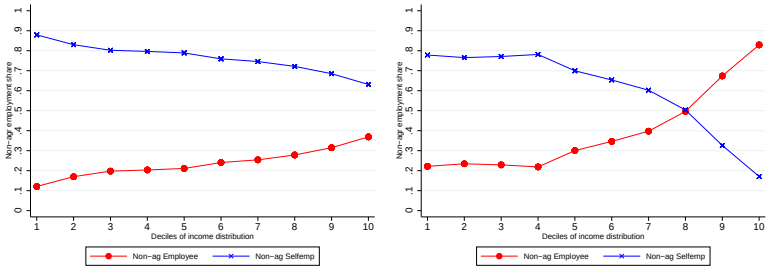
FIGURE 1: EMPLOYEE SHARE OVER INCOME DISTRIBUTION AND DECREASE IN INCOME TAX EXEMPTION THRESHOLD



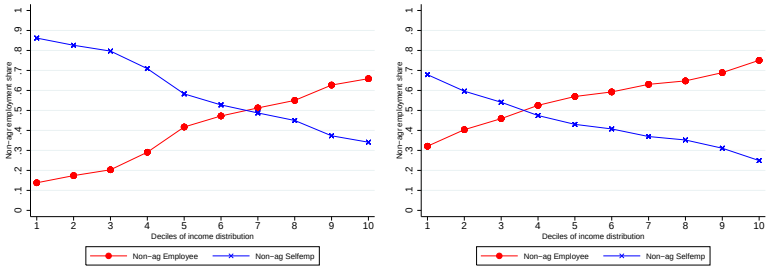
These figures plot the employment-shares of employees and self-employed over deciles of the income-distribution, for different countries (Panel A) and within-country over time (Panel B). The share of each work-type is defined as the share of total non-agricultural employment in the decile of the income-distribution. Employees are defined as individuals working in a firm with size > 1; self-employed are defined as individuals who report working as own-account workers, or as employees in a firm of size 1, or in a family-business with no employer. In each graph, the black solid denotes the location of the personal income tax (PIT) exemption threshold, taken from the tax code of the relevant country-year. The PIT threshold is defined as the level of gross income above which an individual earner becomes liable to pay personal income tax. The source for each graph is a household micro-dataset containing a nationally representative sample; in all underlying household surveys, the work-type status is mutually exclusive at the level of the individual. Source: Appendix and Section 3.

FIGURE 2: EMPLOYEE SHARE: REPRESENTATIVE DEVELOPMENT PROFILES

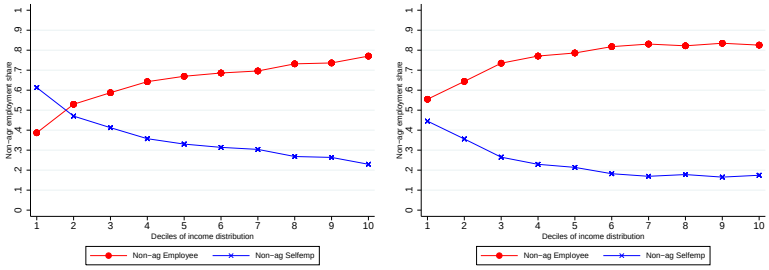
Profile for average country at $277 pc [LHS] and $730 pc [RHS]



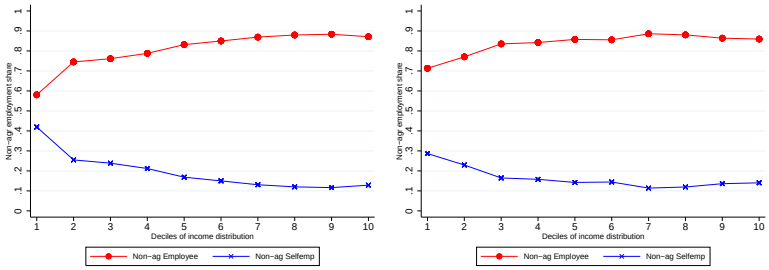
Profile for average country at $1422 pc [LHS] and $3286 pc [RHS]



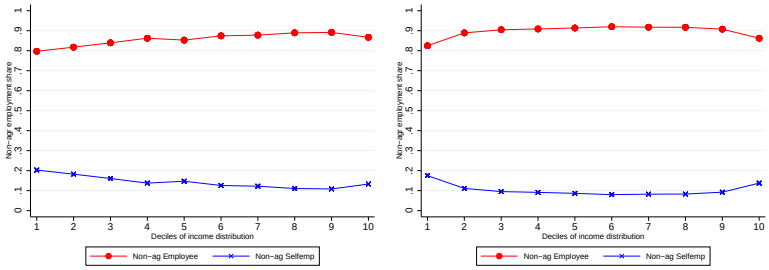
Profile for average country at $4638 pc [LHS] and $6945 pc [RHS]



Profile for average country at $13512 pc [LHS] and $27596 pc [RHS]



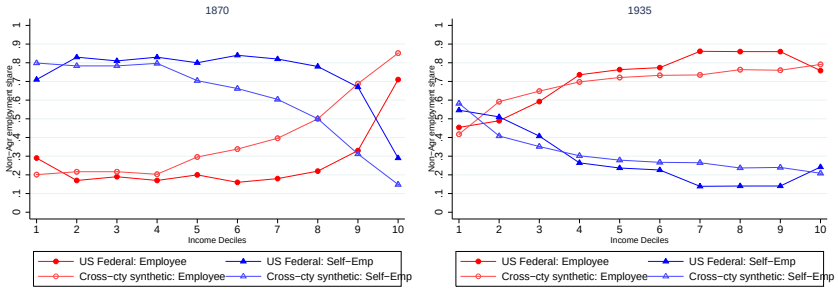
Profile for average country at $37369 pc [LHS] and $53234 pc [RHS]



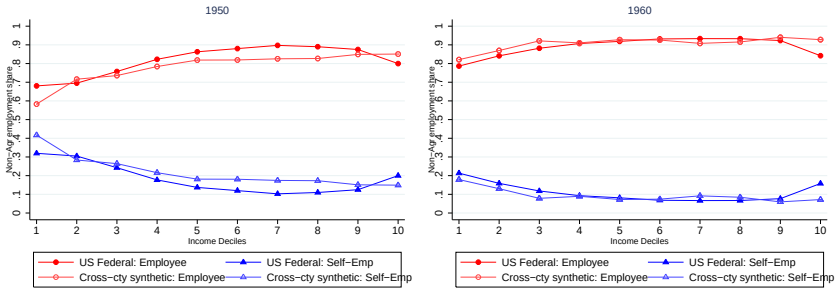
These panels depict the average employment structure profiles over deciles of the income-distribution. Red dotted (blue cross) observations indicate the employee (self-employed) share of non-agricultural employment in an income decile. A profile of employment shares is first construced for the 90 individual countries in the cross-section of the micro database. Then an average profile is constructed over the profiles of countries that lie in a bin with indicated average real per capita income. The bins correspond to deciles of the real per capita income distribution across the 90 countries. Source: Appendix and Section 3.

FIGURE 3: EMPLOYEE SHARE: WITHIN US AND PAIRED SYNTHETIC CROSS-COUNTRY PROFILES

Federal US 1870 profile [$2445 per cap] and Federal US 1935 profile [$6212 per cap]

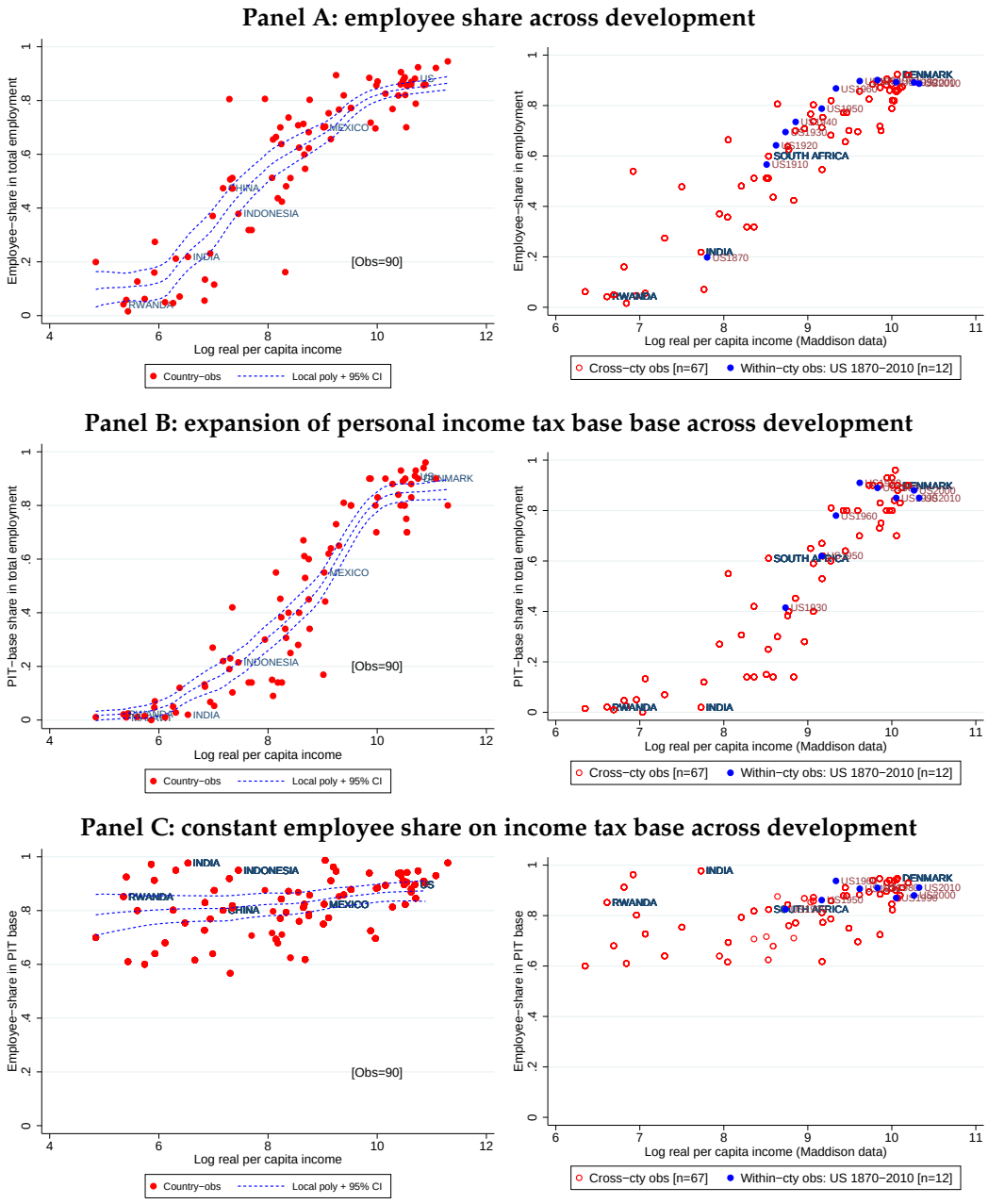


Federal US 1950 profile [$9561 per cap] and Federal US profile 1960 [$11338 per cap]



These panels plot employment structure shares over the income distribution in the US between 1870 and 1960. Each graph are constructed in exactly the same way as the profiles in Figure X, but using a nationally representative sample of the U.S. employed population in 1870, 1935, 1950 and 1960. In each panel, the solid circle and triangle deonote the employment shares in the US historical year. The hollow observations dentoe the employment-shares in the synthetic country based on the cross-country section of the micro databse. For each US profile, the paired synthetic cross-country profile is created by taking the average over profiles of countries whose real per capita income lies within $+/-$ 10 percent of the US real per capita income, using the Maddison dataset. The per capita income reported in brackets corresponds to the average income in the US in the year of the survey in the Maddison data. Source: Appendix and Section 3.

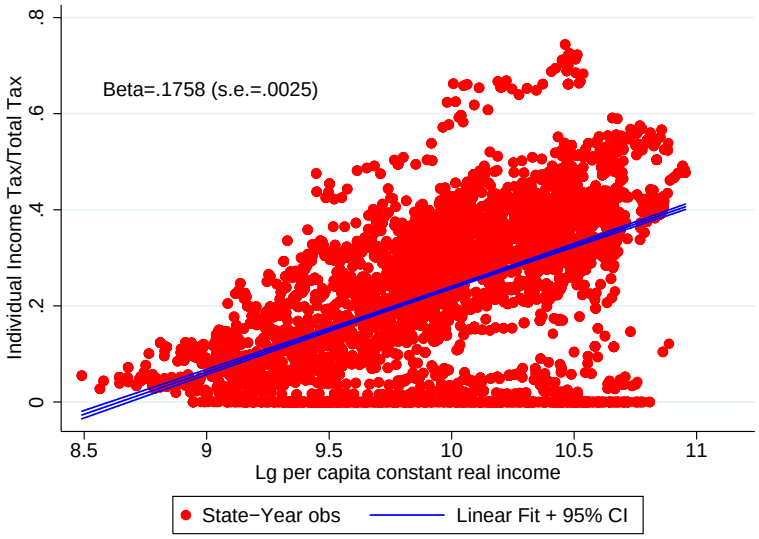
FIGURE 4: EMPLOYEE SHARE, SIZE AND EMPLOYMENT-COMPOSITION OF INCOME TAX BASE



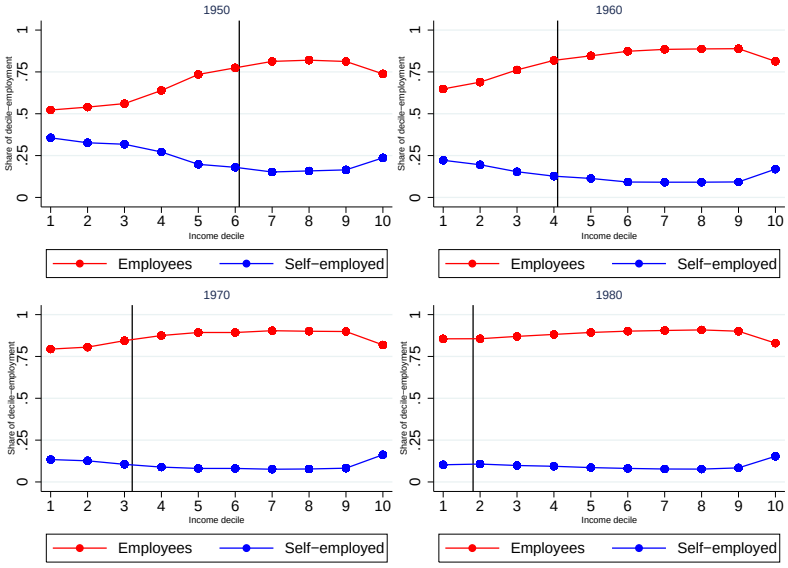
These figures plot correlations between log per capita income and: share of non-agriculture employees in total employment (Panel A); share of employment above the personal income tax threshold (PIT) in aggregate employment (Panel B); share of non-agriculture employees in employment above the PIT (Panel C). Each country-observation is calculated using a household micro-dataset containing a nationally representative sample; in all underlying household surveys, the work-type status is mutually exclusive at the level of the individual Within each panel, the LHS graph plots the correlation using the full sample of surveys in the cross-country section of the micro database; the RHS graph uses the full set of surveys from the within-country section of the database together with the subset of surveys from the cross-country section which could be appended using the Maddison real per capita income database. Dashed lines denote the local polynomial fit on the underlying observations together with a 95% confidence interval. In Panel A, the employee-share of employment is defined as the share of workers who report working in non-agriculture industries, and in firms of size > 1 and which are are not family units or casual daily-wage laborers. In Panel B, the PIT-base share in total employment is defined as the number of percentiles of the gross earnings income distribution which lies above the income tax exemption threshold. In Panel C, the employee-share in the PIT base is defined as the share of non-agriculture employees in total employment counted over the percentiles of the country's income distribution which lie above the income tax exemption threshold. Source: appendix and section 3

FIGURE 5: RISE OF INCOME TAX, TAX BASE EXPANSION AND EMPLOYEE SHARE: US STATES

Panel A: State income tax share of total taxes: all states 1939-2010

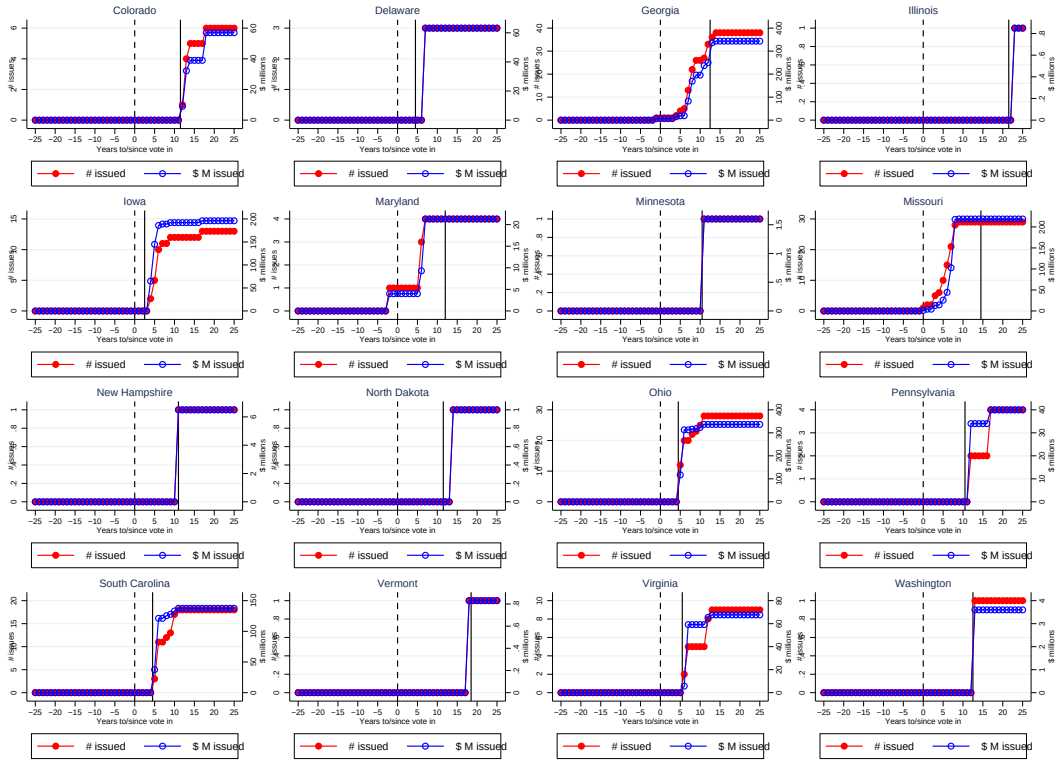


Panel B: employee share and state exemption threshold: average state 1950-1980



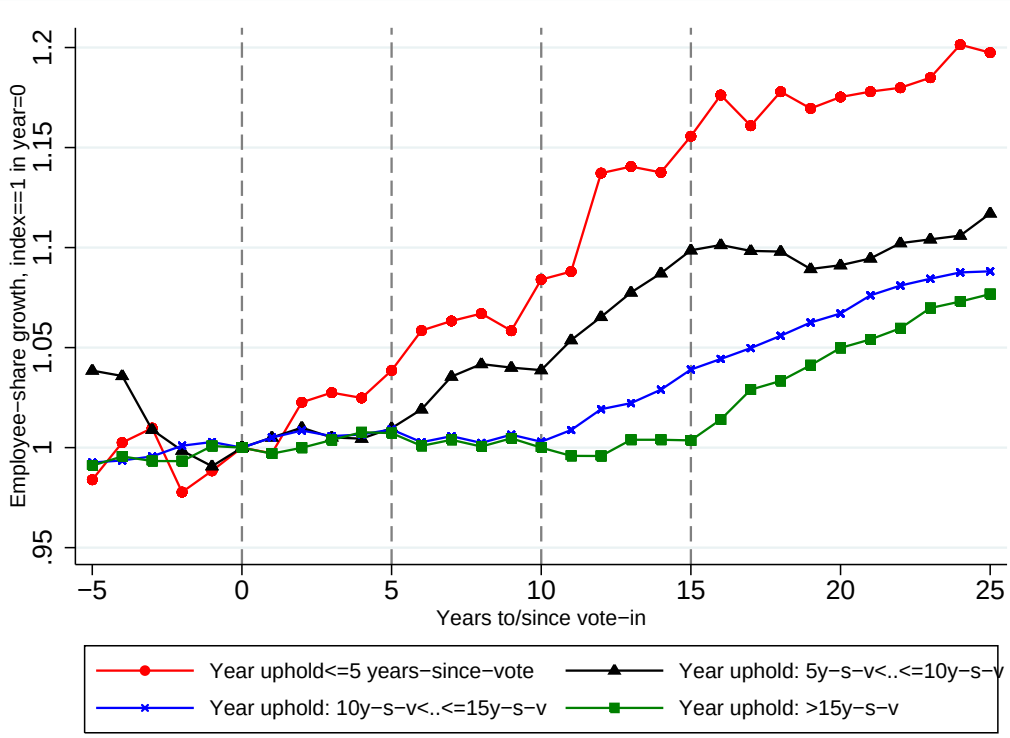
Panel A plots the state income tax share of total state taxes, using all state-year between 1939 and 2010, against real per capita income. The tax-mix observations are from Besley & Jensen (2015), originally sourced from historical Census records. The real per capita income is constructed as the per capita income in a state-year from the historical BEA series, deflated by the historical CPI. The solid lines denote the linear fit with a 95% confidence interval from the regression on the full underlying state-year observations.Panel B plots the employment-shares of employees and self-employed over deciles of the income-distribution, for the average state in the US between 1950 and 1980. The employee-share is defined as the share of employed agents who report being employed in a non-agricultural industry; the self-employed share is defined as the share of agents who report working on their own account, or as employee in a firm of size 1. The PIT threshold corresponds to the state PIT threshold (which in most cases differs from the Federal PIT threshold), and is calculated at the state-year level using the Bakija (2015) historical state-tax calculator. The income-decile distribution of employment-shares is first calculated for each state-year, then the average is taken over all the continental states (N=48) in a given year; the value of the exemption threshold is calculated in every state-year, then the average is taken over all threshold values. Source: appendix and section 4.

FIGURE 6: INDUSTRIAL DEVELOPMENT BOND PROGRAM: VOTE IN, COURT UPHOLDING AND ISSUANCE



This panel plots time-series of cumulative IDB-debt in number of issues and in millions of $ of principal, for the selected 16 states with the largest time lag between upholding and vote in. In each state, time is indicated as years to/since the vote in event, which is year 0 (black dashed line). In each state, the solid vertical line denotes the year of the court upholding of IDB. Source: appendix and Section 4

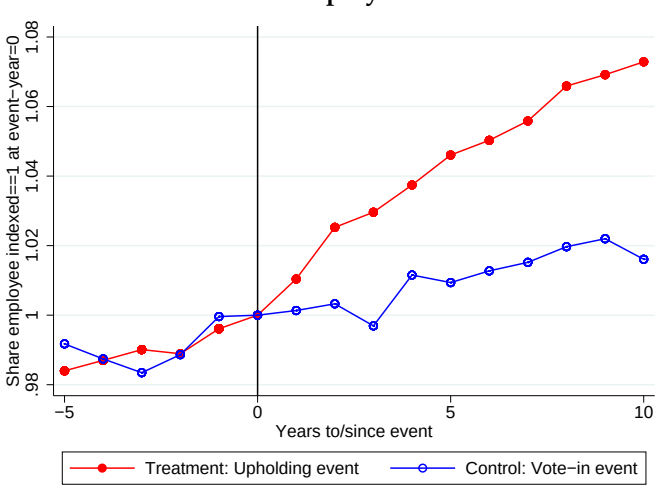
FIGURE 7: GRAPHICAL EVIDENCE ON IMPACT OF UPHOLDING EVENT ON EMPLOYEE SHARE



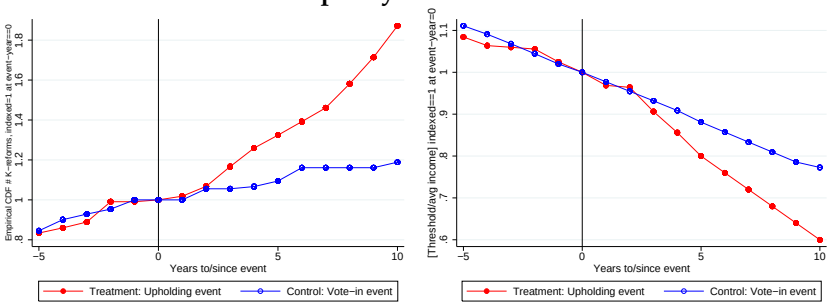
This figure shows the evolution of employee-share of earned income for groups of states for which the time-lag between the vote-in and the upholding event differed. For the circle-group, timelag $\in [0, 5]$; triangle group, timelag $\in (5, 10]$; cross group, timelag $\in (10, 15]$; square group, timelag $\in (15, 20]$. Each series shows the evolution of employee-share for the average state in the group, where employee-share is indexed to 1 in the year of the vote-in for all groups. Vertical dashed lines denote years since vote-in where a first upholding-decision occurs within a group. Source: appendix and Section 4.

FIGURE 8: EVENT-STUDY WITHIN STATE AROUND VOTE IN AND UPHOLDING

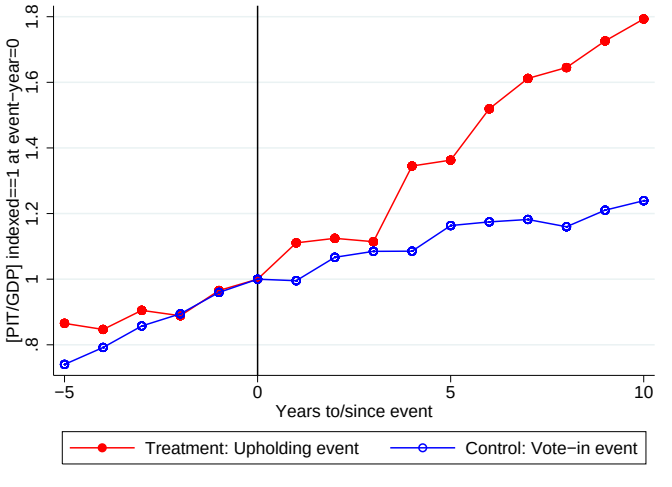
Panel A: Employee-share



Panel B: Likelihood of threshold policy reform and normalized value of threshold



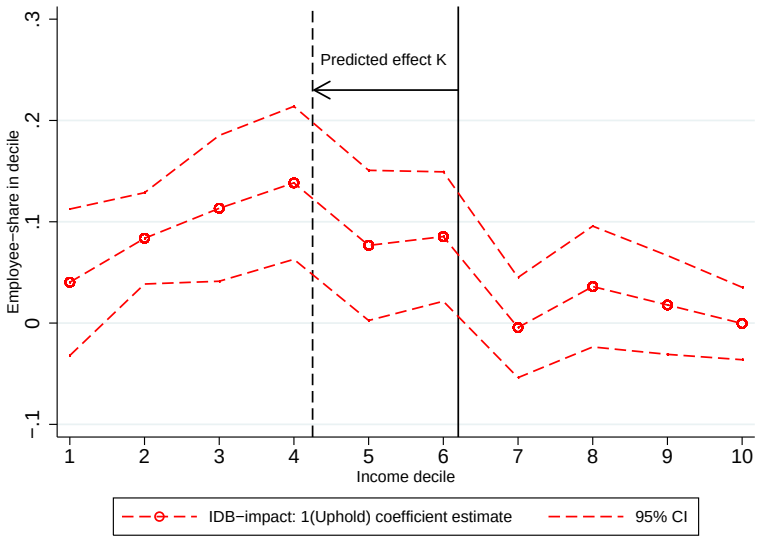
Panel C: Ratio [Personal income tax/GDP]



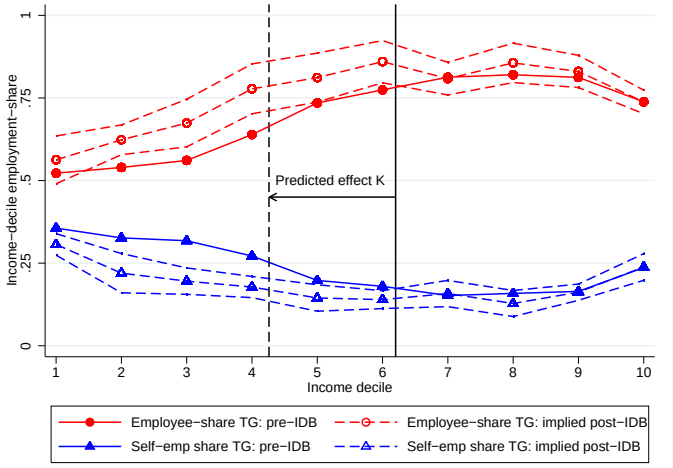
This figure shows the evolution of employee-share of earned income (panel A), size of PIT base and likelihood of PIT reform (panel B), and PIT to GDP ratio (panel C), within-state over time for the average treatment state around two events: vote-in, upholding. In the hollow-circle series (filled-circle series), the treatment-control is based on years before and after the event of state House vote-in of the Constitutional amendment to issue IDB (event of state-court upholding IDB). For each series, the evolution is normalized to 1 in the year of the event. In order to show the two events within-state for ten years after each event, these graph use only the subset of states for which the time-lag between vote-in and upholding exceeded 15 years, and the pre-event period is set to 5 years. These are arbitrary choices, and in the Appendix, I report the same exercise but for a shorter time-window to/since the event. In Panel B, the PIT-base is proxied for by the ratio of the state personal income tax exemption threshold to the state average earnings (right-hand side panel). The left-graph of Panel B shows the evolution of the state-specific empirical cumulative distribution of number of legislative reforms to the state exemption threshold: this measure controls for potential cross-state differences in frequency of tax-reform, and isolates any changes in likelihood that a reform to the state threshold will be passed around the event. Panel C shows the evolution of the personal income taxes relative to total resident earnings. Note the appealing time-lag across outcomes in materializing of the effect of the upholding-event: employee-share increases after 1 year, reform to PIT base and size of PIT base change after 2 years, and PIT-take increases after 3 years. Source: appendix and Section 4.

FIGURE 9: DISTRIBUTIONAL IDB IMPACTS ON EMPLOYEE SHARES AND THRESHOLD LOCATION

Panel A: IDB impact on employee shares and threshold location in income distribution



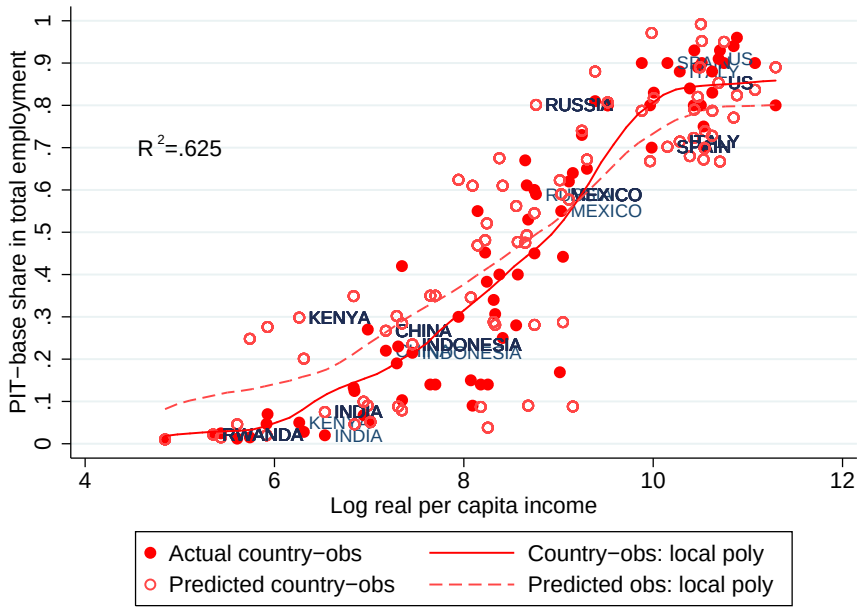
Panel B: implied IDB impact on employee shares and threshold location in income distribution



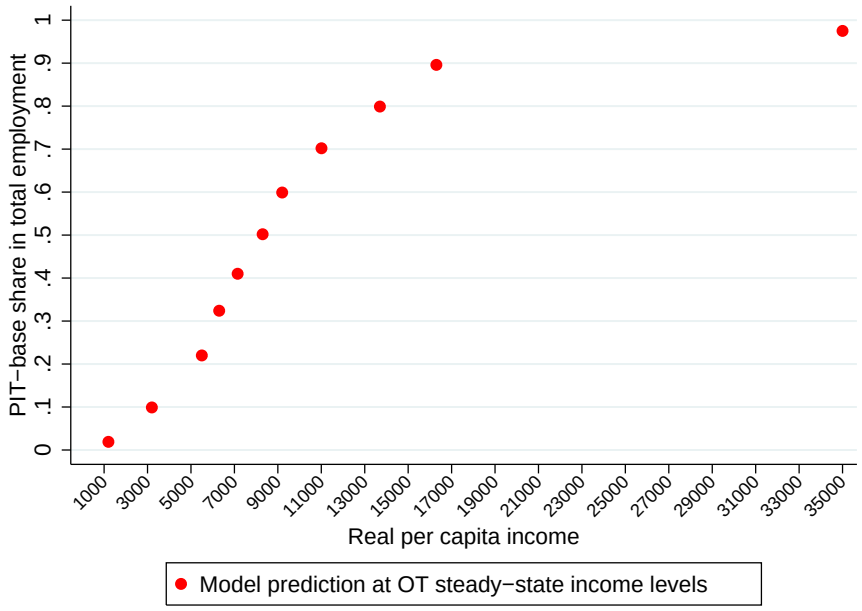
Panel A reports the coefficients $\widehat{\theta_j}$ on the $1(\text{Uphold})$ dummy in a regression on employee-share in decile $j = 1, ..., 10$, using specification 1. Each hollow-circle denotes the decile-j point estimate $\widehat{\theta_j}$ and the dashed lines denote the 95% confidence interval of the point-estimate (robust standard errors clustered at the state level). The black solid line denotes the location of the average PIT exemption threshold in the IDB-treatment state in the pre-IDB period, K^{PRE}. The dashed line shows the predicted post IDB percentile location of the threshold calculated as $K^{POST} = K^{PRE} + \widehat{dK}$, where $\widehat{dK} = -18.43$ corresponds to the reduced-form estimate using 2. Panel B plots the implied post-IDB employee-shares and self-employed shares. The implied employee-share in a decile j, θ_j^{POST}, is calculated as $\theta_j^{POST} = \widehat{\theta_j} + \theta_j^{PRE}$ where θ_j^{PRE} is the average employee share in decile j calculated in the pre-IDB period. The construction of the implied self-employed shares is similar. The solid circle series denotes the pre-IDB distribution of employee shares, θ_j^{PRE}, while the hollow circle series denotes the post-IDB implied distribution θ_j^{POST} . Similarly for self-employed shares denotes with triangle symbols. Source: appendix and Section 4.

FIGURE 10: MODEL FIT

Panel A: Model predicted versus actual size of income tax base in 90 countries



Panel B: Model predicted size of income tax base at steady state employee share stages of development



Panel A plots the cross country actual (solid circle) and predicted (hollow circle) size of income tax base, for the 90 countries in the cross section of the micro database. The predicted size of income tax base is calculated based on the model derived in Section V, and predicts the location of the exemption threshold in all countries using the measured employment shares in the deciles of the country's income distribution as the only source of cross-country variation. That is, values of enforcement capacity, administrative costs, earnings structure, demand for redistribution, marginal value of public goods are all assumed to be constant across countries. The highlighted countries are meant to illustrate cases of good and poor model fit. The cross country model fit is repoted as the R-square from an OLS regression of the actual PIT base share in employment on the predicted PIT base share in employment. Panel B plots the predicted size of income tax base, using the model derived in Section V and the predicted decile distributions of employment shares based estimated at each of the ten development stages discussed in Section V. Similary to Panel A, the model predicts the location of the threshold assuming constant values for all other threshold determinants. Source: Section 3 and Section 5

TABLE 1: DETERMINANTS OF CHANGE TO IDB LITIGATION-STATUS

	LHS=1(Upheld) Non-parametric Cox proportional hazard model, hazard rate reported										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1(Civil law origins)	5.4351 (3.2017)***	4.6122 (3.4472)**	4.4784 (3.3070)**	6.7249 (4.7508)***	6.8493 (5.0120)***	7.0552 (5.3059)***	6.8491 (4.8204)***	5.4314 (4.6463)**	5.9501 (4.7442)**	9.2531 (9.3976)**	5.3948 (4.4142)**
Redev-share lab force		9.0393 (31.4626)	9.2889 (34.6653)	2.6910 (12.0902)	6.9380 (22.0226)	1.4096 (6.5460)	1.7451 (8.0408)	11.9789 (74.1761)	254.7608 (948.501)	.6733 (4.1576)	16.5004 (129.3488)
1(Poll tax)			1.0184 (.7572)	.9983 (.6685)	1.2002 (1.0741)	1.3098 (1.1022)	1.3129 (1.1176)	1.3968 (1.2716)	1.5858 (1.7699)	1.5628 (1.5572)	1.329 (1.5791)
1(Literacy test)			1.3063 (.7206)	1.2828 (.6659)	1.2042 (.5564)	.9580 (.4748)	.9745 (.5073)	1.2009 (1.1384)	.0372 (.0856)	.8025 (.7165)	1.2751 (1.6888)
Log(population)				.6759 (.2843)*	.5863 (.2467)	.6045 (.1880)	.6118 (.2023)	.6416 (.2100)	.5925 (.2283)	.5516 (.2010)	.6417 (.2123)
Manuf share lab force					7.4211 (33.6242)						
Employee share lab force						16.8598 (82.1034)	11.9849 (81.8919)	10.0700 (70.7272)	1794.923 (16589.73)	95.3021 (702.837)	9.6009 (70.2367)
Lg(per cap inc)							1.2221 (3.3499)	.9257 (2.3310)	.1472 (.5211)	.2766 (.7398)	.9216 (2.3287)
1(Southern state)								.6464 (.6681)	.1562 (.2125)	.6113 (.5602)	.6367 (.6839)
(K/y)									5.6413 (7.0495)		
(Pers income tax/GDP)										2.1414 (4.7415)	
(Total income tax/GDP)											.0626 (2.2671)
Obs	134	134	134	134	130	130	130	130	123	123	123

$*, **, ***$ denote significance at the 10 percent, 5 percent, 1 percent level. Standard errors robust to clustering at the state level. This table reports the results of estimating non-parametric Cox proportional hazard models, where hazard rates are reported. Hence tests for significance relate to the null that the coefficient is equal to one. The unit of observation is state-year. A state enters the sample in the year where the Constitutional amendment allowing issuance of IDBs is voted in. The state drops the sample once the highest instance of the state court system has upheld the legality of the IDB-program. In Column 1, the baseline model includes a dummy for civil law origins. In the columns onwards, the baseline model is augmented with additional controls: col. (2) includes the state-share of labor force in redevelopment counties (time-invariant: TI) ; col.(3) includes indicators for whether the state has a poll tax and/or a literacy test for voting (time-varying: TV); col.(4) includes the log of state-population (TV); col.(5) includes manufacturing share of employment (TV); col.(6) includes the employee-share of total employment (TV); col.(7) includes the log of per capita income (TV); col.(8) includes a dummy for Southern states according to US Census definition (TI); col.(9) includes the ratio of state income tax threshold to average earnings (TV); col.(10) includes the ratio of personal income tax to state GDP (TV); col.(11) includes the ratio of total tax to GDP (TV). Sources: appendix and Section 4.

TABLE 2: IDB IMPACT ON EMPLOYMENT AND EARNINGS STRUCTURE

Panel A: Employment

	Log(volume of employment)									Share of employment	
	Total (1)	Non agric employee (2)	Manufacturing (3)	Construction (4)	Trade (5)	Services (6)	Government (7)	Self employed (8)	Agric employee (9)	Non agric employee (10)	Self employed (11)
1(Vote in)	-0.0047	0.0089	-0.004	0.0246	-0.0145	0.0023	-0.0054	.0084	-.0322	.0029	-.0042
	(0.0123)	(0.0111)	(0.0248)	(0.0375)	(0.0131)	(0.0185)	(0.0201)	(.0203)	(.0309)	(.0035)	(.0029)
1(Uphold)	-0.0243	0.0394	0.0763	-0.036	0.0252	-0.0478	.0054	-.0756	-.0085	.0360	-.0368
	(0.0241)	(.0191)**	(.0238)***	(0.0544)	(0.0215)	(.0277)*	(.0338)	(.0240)***	(.0496)	(.0073)***	(.0052)***
R squared	0.9808	0.9878	0.9150	0.9067	0.9871	0.9939	0.9867	0.9422	0.9569	0.9810	0.9559
Number of states	48	48	48	48	48	48	48	48	48	48	48
Number of state-years	2890	2890	2890	2890	2890	2455	2890	2890	2890	2890	2890

Panel B: Earnings

	Log(volume of earnings)					Log(average earnings)					Share of earnings	
	Total (1)	Non agric employee (2)	Self employed (3)	Employee-related transfers (4)	Other transfers (5)	Total (6)	Non agric employee (7)	Self employed (8)	Employee-related transfers (9)	Other transfers (10)	Non agric employee (11)	Self employed (12)
1(Vote in)	-.0089	-.0040	.0192	-.0101	-.0113	-.0004	.0022	.0215	.0000	.0049	.0048	.0000
	(.0139)	(.0133)	(.0216)	(.0185)	(.0236)	(.0117)	(.0062)	(.0309)	(.0170)	(.0240)	(.0043)	(.0044)
1(Uphold)	-.0031	.0508	-.0891	.0880	.0514	.0251	-.0004	-.0025	.0843	.0435	.0429	-.0407
	(.0209)	(.0215)**	(.0420)**	(.0412)**	(.0429)	(.0200)	(.0157)	(.0361)	(.0472)*	(.0477)	(.0137)***	(.0115)***
R squared	0.9988	0.9984	0.9896	0.9975	0.9982	0.9960	0.9989	0.9694	0.9959	0.9961	0.8913	0.8138
Number of states	48	48	48	48	48	48	48	48	48	48	48	48
Number of state-years	2855	2855	2855	2855	2855	2855	2855	2855	2855	2855	2855	2855

$*$, $**$, $***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. Time period is 1939-2005. This table reports OLS estimates $\widehat{\alpha}$ and $\widehat{\theta}$

$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ indicates whether a vote has occured in the state-House to allow issuance of IDB but the IDB has not yet been upheld, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The vote-in and upholding events are mutually exclusive events. The set of state-time varying controls $\mathbf{X}_{st}$ includes: log average resident earnings; dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. All regressions include a state-specific linear trend: $\phi_s \cdot t$. Source: appendix and Section 4.

TABLE 3: IDB REDUCED FORM IMPACT AND EMPLOYEE SHARE IMPACT ON INCOME TAX BASE

	Employee share impact on tax base: Size of tax base			Composition of tax base	Confounding channels: Tax rates	Earnings distribution	Enforcement	Demand for redistribution
	(PIT exemption threshold/average earnings)			[Employee-share above threshold]	Bottom MTR	Hazard ratio	Number tax agencies	Democratic vote share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(Vote in)	-.1400			-.0052	.0018	.0484	.0401	.0072
	(.1140)			(.0119)	(.0065)	(.0870)	(.0577)	(.0101)
1(Upheld)	-.7218			-.0054	.0035	.0263	.0326	.0108
	(.3296)**			(.0185)	(.0075)	(.1473)	(.0965)	(.0178)
Employee-share		-20.318	-29.588					
		(5.832)***	(12.157)**					
1st stage F-test			7.79					
p-value			(.0012)					
Implied elasticity tax base - emp share	-6.678	-5.200	-7.548					
Number of states	48	48	48	48	48	48	48	48
Number of state-years	2931	2931	2931	2931	2931	2901	2815	2931
R-squared	0.7869	0.8111		0.7737	0.6762	0.3035	0.6719	0.6619
Method	OLS	OLS	IV	OLS	OLS	OLS	OLS	OLS

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. Time period is 1939-2005. This table reports OLS estimates $\widehat{\alpha}$ and $\widehat{\theta}$

$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ indicates whether a vote has occured in the state-House to allow issuance of IDB but the IDB has not yet been upheld, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The regression includes average income in all ten deciles of the state-year income-distribution, z_{jst}. The set of state-time varying controls $\mathbf{X}_{st}$ include dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. All regressions include a state-specific linear trend: $\phi_s \cdot t$. In Col. (1), the implied elasticity of [exemption threshold/average earnings] is calculated based on the ratio of reduced-form estimates of 1(Uphold); in Col.(3), the implied elasticity of [exemption threshold/average earnings] is calculated based on the IV-estimated impact of employee-share on $[K/y]$. Source: appendix and Section 4.

TABLE 4: IDB IMPACT ON TAX TAKES

	Personal Income Tax/GDP			CorpIncT/GDP	GenSalesT/GDP	SelectSalesT/GDP	LicenceT/GDP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1(Vote in)	.0007			-.0001	-.0007	-.0005	.0003
	(.0009)			(.0002)	(.0008)	(.0004)	(.0002)
1(Upheld)	.0017			.0001	-.0002	.0001	-.0004
	(.0007)**			(.0004)	(.0010)	(.0010)	(.0003)
Employee-share		.0166	.0248				
		(.007)**	(.0109)**				
1st stage F-test			7.96				
p-value			(.001)				
Implied elasticity	1.292	.6225	.900				
Number of states	48	48	48	48	48	48	48
Number of state-years	2931	2931	2931	2931	2931	2931	2931
R-squared	0.9195	0.9280		0.7081	0.8653	0.8805	0.8414
Method	OLS	OLS	IV	OLS	OLS	OLS	OLS

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. Time period is 1939-2005. This table reports OLS estimates $\widehat{\alpha}$ and $\widehat{\theta}$

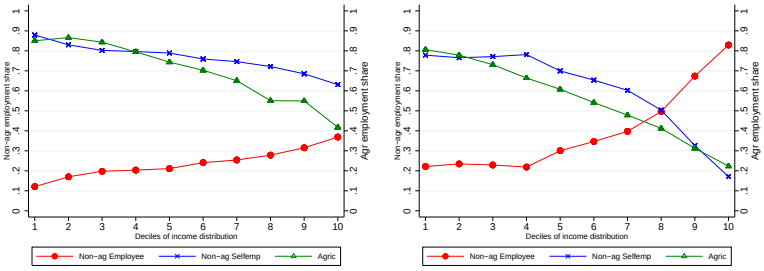
$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ indicates whether a vote has occured in the state-House to allow issuance of IDB but the IDB has not yet been upheld, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The regression includes average income in all ten deciles of the state-year income-distribution, z_{jst}. State-time varying controls $\mathbf{X}_{st}$ include dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. All regressions include a state-specific linear trend: $\phi_s \cdot t$. In Col. (1), the implied elasticity of [PIT/GDP] is calculated based on the ratio of reduced-form estimates of 1(Uphold); in Col.(3), the implied elasticity is calculated based on the IV-estimated impact of employee-share on [PIT/GDP]. Source: appendix and Section 4

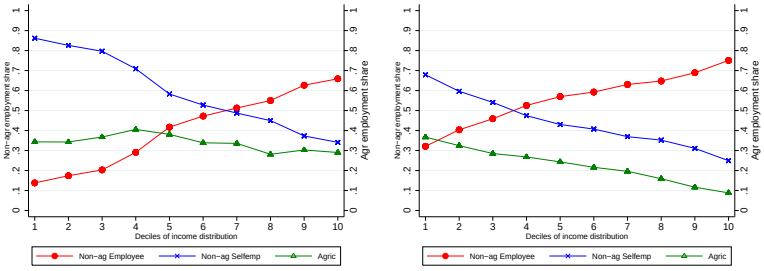
Appendix A: additional results and tables

FIGURE 11: EMPLOYEE SHARE AND AGRICULTURE SHARE: REPRESWNTATIVE DEVELOPMENT PROFILES

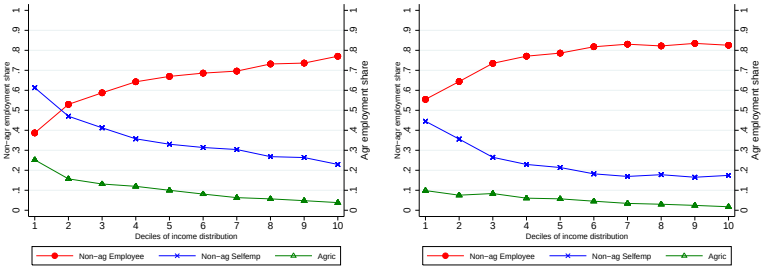
Profile for average country at $277 pc [LHS] and $730 pc [RHS]



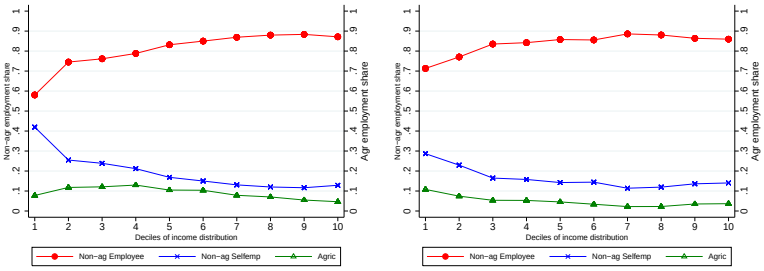
Profile for average country at $1422 pc [LHS] and $3286 pc [RHS]



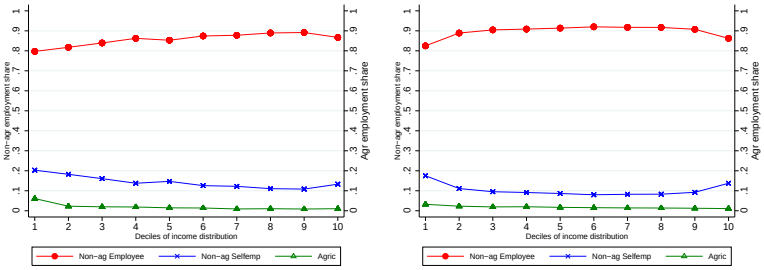
Profile for average country at $4638 pc [LHS] and $6945 pc [RHS]



Profile for average country at $13512 pc [LHS] and $27596 pc [RHS]

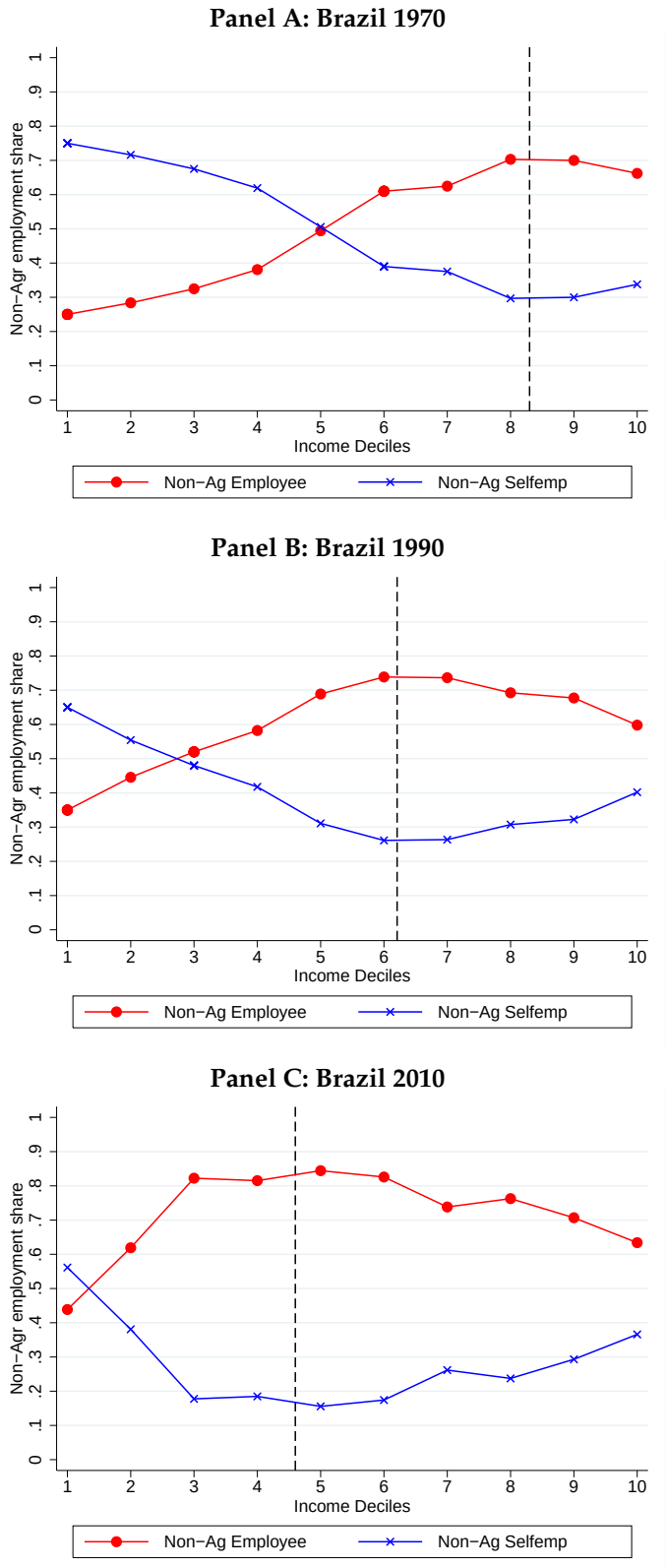


Profile for average country at $37369 pc [LHS] and $53234 pc [RHS]



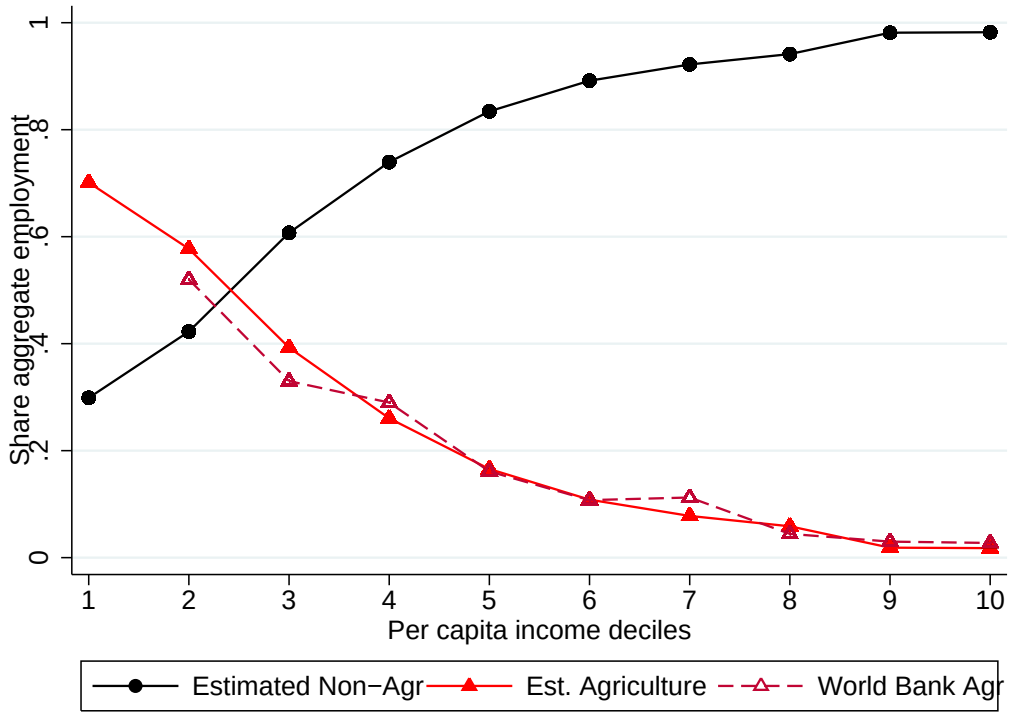
These panels depict the average employment-shares over deciles of the income-distribution. Red dotted (blue cross) observations indicate the employee (self-employed) share of non-agricultural employment in an income decile. Green triangles indicate the agricultural share of total employment in the income decile. A profile is first construced for the 90 individual countries in the cross-section of the micro database. Then an average profile is constructed over the profiles of countries that lie in a bin with indicated average real per capita income. The bins correspond to deciles of the real per capita income distribution across the 90 countries. Source: Appendix and Section 3.

FIGURE 12: DISTRIBUTION OF EMPLOYEE SHARES AND INCOME TAX EXEMPTION THRESOHLD: BRAZIL 1970-2010



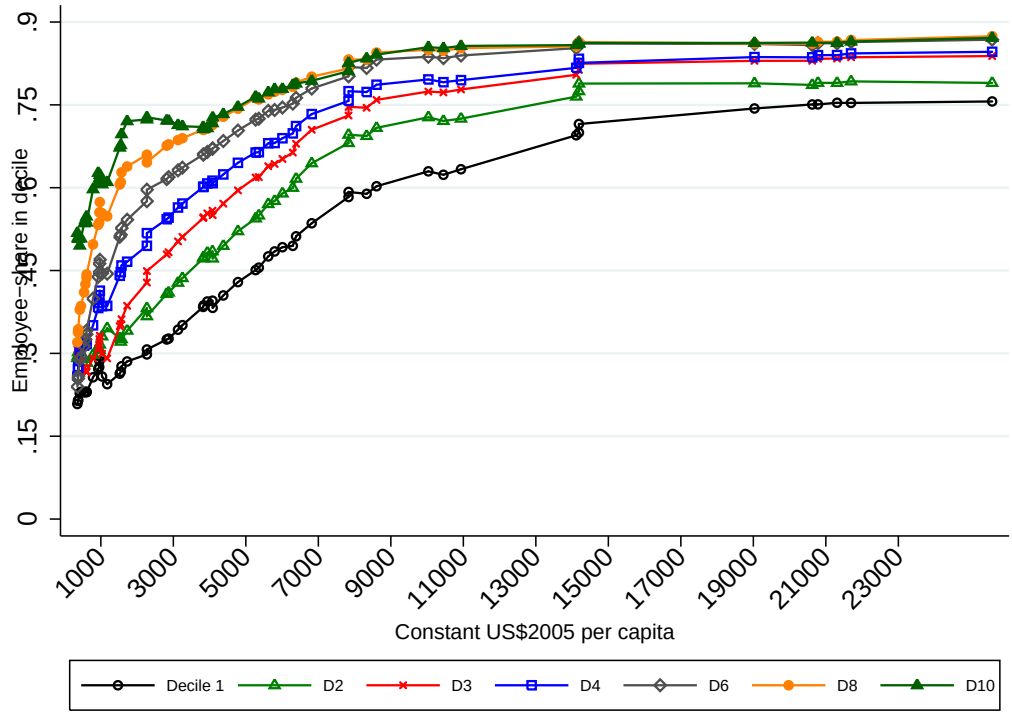
These panels depict the employment shares over deciles of the income-distribution, within Brazil over time 1970-2010. Red dotted (blue) observations indicate the employee (self-employed) share of non-agricultural employment in an income decile.The income-distribution is constructed for the subsample of agents that report being active in the labor force. Each graph is constructed from micro-data and applies populaiton weights to construct a nationally representative sample. Source: Appendix B.

FIGURE 13: ROBUSTNESS: OWN AGRICULTURE ESTIMATES VS WORLD BANK ESTIMATES



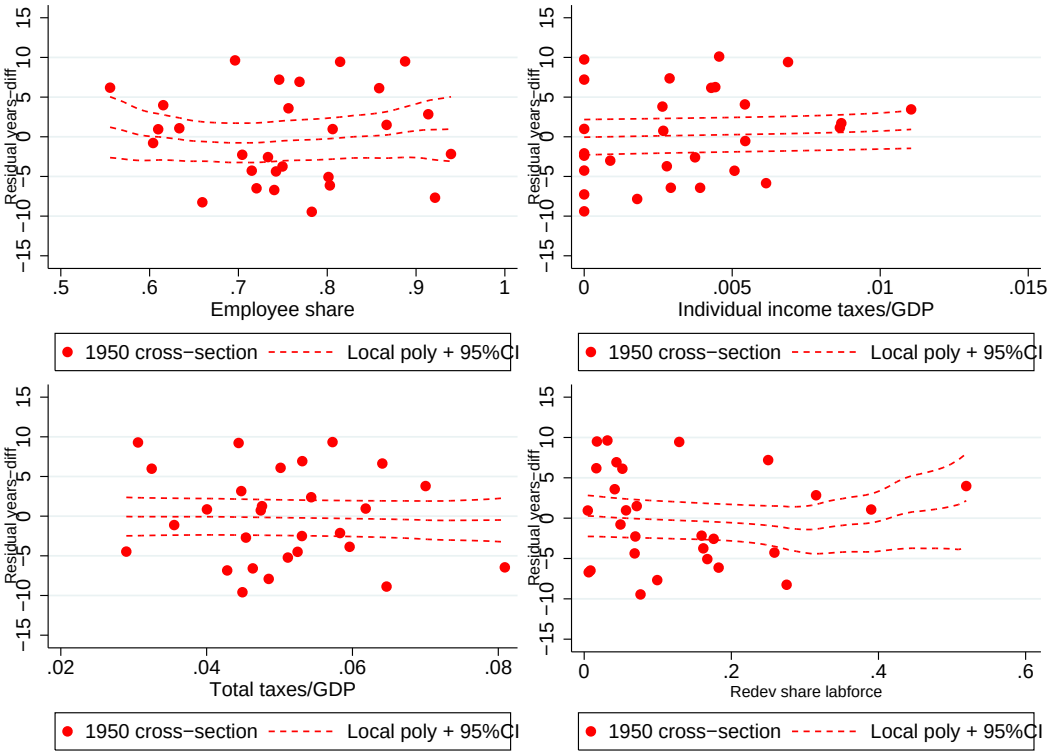
This graph shows estimated weighted employment shares of agriculture and non-agriculture employment-shares across per capita income deciles, based on the cross-country sample of 90 household surveys. Within each decile, the weight assigned to a country is equal to the country-household survey's representative sample share of total household representative sample-size in the decile. The exercise is repeated using country-level aggregate estimates of agriculture share of employment, extraxted from the World Bank World Development Indicators database. In all deciles from the 2nd to the 10th, there is a 100 percent match on countries between my data and the World Bank data. For the countries in decile 1 of my data, there does not exist World Bank agriculture estimates. In the World Bank decile-series, the weight associated to each country is equal to the country's population-share of total population in the decile. Source: appendix B.

FIGURE 14: QUANTITATIVE ANALYSIS OF DECILE-SPECIFIC EMPLOYEE SHARE GROWTH: CROSS-COUNTRY



Each curve in this figure provides the shape of the evolution of employee share in decile d throughout the development path, when development is proxied for by cross-country variation, for deciles of the country income-distribution $d \in \{1, 2, 3, 4, 6, 8\}$. The construction of the curves is explained in Section 3.

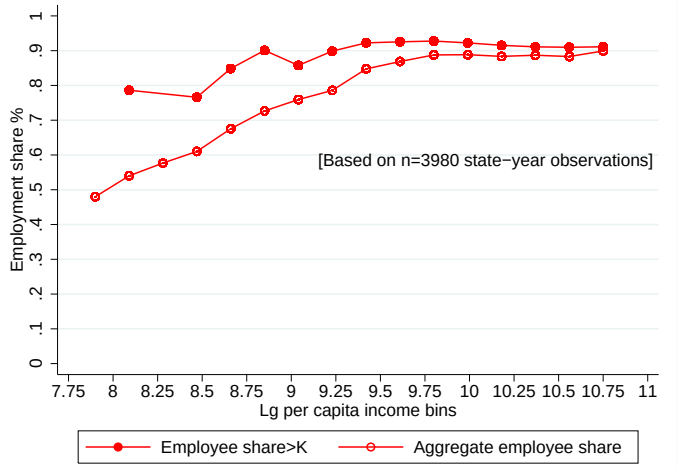
FIGURE 15: CROSS-STATE CORRELATIONS BETWEEN VOTE-UPHOLDING TIME-LAG AND OUTCOMES OF INTEREST



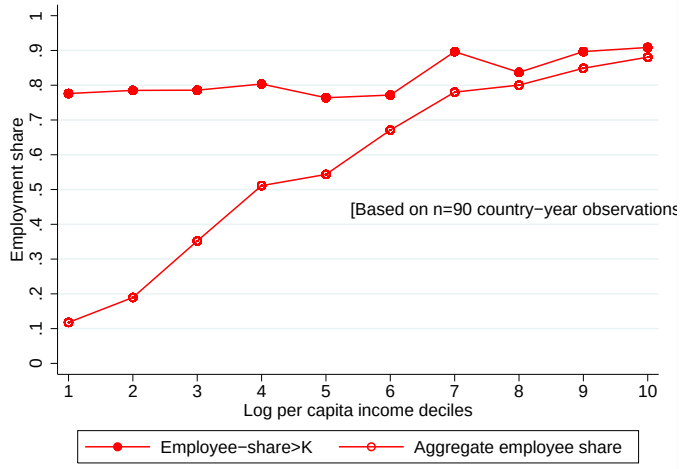
This figure plots the cross-sectional correlation between outcomes of interest in the pre-IDB period and the residual time-lag between vote-in and upholding of IDB program. The residual time-lag is obtained as the residual from a cross-state regression of the time-lag on region dummies and an indicator for civil law origins. The residual is correlated with the (pre-IDB) average employee-share in North-West quadrant; pre-IDB individual income tax to GDP ratio in N-E quadrant; pre-IDB total tax to GDP ratio in S-W quadrant; and, pre-IDB redevelopment-share of the labor force in S-E quadrant. The dashed lines denote the 95% confidence-interval and a fitted local polynomial on the underlying data. The redevelopment-share of the labor force is defined as the total employment-share of counties classified as 'redevelopment areas' by the Area Redevelopment Administration (under the US Department of Commerce). An important characteristic of redevelopment areas was the presence of 'underemployed agents' usually working in 'self-employmrnt and agriculture.' (ARA, 1962)

FIGURE 16: EMPLOYEE-SHARE IN AGGREGATE AND IN PIT BASE: SIMILAR PATTERN ACROSS US STATES AND CROSS-COUNTRY

Panel A: Employee-share in aggregate and on PIT-base: US individual states variation



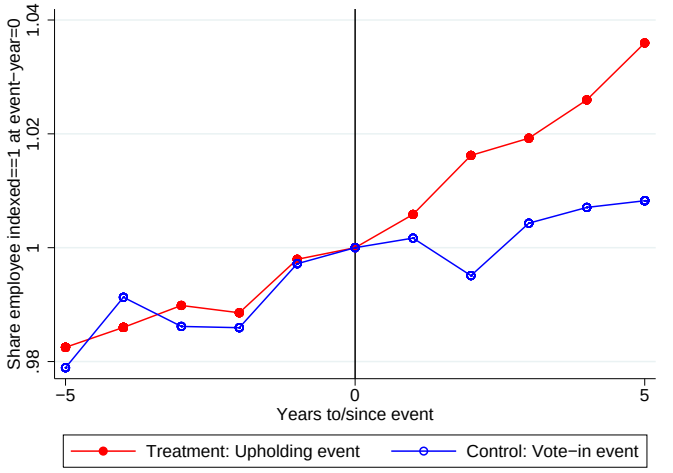
Panel B: Employee-share in aggregate and on PIT-base: cross-country variation



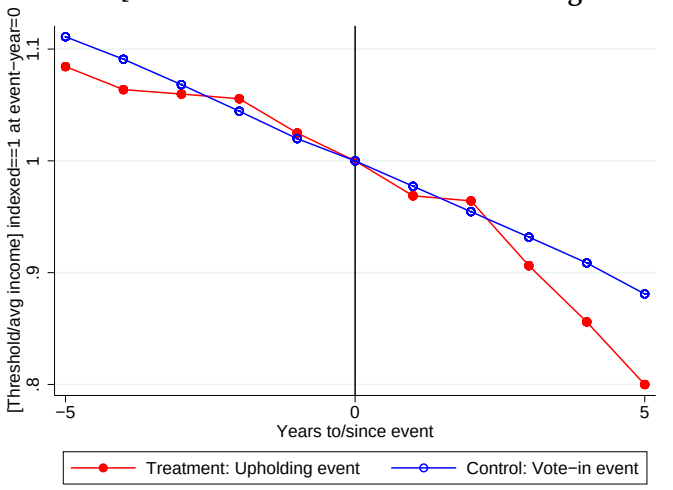
Panel A plots the average share of employees in total employment (hollow-circles) and in employment above the state PIT threshold, in bins of real per capita income, using the full sample of years 1930-2010 for the 48 continental states. Panel B plots the average share of employees in total employment (hollow-circles) and in employment above the country state PIT, using the cross-country sample of 90 countries, in deciles of real per capita income. Employee-share of employment above the state (or country) PIT threshold is defined as the employee-share of employment in the income-distribution which lies above the value of the exemption threshold. Source: appendix B.

FIGURE 17: IDB DID RAW DATA IMPACT: DIFFERENT WITHIN-STATE VARIATION

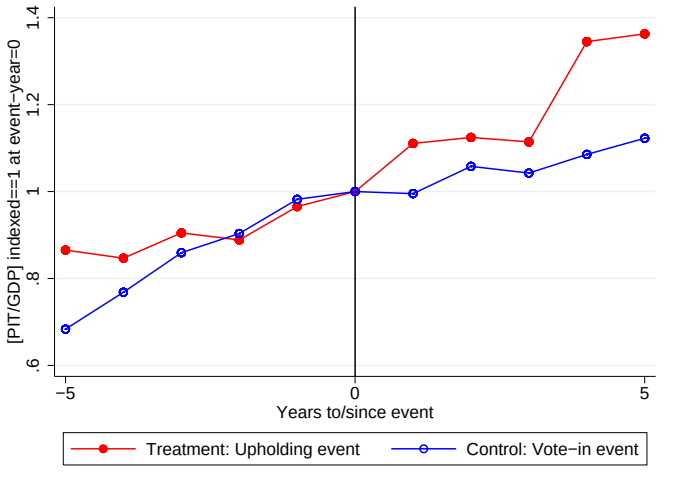
Panel A: Employee-share



Panel B: Ratio [Personal income tax threshold/average earnings]



Panel C: Ratio [Personal income tax/GDP]



This figure shows the evolution of employee-share of earned income (panel A), size of PIT base (panel B), and PIT to GDP ratio (panel C), within-state over time for the average treatment state around two events: vote-in, upholding. In the hollow-circle series (filled-circle series), the treatment-control is based on years before and after the event of state House vote-in of the Constitutional amendment to issue IDB (event of state-court upholding IDB). For each series, the evolution is normalized to 1 in the year of the event. In order to show the two events within-state for 5 years after each event, these graph use only the subset of states for which the time-lag between vote-in and upholding exceeded 10 years, and the pre-event period is set to 5 years. In Panel B, the PIT-base is proxied for by the ratio of the state personal income tax exemption threshold to the state average earnings. Panel C shows the evolution of the personal income taxes relative to total resident earnings. Source: appendix B.

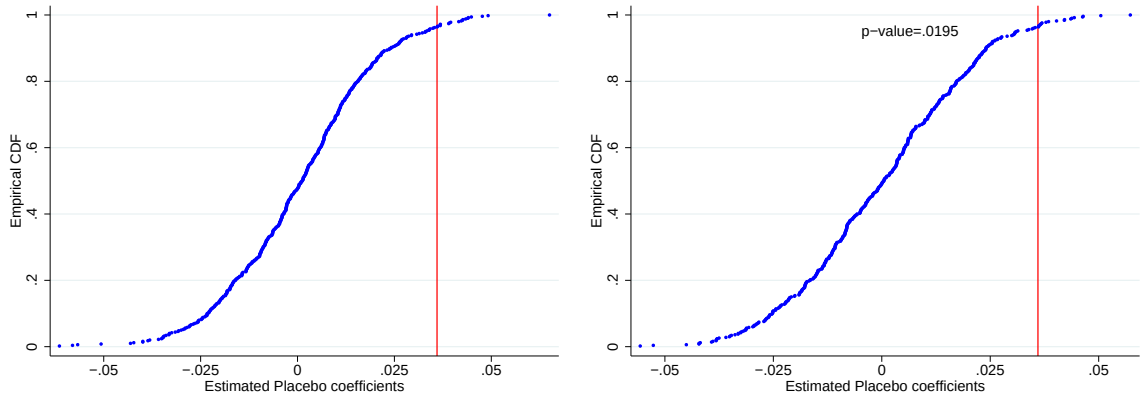
Table A1: Cross-sectional correlations Civil law origins and initial conditions

	Share of employment						PIT base	Tax-take/GDP					
	Employee	Manuf	Services	Govt	Self-emp	Agric	K/y	TotalT	IndincT	CorpIncT	GensalesT	SelectST	LicenceT
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1(Civil law origin)	.0409	.0524	.0073	-.0051	-.0298	-.0111	-.0096	.0037	-.0017	-.0018	.0057	-.0021	-.0018
	(.0577)	(.0532)	(.0185)	(.0144)	(.0394)	(.0211)	(.1283)	(.0040)	(.0012)	(.0013)	(.0041)	(.0020)	(.0013)
Lg(per cap income)	.4176	.2353	.1355	.0231	-.2559	-.1616	-.4766	-.0240	-.0032	-.0082	-.0042	-.0186	-.0082
	(.1658)**	(.1528)	(.0532)**	(.0414)	(.1131)**	(.0605)**	(.3684)	(.0117)*	(.0036)	(.0039)**	(.0119)	(.0059)***	(.0039)**
Region FE	x	x	x	x	x	x	x	x	x	x	x	x	x
Observations	25	25	25	25	25	25	25	25	25	25	25	25	25

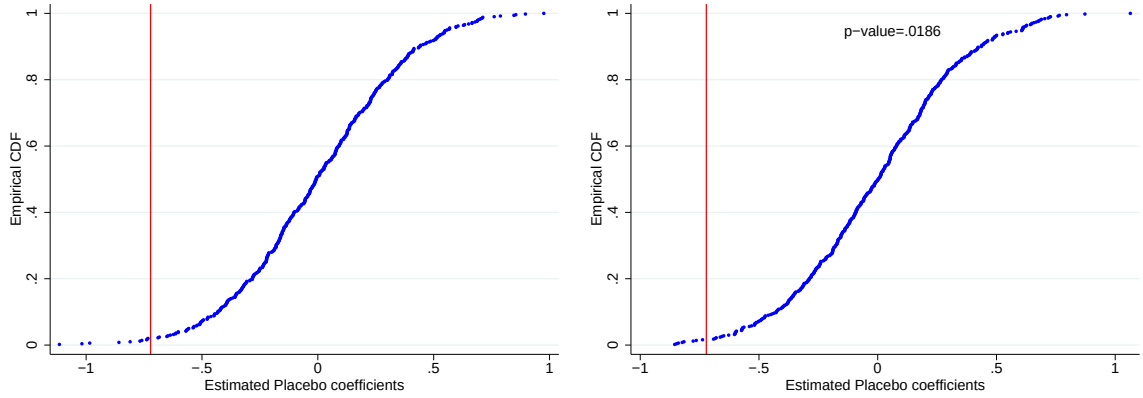
$*, **, ***$ denote significance at the 10%, 5%, 1% level. This table displays correlations between the state time-invarying indicator for civil law origins and a set of outcomes of interest, in the pre-IDB treatment period, for the subsample of states that upheld the IDB program at some point. In all columns, a control for log per capita income is included as well as region fixed effects (4 regions, based on US Census definition). Columns 1-6 display correlations between the civil law dummy and employment-shares. In column 7, K/y is the ratio of state personal income tax exemption threshold to average resident earnings. Columns 8-13 display correlations between the civil law dummy and ratios of tax-revenue to GDP: total tax, individual income tax, corporate income tax, general sales tax, selective sales tax, and licence tax. Source: appendix B2.

FIGURE 18: DISTRIBUTION OF PLACEBO ESTIMATES: $1\,(\text{UPHOLD})$

Panel A : Placebo estimates on employee-share



Panel B : Placebo estimates on [PIT threshold/average earnings]



These figure plot the empirical distribution of placebo effects for the impact of the change in litigation status, $1(\text{Uphold})$, on the employee-share of employment (Panel A) and on the size of the PIT base (Panel B). To construct the CDF, a placebo consists of a triplet [state]-[year of vote]-[time-lag to upholding] IDB-program (or placebo-twin [year-of-vote]-[time-lag to upholding] for RHS figures within each panel). The specification for employee-share and exemption threshold are the same as in respectively Table 2 and 3. The specification is re-estimated using 500 different random number generator seeds and the point estimates $\hat{\theta}$ of $1\,(\text{Uphold})$ are plotted. The vertical line shows the treatment effect estimates on employee-share (PIT base) reported in Table 2 (Table 3). The cumulative percent of placebo-triplet or placebo-twin estimates that exceed (lies below) the actual estimate of employee share (exemption threshold) give a non parametric p-value for test of significance of $\theta = 0$.

Table A2: IDB impact on confounding determinants of exemption threshold

	Marginal tax rates			Earnings-structure	Demand for redistribution				Enforcement				
	1st-bracket MTR	Avg (MTR>0)	Top MTR	(Earnings hazard at threshold)	Democratic vote-share	Dem seat-share	1(Dem governor)	Political competition	Number tax agencies	Tax admin earnings relative to avg earnings of Resident	Govt	Attorney Gen	Treasury
	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)	OLS (8)	OLS (9)	OLS (10)	OLS (11)	OLS (12)	OLS (13)
1(Vote in)	.0018	.0109	.0084	.0484	.0072	-.0166	.0389	-.0015	.0401	.2372	.0274	.0300	.0648
	(.0065)	(.0070)	(.0054)	(.0870)	(.0101)	(.0159)	(.0757)	(.0079)	(.0577)	(.1315)*	(.0374)	(.0337)	(.0540)
1(Upheld)	-.0054	-.0002	.0115	.0326	.0108	.0234	.1049	-.0138	.0326	-.1259	.0544	.0859	.0812
	(.0185)	(.0083)	(.0097)	(.1473)	(.0178)	(.0279)	(.1041)	(.0133)	(.0965)	(.3296)	(.0659)	(.0851)	(.1094)
State-years	2931	2931	2931	2931	2931	2879	2931	2931	2815	2592	2592	2592	2592
States	48	48	48	48	48	47	48	48	48	48	48	48	48

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. Time period is 1939-2005. This table reports OLS estimates $\widehat{\alpha}$ and $\widehat{\theta}$ based on the difference-in-difference specification

$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ indicates whether a vote has occured in the state-House to allow issuance of IDB but the IDB has not yet been upheld, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The vote-in and upholding events are mutually exclusive events. The regression includes average income in all ten deciles of the state-year income-distribution, z_{jst}. The set of state-time varying controls $\mathbf{X}_{st}$ include dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. All regressions include a state-specific linear trend: $\phi_s \cdot t$.

Table A3: Determinants of exemption threshold and tax revenue

	Lg(PIT Threshold/average earnings)	Lg(Personal income tax/GDP)	Lg(Corp inc tax/GDP)	Lg(Gen sales tax/GDP)	Lg(Select sales tax/GDP)	Lg(Licence tax/GDP)
Each coefficient corresponds to a regression of the outcome on the given variable	OLS (1)	OLS (2)	(3)	(4)	(5)	(6)
MTR 1st bracket	-.1755	.0260	-.0003	-.0038	.0106	-.0067
	(1.1417)	(.0103)**	(.0025)	(.0066)	(.0043)**	(.0048)
Avg (MTR>0)	.0663	.0398	.0013	-.0053	.0122	-.0029
	(1.2594)	(.0149)**	(.0035)	(.0071)	(.0046)**	(.0025)
Top MTR	-.0403	.0451	.0040	-.0092	.0056	-.0008
	(.8616)	(.0136)***	(.0031)	(.0073)	(.0045)	(.0017)
Earnings-hazard at threshold	-.0541	.0008	.0000	-.0003	-.0003	-.0001
	(.0175)***	(.0002)***	(.0000)	(.0003)	(.0001)***	(.0000)*
Dem vote-share	.5588	.0103	.0025	-.0041	.0053	-.0013
	(.3314)*	(.0048)**	(.0009)***	(.0028)	(.0018)***	(.0008)
Dem seat-share	.1630	.0082	.0019	-.0014	.0053	-.0012
	(.2292)	(.0029)***	(.0005)***	(.0023)	(.0018)***	(.0009)
1(Dem governor)	-.0014	.0000	.0000	-.0003	.0001	-.0000
	(.0298)	(.0004)	(.0001)	(.0003)	(.0001)	(.0001)
Political Comp	-.8888	-.0062	-.0013	.0009	-.0049	.0017
	(.3545)**	(.0052)	(.0010)	(.0033)	(.0023)**	(.0009)*
1(Tax-agency consolidation)	-.2294	.0006	.0003	-.0008	-.0004	-.0002
	(.1130)**	(.0003)*	(.0001)**	(.0003)**	(.0001)**	(.0001)*
Earnings-ratio (Tax-administrator/Avg Resident)	.0035	-.0009	.0000	-.0005	-.0000	.0002
	(.0043)	(.0004)	(.0001)	(.0004)	(.0002)	(.0001)
Earnings-ratio (Tax-admininistrator/Avg Govt)	-.1170	-.0034	-.0003	-.0024	-.0011	.0005
	(.0946)	(.0017)*	(.0005)	(.0012)*	(.0008)	(.0005)
Earnings-ratio (Tax-admininistrator/Attorney General)	-.1178	-.0017	-.0007	-.0004	.0002	.0003
	(.1006)	(.0020)	(.0009)	(.0018)	(.0008)	.0005
Earnings-ratio (Tax-admininistrator/Treasury official)	.0118	-.0001	.0000	.0002	-.0002	-.0000
	(.0184)	(.0002)	(.0001)	(.0002)	(.0001)*	(.0000)
State FE	x	x	x	x	x	x
Time FE	x	x	x	x	x	x
State-time controls	x	x	x	x	x	x
States	48	48	48	48	48	48

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Standard errors in parentheses robust to clustering at the state level. This table reports OLS estimates $\widehat{\eta}$ based on the specification

$$y_{st} = \beta + \eta X_{st-1} + \omega \text{income}_{st-1} + \mu_s + \lambda_t + \varepsilon_{st}$$

where s denotes state, t denotes time. income_{st-1} is average per capita income, lagged one period. All regressions include state fixed effects and year fixed effects. Each cell reports the coefficient $\widehat{\eta}$ from a separate regression of the outcome in a given column on the regressor in a given row. Source: appendix B2.

Table A4: IDB impact on licence taxes and selective sales taxes

	Decile of (Licence tax/GDP)				(Selective sales tax/GDP)			
	Occupation and small-business	Motor-vehicle	Alcohol	Public utility	Motor-vehicle	Alcohol	Public utility	Tobacco
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(Vote in)	.1134	.0203	.1339	.1376	-.0004	.0001	.0000	-.0001
	(.2426)	(.3105)	(.1469)	(.5172)	(.0003)	(.0001)	(.0001)	(.0001)
1(Upheld)	-.3350	.3401	-.1816	.5920	.0006	-.0001	-.0002	.0002
	(.1603)**	(.2587)	(.3228)	(.5483)	(.0007)	(.0001)	(.0001)	(.0002)
State-years	2986	2986	2986	2986	2986	2986	2986	2986
States	48	48	48	48	48	48	48	48

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. Time period is 1939-2005. This table reports OLS estimates $\widehat{\alpha}$ and $\widehat{\theta}$ based on the difference-in-difference specification

$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + X_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ indicates whether a vote has occured in the state-House to allow issuance of IDB but the IDB has not yet been upheld, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The vote-in and upholding events are mutually exclusive events. The regression includes average income in all ten deciles of the state-year income-distribution, z_{jst}. The set of state-time varying controls $\mathbf{X}_{st}$ includes dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. All regressions include a state-specific linear trend: $\phi_s \cdot t$. In columns (1) to (4), the outcome variable is the decile of the ratio [specific license-tax/GDP], where the deciles are constructed using the full state-year sample. In columns (5) to (8), the outcome variable is the ratio [specific selective sales tax/GDP]. Source: appendix B2.

Table A5: IDB impact in collapsed pre-post DiD specification

	Employee share channel				Confounding channels					
	Employee share (1)	[Threshold/avg inc] (2)	[Emp-share above threshold] (3)	[IncTax/GDP] (4)	Avg inc (5)	Avg employee inc (6)	Bottom MTR (7)	Top MTR (8)	Pol Comp (9)	Dem vote share (10)
1(Uphold)	.0336	-.7875	.0166	.0019	.0070	-.0416	-.0041	.0096	-.0030	.0091
	(.0101)***	(.3590)**	(.0152)	(.0007)**	(.0098)	(.0281)	(.0059)	(.0065)	(.0152)	(.0218)
States	25	25	25	25	25	25	25	25	25	25
State-years	50	50	50	50	50	50	50	50	50	50

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Standard errors in parentheses robust to clustering at the state level. This table reports OLS estimates $\widehat{\theta}$ based on the difference-in-difference specification

$$\tilde{y}_{st} = \beta + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \varepsilon_{st}$$

where s denotes state, t denotes time. $\tilde{y}_{st}$is the residual outcome from: first, running the regression of y_{st} on state fixed effects, year fixed effects, average income in all ten deciles of the state-year income-distribution, dummies for the existence of a poll tax and a literacy test, dummies for state election years, dummies for the existence of a state corporate income tax and of right-to-work laws, a continuous measure of the firm-size coverage of state unemployment insurance laws, but omitting the $1(\text{Vote-in})$ and $1(\text{Uphold})$ dummies; second, constructing the residual outcome from this regression; third, collapsing the outcome by state and pre-post upholding periods. This is a diff-in-diff on the sample of treated states (states that uphold IDB at some point), over the 2-period interval before/after upholding. Source: appendix B2.

Table A6: IDB impact in sample of IDB states and narrow window around vote in and upholding events

	Employee share channel				Confounding channels					
	Employee share (1)	[Threshold/avg inc] (2)	[Emp-share above threshold] (3)	[IncTax/GDP] (4)	Avg inc (5)	Avg employee inc (6)	Bottom MTR (7)	Top MTR (8)	Pol Comp (9)	Dem vote share (10)
1(Vote in)	.0036	.3385	.0067	.0004	-.0101	-.0025	-.0001	-.0017	.0075	.0113
	(.0082)	(.2342)	(.0111)	(.0006)	(.0079)	(.0078)	(.0025)	(.0018)	(.0155)	(.0132)
1(Uphold)	.0393	-1.009	.0056	.0019	-.0162	.0043	.0040	-.0041	-.0167	.0071
	(.0167)**	(.3898)**	(.0141)	(.0007)**	(.0151)	(.0079)	(.0071)	(.0027)	(.0215)	(.0191)
States	25	25	25	25	25	25	25	25	25	25
State-years	910	910	910	910	910	891	925	925	910	925

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. In this table, the sample is limited to the set of states in which the court system upholds IDB. The sample is also limited to state-year observations which lie between 15 years prior to the vote in event and 15 years after the upholding event. The rows report OLS estimates $\widehat{\alpha}$ and $\widehat{\theta}$ based on the difference-in-difference specification

$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + X_{st} + \mu_s + \gamma_t + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ indicates whether a vote has occurred in the state-House to allow issuance of IDB but the IDB has not yet been upheld, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The vote-in and upholding events are mutually exclusive events. The regression includes average income in all ten deciles of the state-year income-distribution, z_{jst}. The set of state-time varying controls $\mathbf{X}_{st}$ includes dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. All regressions include a state-specific linear trend: $\phi_s \cdot t$. Source: appendix B2.

Table A7: IDB impact in cross-state DiD specification

	Employee share channel				Confounding channels					
	Employee share (1)	[Threshold/avg inc] (2)	[Emp-share above threshold] (3)	[IncTax/GDP] (4)	Avg inc (5)	Avg employee inc (6)	Bottom MTR (7)	Top MTR (8)	Pol Comp (9)	Dem vote share (10)
1(Uphold)	.0397	-.7336	.0001	.0014	.0252	-.0008	.0030	.0102	-.0128	.0097
	(.0142)***	(.3279)**	(.0172)	(.0005)**	(.0193)	(.0156)	(.0069)	(.0095)	(.0114)	(.0175)
States	48	48	48	48	48	48	48	48	48	48
State-years	2931	2931	2931	2931	2855	2905	2931	2931	2931	2931

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. This table reports OLS estimates $\widehat{\theta}$ based on the difference-in-difference specification

$$y_{st} = \beta + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \phi_s \cdot t + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The vote-in and upholding events are mutually exclusive events. The regression includes average income in all ten deciles of the state-year income-distribution, z_{jst}. The set of state-time varying controls $\mathbf{X}_{st}$ includes dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. All regressions include a state-specific linear trend: $\phi_s \cdot t$. Source: appendix B2.

Table A8: IDB impact in synthetic matching paired DiD specification

	Employee share channel				Confounding channels					
	Employee share (1)	[Threshold/avg inc] (2)	[Emp-share above threshold] (3)	[IncTax/GDP] (4)	Avg inc (5)	Avg employee inc (6)	Bottom MTR (7)	Top MTR (8)	Pol Comp (9)	Dem vote share (10)
1(Uphold)	.0328	-.6314	.0692	.0014	.0460	1.2381	-.0024	-.0074	-.0187	.0301
	(.0074)***	(.2519)***	(.0672)	(.0006)**	(.0239)*	(.7328)	(.0035)	(.0072)	(.0147)	(.0369)
States	25	25	25	25	25	25	25	25	25	25
State-years	3050	3050	3050	3050	2955	2964	2964	3050	3050	3050

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the level of state synthetic pair in parentheses. Time period is 1939-2005. This table reports OLS estimates based on a difference in difference specification. The regression is done on the sample of IDB states and the synthetic control state paired to each IDB state. The synthetic control is constructed as the weighted average over all non IDB states which maximizes the fit on pre-upholding employee share in the IDB state. The full set of economic covariates and political covariates are used as variables to predict the fit. The regressions include a full set of state FE, year FE, synthetic pair FE. Source: appendix B2.

Table A9: IDB impact using alternative controls for time

	Employee share channel				Confounding channels					
	Employee share (1)	[Threshold/avg inc] (2)	[Emp-share above threshold] (3)	[IncTax/GDP] (4)	Avg inc (5)	Avg employee inc (6)	Bottom MTR (7)	Top MTR (8)	Pol Comp (9)	Dem vote share (10)
1(Vote in)	.0013	.2179	-.0132	.0008	.0811	.0024	.0092	.0000	.0006	.0044
	(.0066)	(.1711)	(.0167)	(.0015)	(.0483)*	(.0088)	(.0061)	(.0000)	(.0083)	(.0116)
1(Uphold)	.0338	-.8188	.0280	.0015	-.0021	-.0128	-.0073	.0094	-.0118	.0223
	(.0097)***	(.3470)**	(.0211)	(.0006)**	(.0158)	(.0114)	(.0119)	(.0120)	(.0153)	(.0186)
States	48	48	48	48	48	48	48	48	48	48
State-years	2931	2931	2931	2931	2931	2854	2931	2931	2931	2931

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. Time period is 1939-2005. This table reports OLS estimates $\widehat{\alpha}$ and $\widehat{\theta}$ based on the difference-in-difference specification

$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + \lambda \mathbf{X}_{st} + \mu_s + \gamma_t + \text{ß}\left(\mathbf{D}_{s1930} \times [t - 1930]\right) + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ indicates whether a vote has occured in the state-House to allow issuance of IDB but the IDB has not yet been upheld, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The vote-in and upholding events are mutually exclusive events. The regression includes average income in all ten deciles of the state-year income-distribution, z_{jst}. The set of state-time varying controls $\mathbf{X}_{st}$ includes dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. $\mathbf{D}_{s1930}$ is a vector of 'structural' determinants of employment: illiteracy rate, population density, and urban share of population. They are obtained in 1930, prior to IDB program, and interacted with linear time trends $[t - 1930]$ to allow their impact to vary over time.

Table A10: IDB impact allowing for independent path of civil law states

	Employee share channel				Confounding channels					
	Employee share (1)	[Threshold/avg inc] (2)	[Emp-share above threshold] (3)	[IncTax/GDP] (4)	Avg inc (5)	Avg employee inc (6)	Bottom MTR (7)	Top MTR (8)	Pol Comp (9)	Dem vote share (10)
1(Vote in)	.0160	.1802	-.0099	.0005	-.0174	.0035	.0034	.0110	.0016	.0037
	(.0099)	(.2091)	(.0192)	(.0015)	(.0129)	(.0107)	(.0058)	(.0075)	(.0079)	(.0113)
1(Uphold)	.0463	-.9814	.0305	.0015	.0480	-.0076	-.0087	.0068	-.0029	.0271
	(.0116)	(.3080)***	(.0250)	(.0006)**	(.0488)	(.0130)	(.0108)	(.0106)	(.0154)	(.0197)
States	48	48	48	48	48	48	48	48	48	48
State-years	2931	2931	2931	2931	2931	2854	2931	2931	2931	2931

$*, **, ***$ denote significance at the 10%, 5%, 1% level. Robust standard errors clustered at the state level in parentheses. Time period is 1939-2005. This table reports OLS estimates $\widehat{\alpha}$ and $\widehat{\theta}$ based on the difference-in-difference specification

$$y_{st} = \beta + \alpha \mathbf{1}\left(\text{Vote in}\right)_{st} + \theta \mathbf{1}\left(\text{Upheld}\right)_{st} + \sum_{j=1}^{10} \omega_j z_{jst} + X_{st} + \mu_s + \gamma_t + \breve{}_t \left(\mathbf{1}\left(\text{Civil Law}\right)_{\mathbf{s}} \times \gamma_t\right) + \varepsilon_{st}$$

where s denotes state, t denotes time, $\mathbf{1}\left(\text{Vote in}\right)_{st}$ indicates whether a vote has occurred in the state-House to allow issuance of IDB but the IDB has not yet been upheld, $\mathbf{1}\left(\text{Upheld}\right)_{st}$ indicates whether the court-system has upheld the legality of IDB. The vote-in and upholding events are mutually exclusive events. The regression includes average income in all ten deciles of the state-year income-distribution, z_{jst}. The set of state-time varying controls $\mathbf{X}_{st}$ includes dummies for the existence of a poll tax and a literacy test, both used for voting restrictions; dummies for state election years; dummies for the existence of a state corporate income tax and of right-to-work laws; a continuous measure of the firm-size coverage of state unemployment insurance laws. $\mathbf{1}\left(\text{Civil Law}\right)_s$ is a state specific time invariant dummy which takes the value of 1 if, by the time of American acquisition, the colonizers of the state had civil law legal systems. The civil law dummy is fully interacted with the set of year dummies γ_t. Source: appendix B2.

Appendix B: data-appendix

This appendix describes the sources used to construct the different datasets used in the paper, and gives more details on the construction of variables. Section B1 describes all data-related material used in Section I and Section III. Section B2 describes data-material used in Section IV.

B1. Employment structure: cross-country and within-country data

I discuss in turn the data-collection for the cross-country set of household surveys (section B.1.1) and for the historical surveys within-US over time and within-Brazil over time (section B1.2).

B1.1. Cross country household-surveys

The database contains microdata collected from 90 countries around the world, to document on changes in employment structure transformation in as many incremental stages over development as possible. Construction of the data-set was built using three criteria: to obtain household surveys with information on income (as opposed to only expenditure) and employment for as large a sample as possible; to obtain one survey per country in the most recent year possible; to obtain surveys across all levels of development. Basic demographic and health surveys were discarded because they lack the required information on employment and income. Labor force surveys were used, which contain basic demographic information, labor force attachment information, employment information, and detailed sources of income. Living conditions surveys were also used, which in addition to the content of the labor force survey, contained information on expenditure and possibly health and education. Whenever both types existed, the living conditions survey is preferred over the labor force survey, for three reasons. First, the living conditions survey usually contains information on a broader range of income-sources which, especially in the context of less-developed countries, can be quite important in order to construct the lower deciles of the country's income-distribution. Second, it is not always clear what the underlying sample-design is for the labor force survey, and it could potentially omit individuals which in the context of this study should be included in the survey, such as casual wage-day laborers and household family workers; on the other hand, the scope of a living conditions survey is usually to assess the conditions of a nationally representative sample of individuals, which should include all the alternative work type patterns. Third, the sample-size of a living condition survey is typically larger

than that for a labor force survey, which does not have to imply better quality of data, but usually is due to sampling-design which attempts to survey all geographical areas in the country.

Based on these criteria, the resulting data-collection resulted in 90 household surveys which are detailed in Table **??**, displaying for each country the per capita income in the year of the survey, the survey type, the representativeness, the sample-size, the underlying variable used to create the income-distribution, and the source. The average number of households surveyed is 20,200. 64 of the 90 surveys are in the form of living condition household surveys, the remainder in the form of labor force surveys, 76 of the 90 surveys date from 2005 or a more recent year. The emphasis in the data-collection on the ability to construct personal income measures based on reported sources of income rather than expenditure resulted in only one survey, Niger 2011, using expenditure as the underlying variable for construction of the earned income-distribution.

All higher-income countries are retrieved from the Luxembourg Income Study publicly available data-portal. Some surveys were collected from the Living Standards Measurement Study survey program, but in many cases a more recent survey than the country's LSMS could be found, and was therefore used whenever possible. The remainder of surveys were sourced usually directly with the country's relevant statistical body, such as a national statistics office or a Department of Census and Statistics. According to the International Household Survey Network, just over 40 percent of the surveys collected in my sample are 'not publicly available', neither through licensing nor through an external repository.[26]

B1.2. Within-country survey data: US 1870-2010, Brazil 1970-2010

US 1950-2010 The historical Federal profiles in the US between 1950 and 2010 were constructed using the decennial Census samples, extracted from the IPUMS USA database. Each Federal profile between 1950 and 2010 was constructed in the same way as for the profiles in the individual states in the same year, discussed in section B2.2. below.

US 1935 Before 1950, the decennial Census does not report total personal income at the individual level. The 1940 1 percent sample does contain wage and salary income, but no business income nor farm income, which are required to construct a personal gross income distribution. I therefore resort

[26] At http://catalog.ihsn.org/index.php/catalog

to the 1935-36 Study of Consumer Purchases. The scope of the study was to "ascertain for the first time in a singe national survey the earning and spending habits of inhabitants of large and small cities, villages, and farms" (ICPSR Study 8908, 2009). The survey was the result of a joint effort by the Bureau of Labor Statistics and the Bureau of Home Economics of the Department of Agriculture, and is meant to have been the sampling-methodology predecessor for the income-component in Census. The survey contains both a labor force component, where respondents gave information on income and housing, and for a subset of the total sample, a living conditions component where respondents gave additional information on expenditure. The primary sampling units were chosen to represent "the demographic, regional, and economic characteristics of the United States". (ICPSR, 2009) From these areas, a randomly selected group of approximately 700,000 families were screened in a first wave. From this first wave, 300,000 families were chosen to supply basic income and housing info, and a subset of 61,000 families were selected to provide additional expenditure information. It is important to understand the selection criteria into the different waves. The ICPSR accompanying documentation explains that in order to be selected out of the first wave, the requirements were: "families include at least two members, with husband and wife married for at least one year, and with no more than the equivalent of ten boarders for the survey year (...) farm families had to live in a setting that met the Census definition of a farm; the family itself must operate the farm (or in the southeast, be a sharecropper) and have conducted farming activities for at least one year" (ICPSR Codebook, 2009). Families were admitted to the first wave "without restriction in terms of occupation, income, employment status, or whether they were drawing or had drawn relief during the year." Selection into the second-wave where the survey included expenditure components, was based on the following criteria: "non-farm families must have had at least one wage earner in a clerical, professional, or business occupation. A minimum income for the survey year of $500 was required in the largest cities and $250 in the smaller cities and rural areas (...) Families that had received relief were excluded from this third wave." These criteria produce a highly selected sample for the second-wave respondents, and hence I base the analysis on the sample of first-wave respondents.

The ICPRS data-sample that I use for the 1935 Federal profile is based on random subsamples of approximately 5,000 families who only completed the first-wave 'labor force' component of the survey.[27] The ICPSR subsample was created in the following way: "a sampling fraction of 1 schedule

[27] The ICPSR data available from the 1935-36 survey has also been used in Collins & Wanamaker (2014), Costa (2001), Margo (1993).

for entry for every 83 schedules counted was chosen" from the urban sample, creating 3200 schedules from the larger urban areas and 1800 schedules from the more rural areas"; the ICPSR-sample consists of schedules "spread across both the rural and urban portions of the original investigation." I code as an employee any individual respondent who reports being a "salaried worker/wage earner". I code as self-employed any respondent who reports being "self-employed", and any respondent who does not specify a type of work but declares to be working, is above age 20 and who has substantial work-related income. I rank inviduals based on the reported total income, in order to construct the Federal income-distribution. I then estimate the employee and self-employment employment-shares, together with the agriculture industry-share, in all deciles of the Federal income-distribution. The procedure is further explained in Section 4.2.

US 1870 The 1935-36 survey marked a clear shift in focus of the surveys conducted by the Bureau of Labor Statistics. Indeed, the surveys carried out prior to the 1930s focused on measuring family income and expenditure patterns of the U.S. employed workers and their families. Consequently, the available surveys, including the "Cost of living in the United States, 1917-1919" (ICPRS 7711, 1986) and the "Cost of living of industrial workers in the United States and Europe, 1888-1890" (Haines, 2006) contain data from families of wage earners or salaried workers in industrial locales scattered throughout the U.S. In order to construct a historical profile before the 1930s, I use data from Lindert & Williamson (2016), an on-going data-collection project to assess incomes in the U.S. between 1650 and 1870. Unlike previous work which approaches the measurement of income during this historical period from the production-side or the expenditure-side (including Berry, 1968; Gallman, 2000), Lindert & Williamson build estimates of income based on personal income records, assembling nominal earnings from free labor and property income.

The approach to estimating income in Lindert & Williamson derives from combining information about income and labor force participation counts across occupation-space-time. This amounts to building 'social tables' across occupations within a given space-time frame, and the approach is conceptually similar to a social accounting matrix, which was used in studies of development economics (and at the World Bank) in the 1970s and 1980s. The authors provide a tremendous effort to capture all occupation categories in a given space-time, and draw on data from local tax assessments and oc-

cupational directories for 'registered' occupations, and local censuses for 'unregistered occupations'. These same data-sources usually provide counts of the total number of individuals across the different occupations. The authors combine previous work (including Blodget, 1806; Main, 1965) with new estimates from local sources to derive personal earned income across occupation-space-time. In some instances, the occupation-space-time income reported was not at the annual level, and the authors bring the estimates to such level by making assumptions on the full-time number of hours spent (the assumptions are discussed in Lindert & Williamson, 2016). The authors also collect data on property income by assuming rates of return on wealth estimates that vary across occupation-space-time, and combine this with earned income to derives measures of total income. I construct a historical 1870 profile based on the data kindly provided by Peter Lindert.[28] This cross-section builds upon the 1870 1 percent US Census sample delivered to the authors by IPUMS USA, which also delivered the authors with sampling weights at the individual-level. The 1 percent sample contains space-occupation counts, which are then merged with the authors' estimate of total income at the same level. I extend their analysis and classify all available occupation categories as either self-employed or employee, and code agriculture versus non-agriculture, which in this setting amounts to farming versus non-farming. I use a text-algorithm which assigns self-employed vs employee status according to keyword-search in the occupation title. Per example, all occupations where a reference is made to 'manufacturing' or to 'manager' are coded as employee cells. The enumerator instructions for the sample-design are particularly useful for my exercise in that they highlight very clearly the need to distinguish between self-employed and employee status: "Do not call a man a 'shoemaker', 'bootmaker', unless he makes the entire boot or shoe in a small shop. If he works in a boot and shoe factory, say so (...) Cooks, waiters, etc., in hotels and restaurants will be reported separately from domestic servants." Coding workers attached to farming was based on a keyword-search that would turn up the words 'agriculture' or 'farming'. I use this classification to construct employee and self-employed shares of employment in the ten deciles of the income-distribution, applying the sampling-weights provided by IPUMS USA. The income-distribution reported in Panel B of Figure 1, and Panel D of Figure 13 compute total income as the sum of earned income and property income, but the results are robust to constructing the distribution based only on earned income.

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Results from the project relating to earlier historical periods are forthcoming in Lindert & Williamson (2015). The data for 1870 will be used in their forthcoming book Williamson & Lindert (2016).

Brazil 1970-2010 As a robustness check to the US within-country over time results on the changes in the distribution of employment-shares, I construct a within-country profile over time for Brazil between 1970 and 2010. The data is extracted from IPUMS International. My selection-criteria was to choose a country with a lover level of per capita income, to document on employment structure transformation within-country at lower initial levels of development. IPUMS International also has long-run data from Indonesia (1976-2010) and Mexico (1960-20100, but unlike Brazil, the personal income variable is not consistently recorded throughout the data-period. For Brazil, I do not include the 1960 estimate because the reporting-basis for total personal income changes substantially between 1960 and 1970 (the 1960 income is only reported in broad income ranges). Between 1970 and 2010, the definition of individual total income has remained fairly constant, including the constant reference across surveys to monthly earned income. The employment variables are constructed based on the class of worker categories, where I code an individual as employee if she reports 'wage/salary' as her main occupation, and as self-employed if she reports 'self-employed' or 'unpaid worker' as the main occupation. I drop from the sample all respondents who respond 'not in universe' to the class of worker question. I build the income-distribution based on total earned income, and estimate employment-shares across the income-deciles using individual population weights. The results from this exercise are reported for 1970, 1990, 2010 in appendix Figure 18.

B2. US states as development laboratory: state-year data

B2.1. Employment-shares at level of state-year

I construct the aggregate employment-share variables using decennial data at the state level between 1910 and 2010. The data was extracted from IPUMS USA. In each decennial data-extract, I exclude from the sample any individual for whom the general class of worker variable is 0 ("N/A"), and, if the variable exists, any individual who reports total personal income either equal to 9999999 ("N/A") or strictly negative. In the IPUMS USA data, total personal income corresponds to the respondent's total pre-tax personal income or losses from all sources for the previous year. I code as self-employed (employee) in non-agriculture a respondent who responds 'self-employed' ('works for wages') in the class of worker category and who does not respond working in 'agriculture, forestry and fishing' using the 1950-based industry classification. Note how the occupation-classification in IPUMS USA is consistent with the classification used in the cross-development sample, in the sense that if a respon-

dent has multiple sources of employment, the occupation-category concerns the work in which they spent the most time during the reference day or week.

Within each decennial extract, I apply person-weights to estimate, for each state, the representative total number of respondents, the total number of agriculture respondents, the total number of non-agriculture employee respondents, and the total number of non-agriculture self-employed respondents. These variables permit the construction of employment-structure variables. Per example, the employee-share variable is constructed as the ratio of total number of non-agriculture employee respondents to the total number of respondents. In addition, I construct the employment-shares by industry, using the 1950-based industry classification.

I construct continuous measures of employee counts using the historical series 'State and Area Employment, Hours and Earnings" collected by the Bureau of Labor Statistics. State agencies report data from a sample of establishments in all nonagricultural activities, including government. The series provides a breakdown of employees by consistently defined major industry categories in all states and years between 1939 and 2002. Unfortunately this series only provides data on average earnings and average hours worked beginning in the 1970s.

B2.2. Employment-shares at level of income decile-state-year

I construct the employment-shares by income-decile of the income-distribution of each state, in years 1935 and 1950-2010. The 1950-2010 data is again extracted from the IPUMS USA database. The definitions of type of work and industry are the same as those used to construct the state-year aggregate employment-shares. I rank all respondents within a given state according to the reported total personal income. The personal income reported measures each respondent's total pre-tax personal income. Importantly, throughout the sample-period, this measure is largely comparable: it includes in all samples, the wage, farm and business components. I then apply person-weights and partition each state's income-distribution into ten deciles, that is, into ten bins of equal sample-size. Within each decile, I estimate the conditional proportions of employees, self-employed and agriculture workers to construct the employment-shares by income-decile.

In years before 1950, the decennial US Census does not provide reported income and occupation-category at the level of the individual. I use the 1935-36 Study of Consumer Purchases in the United States, which had the scope to 'ascertain for the first time in a single national survey the earning and

spending habits of inhabitants of large and small cities, villages, and farm. I access this data under the ICPSR data-archive reference #08908. I discuss the 1935 data-sample and construction of variables in more detail in thr sub-section above. I construct the deciles of the state-specific income-distribution and estimate the employment-shares specific to each decile-state. I use these data to construct the profile of employment-share and self-employment share over deciles of each state's income-distribution, for all continental states, between 1935 and 2010.

I use this data to construct the variable measuring the employee-share above the PIT-threshold K. I first locate the decile of the state-year income-distribution in which the state-year PIT threshold is located in. I then recompute the non-agriculture employee-share of all respondents whose income lie in a decile weakly above the PIT-decile.

B2.3. Earnings-shares

The earning-structure is constructed for all states and all years between 1929 and 2001 by combining the two historical series SA5H and SA5 'Personal Income by Major Components and Earnings by Industry' published by the US Bureau of Economic Analysis. The denominator for earnings-structure is systematically line-item 45 'Net earnings by place of residence', which equals total earnings less contributions for government social insurance plus 'adjustment for residence'. The employee-share uses in the numerator line-item 90 'private non-farm earnings'; the self-employed share of income uses line-item 70 'proprietors' income'; the manufacturing-share of income uses line-item 400 'Manufacturing'; the services share of income uses line-item 800 'Services'; the government-share of income uses line-item 900 'Government and government enterprises'.

The line-item 45 is also used as the denominator y to construct the ratio of the PIT-threshold K to average earnings, K/y. Importantly, this measure y of personal earnings excludes transfers from all levels of government.

B2.4. State tax-revenues

The tax-revenue sources by state and year are based on the historical series on state government finances published by the US Census Bureau. The State Government Finances series publishes series on yearly tax-revenue collected over the fiscal year of each state. I proxy for tax-take by constructing the ratio of a given total tax-revenue collected to the total personal income in the state, where the denomi-

nator is based on the BEA historical series of state personal income. This tax-take ratio differs from the usual construction of the variable, where the denominator use a measure of aggregate output; however, GDP data at the state-level in the US is only available from 1963 onwards, and I follow the US states literature (e.g. Barro and Sala-i-Martin, 1992; Besley et al., 2010) in using state personal income as a measure of state output. The line-codes corresponding to the various tax-takes constructed are: personal income tax, T40; corporate net income tax T41; General sales tax, T09; selective sales tax, 'total select sales tax', sum of T10, T11, T12, T13, T14, T15, T16, T19) ; license taxes, 'total licence taxes', sum of T20, T21, T22, T23, T24, T25, T27, T28, T29.

B2.5. State personal income tax structure: K, τ, and K-reforms

To construct measures of the state PIT-base and state PIT-rate structure, I use data from the Bakija (2009) historical U.S. Federal and state income tax calculator program. I thank Jon Bakija for kindly providing me access to the calculator. The data models federal and state personal income taxes based on legal text, covering the period from 1900 to 2007 for state income tax laws. I construct the PIT-exemption threshold K for an individual earner who files under the status of being single, who reports having one dependent, and who claims the standard deduction. I choose a single-earner as the filing-type for two reasons: first, because I construct the deciles of the income-distribution based on ranking of total personal earned income; second, to avoid dealing with a large set of rules concerning interactions between spouses in terms of exemption values when filing under married status. Under the standard deduction (as opposed to the itemized deduction), the filer does not deduct state personal income tax from her federal income tax liability, which provides additional incentives for the filer to under-report state income taxes: I choose this filing-choice to more closely fit the under-reporting model in Section 2. Evidence from IRS statistics suggest that standard deduction filers are systematically more prevalent at lower levels of gross income (the Statistics of Income series on individual income tax returns regularly documents on this: see e.g. IRS, 1982). I set K to 0 in all years where the state did not have a personal income tax. I then construct the ratio K/y where y is the state-year per capita personal income, extracted from the historical US BEA series.

I use the same state tax calculator to construct measures of the tax-rate structure. The calculator provides data on the number of brackets for the specific filing-type, and the marginal tax rate which applies to each bracket. Some states have multi-bracketed structure with progressive marginal tax

rates, other states apply a single-rate flat income tax over all taxable income. Some states also feature a 'zero-th bracket' on which there is a zero percent tax rate, but this is a very rare event. I construct the 1st bracket marginal tax rate, the average of all marginal tax rates strictly greater than zero, and the top-bracket marginal tax rate. All these variables are set to 0 if the state does not levy a personal income tax.

The measure for PIT-threshold reforms is coded in the following way. Before the early 1990s, following the move to inflation-adjust the income-tax brackets of the Federal schedule, no state provided inflation-adjustment to its nominal-valued (bracketed) own income tax. Thus the dollar value of the calculated threshold K would remain constant unless a reform occured to change K. I therefore code a year of reform as a year, before 1990, during which the calculated nominal value of K changed. Second, I construct the state-specific empirical cumulative distribution of K-reforms over time. This cumulative distribution controls for the the large cross-state heterogeneity in frequency of K-reforms.

B2.6. State-time covariates

The poll tax and literacy test dummies and election-year dummies are taken from Besley et al. (2010). They provide state-time varying measures of the share of the state population subject to either a literacy test or a poll tax. Prior to the 1965 Voting Rights Act, such measures were in place in predominantly Southern states. The 1965 VRA gave the Attorney General the authority to appoint federal examiners to oversee voter registration in states using literacy or qualification tests, and the power to seek legal action against poll taxes as a prerequisite for voting in state elections. The authors use variation in these dummies to instrument for political competition, which they find to have a positive impact on the share of non-farm income.

I construct proxies for the state-year policy environment. These different proxies are meant to capture variation in state-policies which may have affected location decisions of private firms. The choice of proxies is based on historical readings which provide qualitative evidence that these policies contributed to the workforce transition into manufacturing and services jobs, especially in Southern and Midwestern states (Cobb, 1993; Newman, 1984). First, a dummy for the existence of a corporate income tax is constructed, which takes value 1 in all years in a state where there exists such a tax-base. The date of creation of state-CIT is taken from Table 4.1 of Newman (1984). The dummy for existence of right-to-work laws was extracted from Besley et al. (2010). Right-to-work laws make it

illegal to demand that employees join a union, or to automatically deduct union fees from wages. The continuous measure of state unemployment insurance firm-size coverage is taken from the historical publication series 'Significant Provisions of UI State Laws" published y the US Department of Labor (Dept Labor, 1937). I download all publications between 1937 and 1979. In each state-year, I code the firm-size coverage, that is the lower-bound on firm-size above which an employee in a given firm is entitled to receive state UI benefits. This measure is defined consistently over the entire series. I also wanted to code the employer UI-contribution, expressed as a percentage of wages, but this measure is not consistently reported throughout. Federal-time varying regulation provided an upper-bound on the allowed firm-size, but states were free to legislate in order to define a firm-size below the Federally mandated size. Some states chose to lower the firm-size coverage early on, ahead of Federal regulations, while some states followed the Federal upper-bound throughout time. After 1979, Federal regulations extended coverage to all firms with one employee or more, and I code the state-time coverage as equal to 1 from 1979 onwards.

I control several proxies for income. I use either the log of per capita personal income based on the BEA historical series, or I use the ten measures of average personal income in all deciles of the state-year income distribution, constructed using the same methodology as for employment-shares at decile-state-year level.

Finally, in the appendix I provide controls for time which interact cross-sections of three structural variables in 1930 with a linear time trend. The first structural variable is population density, which is defined as the average population per square mile. This variable is extracted from the US Census resident population data. The second structural variable is the illiteracy rate, by state. This variable is defined as the share of population 14 years old and over who is unable to read and write a simple message in English or another language. The cross-section is extracted from the 1962 Current Population Report, published by the Department of Commerce. The third structural variable is the rural share of total population, based on the US Census data on rural and urban populations. The US Census defines urban areas as densely developed territory which encompasses residential, commercial and non-residential urban land uses.

B2.7. State-year outcome variables

I proxy for the earnings-hazard at the PIT-threshold in the following way. First, I locate the income-decile of PIT-K in a given state-year. I then calculate the mass of income above K, in terms of deciles, and the average income in the decile of K. Total mass of income over the income-distribution is normalized to 1, as in the model of Section 2, and thus each decile represents a mass of 0.1. The sum of decile-mass above K is a proxy for $1 - H(z_K)$. I multiply the average income in the decile of K by 0.01: this is the proxy for $h(z_K) \cdot z_K$. The ratio of the proxies of $1 - H(z_K)$ to $h(z_K) \cdot z_K$ is the empirical proxy for the hazard-ratio.

I construct proxies for tax enforcement capacity in two ways. The data are based on the historical series of the Book of the State, published annually from 1993 until today by the Council of State Governments. First, I collect data at the state-year level on the number of agencies administering major taxes: property, income, sales, gasoline, motor vehicle, tobacco, death, liquor. I code the total number of state tax agencies in operation in every state-year. This variable is available from 1939 to 2009. Second, I collect state-year data on the annual salaries of the chief state administrative official in different departments: revenue-collection and taxation; treasury; Attorney general. I construct the ratio of the annual salary in revenue-taxation relative to the salary in the Treasury and relative to the salary as Attorney General. I also construct the ratio of annual administrative salary in revenue-taxation relative to average government-employed earnings, using the historical earning-shares data described above. These relative-earnings ratios are available between 1948 and 2009. These variables are intended to proxy for investments in enforcement capacity, through consolidation of the number of tax agencies, and by funding higher wages to tax administrators. These variables represent, to my knowledge, the first long-run time-series evidence on the long-run evolution of proxies for tax administrative capacity of individual states in the US.

Finally, I use data from Besley et al. (2010) to build proxies for political outcome-variables. I use their measure of party-neutral political competition, which is defined as minus the absolute value of the deviation of the democratic vote-share from 50 percent, where the vote-share is the average vote-share over all state-wide races. I also use a dummy for whether the governor in the state-year is a Democrat. Further, I use the Democratic vote-share averaged across all state-wide elections, and the Democratic seat-share in the state House.

B2.8. Industrial Development Bonds program: litigation status, volume issued

The data on the timing of vote-in and upholding decisions is built from two main sources. The year of vote-in is drawn primarily from the legal review of Abbey (1966), where the year of vote-in is defined as the year of original enactment or adoption (which may follow the year of the legislative vote-in with a one-year lag). I supplement the legal review source with an administrative source (US ACIG, 1963) to check consistency of the years reported. The year of vote-in differs on average by 1 year, and only in one case out of 25 does the difference amount to 3 years. Some vote-in dates occur in the latter but not in the former source, which could be due to the fact that the administrative report was published before the Abbey review. The Abbey review is also consistent with less comprehensive and earlier reviews of the vote-in events, including Pinksy (1963). The year of upholing is defined as the year in which the leading court-case at the state-level occurs. The set of leading court-cases is drawn from the 1978 report of the Institute of International Law and Economic Development, prepared for and published by the Economic Development Administration of the Department of Commerce.

I collect data on number of IDB issues and the dollar amount of each IDB-issue using the historical records of Moody's Municipal and Government Manual of Issuers. Though IDB-issues do appear in earlier series such as the 1970 series and the 1972 series, I focus on the 1974 series because it effectively supersedes the previous series in terms of recorded issues for the historical period that I am interested in. I cannot use publications from 1975 onwards because the reported issues bundles together pollution control bonds and IDB-bonds. Using the Special Features section of the 1974 publication, I code at the state-year level, the total number of issues and the total nominal dollar value that correspond to these issues. I then construct the cumulative series of IDB number of issues and of IDB volume of issues over time, by state. The constructed data-series represents, to the best of my knowledge, the first complete historical time-series on issuance of IDB-debt by state.

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Table B1: Cross-country household surveys: data-sources

	$ Per cap income	Year	Survey type	Sampling properties	Sample-size (number of households)	Distribution	Original source
Argentina	5700	2009	Living conditions	Urban representative	35724	Income	National Institute of Statistics and Census
Australia	32443	2010	Living conditions	Nationally representative	11642	Income	Luxembourg Income Study
Austria	36446	2004	Labor force	Nationally representative	5823	Income	Luxembourg Income Study
Azerbaijan	651	1995	Living conditions	Nationally representative	2287	Income	Living Standards Measurement Survey
Bangladesh	371	2005	Living conditions	Nationally representative	10080	Income	Bangladesh Bureau Statistics
Belgium	34009	2000	Labor force	Nationally representative	2855	Income	Luxembourg Income Study
Belize	3269	1999	Labor force	Nationally representative	5206	Income	Statistical Institute of Belize
Bolivia	1081	2007	Living conditions	Nationally representative	8937	Income	National Institute for Statistics
Brazil	5271	2009	Living conditions	Nationally representative	129333	Income	IBGE
Bulgaria	4339	2007	Living conditions	Nationally representative	4937	Income	Living Standards Measurement Survey
Cambodia	590	2009	Living conditions	Nationally representative	5894	Income	Cambodia National Institute of Statistics
Cameroon	931	2007	Living conditions	Nationally representative	51836	Income	Cameroon National Institute of Statistics
Canada	35277	2010	Living conditions	Nationally representative	30494	Income	Luxembourg Income Study
Chile	8217	2009	Living conditions	Nationally representative	71469	Income	National Institute for Statistics
China	1308	2002	Living conditions	Urban representaitve	20632	Income	ICPRS 21741
Colombia	3841	2009	Living conditions	Nationally Representative	56583	Income	National Department for Statistics
Costa Rica	5180	2009	Living conditions	Nationally Representative	13244	Income	National Institute for Statistics and Census
Cote d'Ivoire	939	2008	Living conditions	Nationally representative	12600	Income	National Institute of Statistics
Czech Republic	14640	2010	Labor force	Nationally representative	4403	Income	Luxembourg Income Study
Dem Rep Congo	127	2004	Living conditions	Nationally representative	7347	Income	National Center for Statistics and Economic Studies
Denmark	46540	2010	Labor force	Nationally representative	88218	Income	Luxembourg Income Study
Dominican Republic	4493	2009	Labor force	Nationally representative	8281	Income	National Office of Statistics
Ecuador	3210	2009	Living conditions	Nationally representative	19432	Income	National Institute for Statistics and Census
Egypt	1550	2010	Living conditions	Nationally representative	15741	Income	Economic Research Forum
El Salvador	3005	2009	Living conditions	Nationally representative	20361	Income	Demographic Association
Estonia	10370	2010	Living conditions	Nationally representative	5375	Income	Luxembourg Income Study
Ethiopia	229	2013	Living conditions	Non-capital representative	3969	Income	Living Standards Measurement Survey
Finland	38065	2010	Labor force	Nationally representative	9420	Income	Luxembourg Income Study
France	33819	2010	Living conditions	Nationally representative	10595	Income	Luxembourg Income Study
Germany	36127	2010	Labor force	Nationally representative	11788	Income	Luxembourg Income Study
Ghana	501	2005	Living conditions	Nationally representative	10380	Income	Ghana Statistical Service
Greece	21310	2010	Labor force	Nationally representative	4668	Income	Luxembourg Income Study
Guatemala	2092	2006	Living conditions	Nationally representative	28187	Income	Luxembourg Income Study
Honduras	1490	2009	Living conditions	Nationally representative	21112	Income	Government of Honduras
Hungary	10937	1999	Living conditions	Nationally representative	2063	Income	Luxembourg Income Study
Iceland	51528	2010	Labor force	Nationally representative	4133	Income	Luxembourg Income Study
India	687	2004	Living conditions	Nationally representative	93278	Income	Luxembourg Income Study
Indonesia	1731	2011	Living conditions	Nationally representative	111824	Income	SUSENAS
Ireland	44583	2010	Labor force	Nationally representative	4535	Income	Luxembourg Income Study
Israel	22169	2010	Living conditions	Nationally representative	7905	Income	Luxembourg Income Study
Italy	29163	2010	Labor force	Nationally representative	6962	Income	Luxembourg Income Study
Jamaica	4150	2002	Living conditions	Nationally representative	18943	Income	Statistical Institute
Japan	36817	2008	Living conditions	Nationally representative	7480	Income	Luxembourg Income Study
Jordan	2817	2010	Living conditions	Nationally representative	5808	Income	Economic Research Forum
Kenya	524	2005	Living conditions	Nationally representative	24383	Income	Kenya National Bureau of Statistics

Per capita income is the World Bank $US2005 constant per capita income of the country in the year of the survey. Labor-force surveys contain information on demographics, income and employment; living condition surveys in addition contain information on expenditure, and possibly health and education. Distribution refers to the variable at the individual level used to construct the country income-distribution.

Table B1 continued: Cross-country household surveys: data-sources

	$ Per cap income	Year	Survey type	Sampling properties	Sample-size (number of households)	Distribution	Source
Lithuania	9426	2008	Living conditions	Nationally representative	15837	Income	Statistics Lithuania
Luxembourg	80276	2010	Labor force	Nationally representative	6148	Income	Luxembourg Income Study
Malawi	222	2010	Living conditions	Nationally representative	12271	Income	Living Standards Measurement Survey
Mexico	8336	2010	Living conditions	Nationally representative	16842	Income	ENIGH
Mongolia	861	2003	Labor force	Nationally representative	12787	Income	National Statistical Office
Morocco	2315	2010	Living conditions	Nationally representative	2000	Income	Direction de la Statistique - Haut Commissariat
Namibia	4086	2010	Living conditions	Nationally representative	44546	Income	Namibia Central Bureau of Statistics
Netherlands	41110	2010	Labor force	Nationally representative	11935	Income	Luxembourg Income Study
Nepal	351	2008	Labor force	Nationally representative	7402	Income	Nepal Central Bureau of Statistics
Nicaragua	1175	2005	Living conditions	Nationally representative	6884	Income	National Institute of Statistics and Census
Niger	272	2011	Living conditions	Nationally representative	4078	Expenditure	Living Standards Measurement Survey
Nigeria	1034	2011	Living conditions	Nationally representative	6136	Income	Living Standards Measurement Survey
Norway	64545	2010	Labor force	Nationally representative	15635	Income	Luxembourg Income Study
Pakistan	765	2009	Labor force	Nationally representative	9082	Income	Pakistan Federal Bureau of Statistics
Panama	6287	2010	Labor force	Nationally representative	128925	Income	IPUMS International
Papua New Guinea	1111	1996	Living conditions	Nationally representative	4043	Income	Living Standards Measurement Survey
Paraguay	1553	2009	Living conditions	Nationally representative	4439	Income	Centre for Population Studies
Peru	3565	2009	Living conditions	Nationally representative	21753	Income	National Institute for Statistics and Information
Poland	9044	2010	Living conditions	Nationally representative	46768	Income	Luxembourg Income Study
Puerto Rico	21959	2005	Labor force	Nationally representative	13803	Income	IPUMS International
Romania	3447	1997	Living conditions	Nationally representative	35995	Income	Luxembourg Income Study
Russia	6386	2010	Living conditions	Nationally representative	8345	Income	Luxembourg Income Study
Rwanda	211	2000	Living conditions	Nationally representative	15730	Income	Rwanda National Institute of Statistics
Serbia	3733	2007	Living conditions	Nationally representative	5557	Income	Living Standards Measurement Survey
Sierra Leone	311	2004	Living conditions	Nationally representative	18467	Income	Statistics Sierra Leone
Slovakia	14162	2010	Labor force	Nationally representative	6935	Income	Luxembourg Income Study
Slovenia	19054	2010	Living conditions	Nationally representative	4844	Income	Luxembourg Income Study
South Africa	5794	2010	Living conditions	Nationally representative	5489	Income	Luxembourg Income Study
South Korea	19528	2006	Labor force	Nationally representative	13178	Income	Luxembourg Income Study
Spain	25596	2010	Labor force	Nationally representative	12392	Income	Luxembourg Income Study
Sri Lanka	1486	2008	Labor force	Nationally representative	12540	Income	SL Department of Census and Statistics
Sudan	780	2009	Living conditions	Nationally representative	13414	Income	Economic Researc Forum
Sweden	41041	2005	Labor force	Nationally representative	11607	Income	Luxembourg Income Study
Switzerland	53340	2004	Living conditions	Nationally representative	7933	Income	Luxembourg Income Study
Tanzania	452	2011	Living conditions	Nationally representative	3922	Income	Tanzania National Bureau of Statistics
Tajikistan	375	2007	Living conditions	Nationally representative	1503	Income	Living Standards Measurement Survey
Taiwan	37500	2005	Living conditions	Nationally representative	20260	Income	Luxembourg Income Study
Tunisia	3847	2010	Living conditions	Nationally representative	25371	Expenditure	Economic Research Forum
Turkey	8493	2011	Living conditions	Nationally representative	13021	Income	Turkish Statistical Institute
Timor-Leste	550	2007	Living conditions	Nationally representative	9306	Income	Living Standards Measurement Survey
Ukraine	1974	2010	Living conditions	Nationally representative	9825	Income	State Statistics Committee of Ukraine
United Kingdom	37899	2010	Labor force	Nationally representative	24636	Income	Luxembourg Income Study
United States	43952	2010	Living conditions	Nationally representative	31255	Income	Luxembourg Income Study
Uruguay	6280	2009	Living conditions	Nationally representative	46936	Income	National Institute for Statistics
Venezuela	5880	2006	Labor force	Nationally representative	38492	Income	National Institute for Statistics

Per capita income is the World Bank $US2005 constant per capita income of the country in the year of the survey. Labor-force surveys contain information on demographics, income and employment; living condition surveys in addition contain information on expenditure, and possibly health and education. Distribution refers to the variable at the individual level used to construct the country income-distribution.