Rise of employees and growth in tax capacity*

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Abstract

This paper studies how the transition from self-employment to employee employment share over the development path can explain growth in personal income tax (PIT) capacity. Proxying for development using either 84 household surveys across countries today or 140 years of historical data within-US (1870-2010), I first establish two new stylized facts: 1) within-country, employee share is increasing in through the income-distribution, and the profile moves leftward with development; 2) the PIT exemption threshold moves down the income-distribution with development such that the employee share above the threshold is high and constant. These findings are consistent with a model in which high employee share is a necessary condition for taxation and the rise in third-party income through increases in employee shares drives growth in tax capacity. To provide more conclusive evidence, I use quasi-experimental variation in industry-subsidy policies in the U.S. in the 1940-60s that generated exogenous changes in employee share. I find that the exogenous increase in employee share is associated with a lower State PIT threshold. I find that an expansion of the State PIT base is associated with an increase in personal income tax revenue and a substitution away from 'distortive' taxes, including selective sales taxes. This last finding is consistent with the model where growth in employee mass lowers the marginal cost of funds of PIT and increases tax-reliance on PIT, and leads to substitution away from distortive tax-sources that have high marginal cost of funds. My model and empirical findings therefore address both the observed increase in PIT take and the observed variation in tax-mix over levels of development.

1 Introduction

The size of government increases dramatically over levels of development. When proxying for government size by using the ratio of total tax revenue to GDP, this observation holds

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both within developed countries over the long-run, and in a current cross-section of countries at different levels of per capita income. Such positive correlation between development and tax take is the outcome of interactions between economic development, tax structures, and political institutions. It is likely that the nature of these interplays are different over the short-run and over the the long-run. I propose an explanation to the positive correlation which runs from development to tax structures, over the long-run: development leads to structural transition from self-employment to employee occupation status, which from a tax collection point of view, respresents an increase in the enforceable mass; government captures the additional enforceable mass by expanding the income tax base, which in turn leads to higher personal income tax (PIT) take.

It is widely recognized that income tax enforcement is successfull whenever third-party reporting of income is present, and that it is poor whenever such reporting trail is not present. Hence from an income tax collection point of view, to a first-order approximation, employee income (where third-party reporting is present) represents the enforceable income, while self-employed income (where third-party reporting is limited or absent) proxies for non-enforceable income. The starting point for my working hypothesis is the observation that employee share in total employment varies significantly across development, but that employee share above the PIT exemption threshold in these countries does not. Figure 1 documents on these two observations for a sample of 80 countries across levels of development. To reconcile these two observations, I first provide a detailed account of how employee share is distributed within a country over the income-distribution and how this distribution changes over the development path. I find that employee share is increasing in income-deciles of the income-distribution; and that, in a country starting at low development, movement along the development path first leads to an increase in employee mass exclusively concentrated in the top decile, followed by employee growth in deciles locally further down the income-distribution. I label this the first stylized fact. The decile-specific employee growth relates to changes to the PIT tax-base because I observe that K consistently moves down a country's income-distribution to capture growth in deciles situated locally further down. I label this the second stylized fact. I provide extensive documentation to show that this process is highly progressive throughout the development path, where development path is proxied for in different ways. I set up a model consistent with these stylized facts, where the threshold will be locally lowered if the marginal revenue gain outweights the marginal cost of such base-expansion, and where, as a proxy for increased enforceable mass, growth in employee mass leads to decreased marginal cost of such expansion.

I focus on the PIT threshold K because it provides a natural link between employee growth that is heterogeneous over the deciles of the income-distribution and total PIT take. The reduced-form correlation between aggregate employee mass and PIT take has already been noted in the literature (Kleven, 2014). But my proposed channel for explaining this reduced form correlation through changes to the tax-base is entirely new. Studying the choice of K as an income tax instrument has been largely neglected in the literature - which focuses more on marginal tax rates and enforcement - yet K it is an important tool in policy-considerations (Keen, 2014). It is also the case that there is more variation across development levels in the size of the tax-base than in (top) marginal tax rates (Figure 2), suggesting K is potentially

an important component when explaining the observed cross-development increase in PIT take.

My finding that at low levels of development, employee growth is large in the topdeciles and that the PIT base in those countries seems to progressively expand to accomodate for this new enforceable mass is at ods with the general view that income tax instruments are irrelevant in low/lower-middle income countries. Such general view is usually motivated by the observation that while there is a strong positive correlation between marginal tax rates and tax take in rich countries, that correlation is essentially nil in developing countries - suggesting that income tax instruments are unimportant in poor countries and that the tax take variation to be explained in that sample must be due to underlying differences in enforcement capacity. I present basic correlations which annul this observation and show that variation in income tax instruments *is* associated with variation in onserved tax take variation both wihtin the group of less developed countries (unlike in previous studies) and in more developed countres (like in previous studies), but only through variation in the size of the income tax-base, which is highly (negatively) correlated with the total tax take in *both* sets of countries. I label this the third stylized fact. This 'stylized fact' suggests previous studies' flawed conclusion that income tax analysis was irrelevant in less-developed countries stemmed from the failure to account for the impact of the income tax-base instrument on total tax take. It also calls into question the recent literature's focus on investments in enforcement capacitites in lower income countries, and suggests an important role for statutory income tax instruments such as the exemption threshold in these countries. Finally, stylized fact #3 suggests the proposed mechanism outlined in stylized facts #1 and #2 may be important to explain incremantal variation in income tax take both within the set of less developed countries and within the set of developed countries.

I use the employee-driven expansion of the PIT base to provide an explanation for the observed changes in tax-mix and emergence of 'modern' tax structure over the development path. I define a modern tax system as a structure characterized by a strong reliance on personal income taxes, and weak reliance on selective sales taxes. Kleven, Kreiner and Saez (2014) made the observation that over increasing levels of per capita income, personal income tax strongly increasses as a tax-take, using long-run evidence within a set of developed countries. I here complement their finding by confirming that it also holds in a large cross-section of countries today and by showing that cross-development, there is a sizeable shift away from reliance on selective sales taxes. Figure 3 shows that across levels of development, personal income tax share of total taxes increases significantly, corporate income and general sales remain robustly flat, and the reliance on selective sales taxes decreases. (based on Bachas and Jensen database, 2015) The graphs in Figure 3 suggests there is substantial cross-development variation in tax-mix, which should be accounted for when explaining cross-development variation in total tax take. In an extension to the stylized model, I show that employee growth will lower the MCF of the personal income tax; and, that if the government maximizes household welfare then this decrease in PIT-MCF should lead to an optimal higher reliance on PIT and a decreased reliance on more distortive taxes (such as selective sales taxes). This is a model which can fit the observed tax-mix over development levels without resorting to arguments about cross-development variation in investments in

enforcement capacity or in demand for public goods.

To complement the stylized facts, in a last section I use the setting of individual States within the U.S. to attempt to capture exogenous variation in employee employment at the individual State level and correlate this employee growth with changes to State PIT base and State PIT take. Importantly, I first show that within-State over time, the stylized facts #1, #2 and #3 are also verified and remarkably robust. I then study the impact of a State-level industry policy-reform. From the mid-1940's, individual States across the U.S. engaged in the construction/renovation of industrial facility, which the State would then lease out to private enterprises. To finance these facility developments, States issued newly invented 'industrial development bonds'. The use of State development bonds is anecdotally referred to as the era of 'industry experimentation' (Cobb, 1993). Indeed, the States which chose to take-up industry-subsidizing were forced to engage in lending of public credit for private purposes, which went against the State Constitutions that provided specific provisions prohibiting this exact type of government intervention. As a consequence, adopting the ability to subsidize industry required overcoming a costly and uncertain process: on the extensive margin of adoption, States had to pass laws which changed the constitutional amendments to allow lending of public credit for private purposes; on the intensive margin of actual bond-issuance, most States required voter approval of each bond-financed industry-project. These institutional features provide useful variation for a first stage: some States with low levels of employee mass never adopted; some States adopted on the extensive margin, but never made it to actually issue any bonds on the intensive margin; and, amongst the States that adopted and issued, there is a lengthy staggered adoption rate. On the other hand, I show that the impact of adoption-issuance on employee employment growth is immediate, and that employee growth in the adopting and non-adopting States trended in close patterns up to the year of reform. Together, these observations motivate a diff-in-diff model estimation of the impact of industry-subsidy on employee growth. Using the diff-in-diff estimators, I find that subsidy-adoption has a large and negative impact on the location of the State PIT threshold, both in the reduced-form and in the IV model, consistent with my stylized model. In both the reduced-form and in the IV-setting, I find that subsidy-adoption is associated with higher PIT take, lower selective sales tax and licence tax takes, and a nil change to general sales tax and corporate income tax; these findings are consistent with the extended model of optimal tax-mix, but go against a confounding story of increased taste for revenue in reforming States. Because the stylized facts #1, #2 and #3 also hold within-State over time, the diff-in-diff estimated impact of employee growth on PIT base expansion and PIT take may carry some external validity and shed light on the causal employee-driven channel of PIT base expansion over the development path.

The rest of the paper is organized as follows. Section 2 provides a brief review of related literatures. Section 3 presents a model of optimal income tax exemption threshold. Section 4 documents on stylized facts on employment-structure, PIT structure and tax-mix over the development path. Section 5 exploits tests the prediction of the model in the context of the U.S. individual States. Section 6 concludes.

2 Review of related literatures

2.1 Tax exemption thresholds

My findings first relate to the theory and findings in the public finance literature on tax exemption thresholds. As mentioned earlier, there exists no study which combines theory and evidence on the optimal location of the PIT exemption threshold. The closest paper here is the theoretical contribution of Lundholm et al. (1994), who study the optimal two-bracket linear income tax. Because their focus is on investigating the implications of adding to the linear income tax the additional level of generality generated by a second tax-bracket, they do not study the implications of agent heterogeneity on the optimal location of the brackets, which is the focus of my theoretical model.

Dharmapala et al. (2005) analyze the optimal taxation of firms when the government faces fixed (per-firm) administrative costs of tax collection. The authors investigate the optimal setting of a cut-off below which firms can be be exempted from taxation. They find that it may be optimal to set the cutoff high enough to exempt a sizable number of firms, even though some firms reduce their outputs to the cutoff level, which in the analogue setting of individual income taxes, is consistent with the PIT exemption rule that I derive. Finally, Keen and Kanbur (2014) derive formulas for optimal thresholds in the case of sales taxes, and provide correlations to support their model predictions

2.2 Taxation and development

The second related literature is the set of studies on taxation and development. One strand of this literature focuses on explaining cross-development differences in tax take as a function of tax enforcement differences. Gordon and Li (2005) argue that most of cross-development variation in tax mix can be explained in a model where the government is able in practice to collect taxes only from the firms which make use of the financial sector - the attachement of firms to the financial sector, which varies over development, drives part of the enforcement capacity of the State.

Another strand of this literature argues that factors such as demand for public goods and political structure incentivize investments in tax capacity. The leading reference here is by Besley and Persson (2013). In the context of these articles, my paper does relate to the set of studies emphasizing the importance of information trails for tax collection, but importantly I argue that these information trails impact total tax take and tax-mix by causing the statutory tax instruments to vary while most of these studies have focused on the impact of tax enforcement capacity. My study is more closely related to the wave of taxation-development papers written in the 1980s, which argue that deep, structural economic transformation impacts tax take and the optimal tax-mix: here the main reference is the set of papers collected in 'Supply-side tax policy' (Gandhi and Ved, 1987).

Finally, my model and empirical findings relate to the set of studies which focus on explaining cross-development variation tax-take and in tax-mix. Kleven, Kreiner and Saez (2014) present an agency model to explain why third-party information reporting by employ-

ers improves income tax enforcement. They embed the agency model into a macroeconomic growth model where size and complexity of the firms grows with exogenous technological progress. At low levels of development, firms are very small and untaxable, leading to zero tax revenue collected. Along increasing development levels, firm-size grows and firms start becoming taxable, provided the tax-rate is not too high. At high development levels, firms are sufficiently large to allow the government to impose the first-best tax rate. The main deviation of my setting from this model is that I rely on explaining PIT take and optimal tax-mix through changes to the tax-base, while their modeling focuses on the tax-rate.

2.3 Employment structures across development

The stylized facts of Section 4 relate to the large literature on development and employment structures. Classical economists observed that economic growth is accompanied by a concentration of production in ever-larger units and by a corresponding decline in self-employment and family enterprises. In more recent times, empirical work by Kuznets (1966), showed evidence of this tendency in cross-country data. Kuznets put forward the theory that modern economic growth was characterized by a set of features, including the shifts in the structure of production: from small to large firms; from self-employment to salaried work; and from unincorporated enterprises to large corporations. In addition to Kuznets, Hirschman (1958), Rostow (1960) and Lewis (1965) recognized that structural changes in employment and firm size were a central feature of economic growth.

My findings provide micro-based evidence on the structural change to occupation employment shares along the income-distribution over the development path. These results are most directly consistent with the observed structural change to aggregate occupation employment-shares, first systematically noted in Kuznet's 'Modern Economic Growth.' (1966) There, Kuznets groups countries by income groups and observes a significantly higher share of own-account workers in less-developed countries; I provide micro-based evidence on the location of these own-account workers in the income-distribution of the less-developed countries, and on the transition of these own-account workers into employee employment over development levels. Kuznets further observes that "in the underdeveloped countries the per worker income of employees is distinctly higher than that of entrepreneurs", which is consistent with my micro-evidence showing that in those countries employee-share of employment is exclusively concentrated in the top deciles of the income-distribution. My results are also consistent with Kuznets' observed aggregate structural change of industry-shares of employment, more specifically the dominance of agriculture in employment at lower levels of development. I provide the first precise micro-based documentation on the structural change of agriculture employment share over the deciles of the income-distribution. Kuznets notes that occupation and industry structural change are sometimes closely associated, and I can show precisely the income-levels past which this observation no longer holds: in lower income countries, over 90 percent of agricultural employment is characterized by self-employed occupation form, while from around $4,300 per capita, agricultural employment is (low and) evenly spread between employee and self-employment shares.

Beginning with the Lewis model (1954), there is a large literature which models labor

markets in developing countries as dual markets with a modern sector and a traditional sector, where the traditional sector is characterized by having a large pool of 'surplus' labor from which the modern sector may draw. This is an accurate characterisation of the historical labor markets in the individual U.S. states where I study the impact of the industry-subsidy reform: rural counties had excess low-skilled self-employed which were not drawn upon by the geographically distanced industrial facilities due to restrained access to investment opportunities. By State financing of the up-front cost of building new industry facilities, the industry-policy effectively subsidized the industry's cost of firm-expansion. I show that, from an industry growth perspective this policy was hugely successfull, and may shed light on current industry policies in developing countries which similarly try to raise individuals out of labour-surplus rural settings.

3 Stylized model

To guide the empirical findings, I provide a simple model where employee employment-share is heterogenenous over deciles of the income distribution and the government proceeds to a marginal expansion of the tax-base through $dK < 0$ if the marginal gain of doing so outweights the marginal cost. The marginal cost of the reform $dK < 0$ includes the marginal distortions caused by expanding the tax-base: these distortions are summarized by the reform-induced behavioural changes to reported income. The key assumption is that employees are characterized by a lower elasticity of reported earnings with respect to the tax-schedule. Under this assumption, the behavioural response (and hence the marginal cost) of a local expansion of the tax-base will be lower, the higher is the employee share of the population affected by the reform. I model 'development' as an increase in the employee share of employment in the income-deciles. This simple model predicts that development-induced increase in employee share of employment will lead to a lowering of the exemption threshold, through decreasing the marginal cost of such tax base-expansion.

When extended to choosing instruments over several tax-bases, the model delivers the prediction that development-induced employee growth leads to greater reliance on income taxes and substitution away from distortive taxes (such as selective sales taxes). This prediction is consistent with observed cross-development variation in tax-mix. Importantly, I formulate a simple model which thus delivers predictions to explain cross-development variation in income tax take and tax mix without having to resort to arguments about investments in enforcement technology nor changes to demand for public goods.

3.1 Model setup

The country is characterised by an income distribution and by heterogeneous shares of employees and self-employed over deciles of the distribution. Denote s an income level, and φ_s the employee share of employment at income s. I assume the occupation status is fully descrived by the binary self-employed vs employee categories, hence $1 - \varphi_s$ is the share of self-employed at income level s. In the empirical part of the paper, I find that employee-share

is increasing in deciles of a country's income distribution, which I model as $Corr\left(\varphi_s, s\right) \geq 0$. The empirical sections also describe how as a country develops, employee-share increases in all deciles. The 'development'-induced change to employment structure is therefore modeled simply as an increase in φ_s. The empirical sections make clear that development is associated with employee-share growth which is heterogeneous across income deciles s. I do not require this part for the basic intuition and main prediction of the model. In this stylized setting, I do not model what is the underlying mechanism which determines $Corr\left(\varphi_s, s\right) \geq 0$. Since I do not model the decision to enter a given occupation category, I am essentially modeling exogenous heterogenity in earnings ability s, and a random occupation-category draw from a probability distribution which is conditional on s.

I also do not model how 'development' leads to an increase in employee-share s. In a longer version of this paper, I outline a potential model which delivers this 'development growth pattern'. In the model, firms are heterogeneous in revenue-productivity and set the wage as a function of firm-size. Optimal firm-size depends on the firm-specific revenue productivity, and a productivity cut-off value generates a distribution of self-employed and employee-hiring firms. There is a firm-size wage premium, which can originate in managerial ability to monitor (Lucas, 1978); fixed costs and skill-matching (Barron, 1987); shirking and firm-size monitoring capacity (Bulow and Summers, 1987); or, forced rent-sharing of larger firms with their workers (Akerlof and Yellen, 1990). The firm-size wage premium has received considerable empirical support both in developed countries (EU: Lallemand et al., 2005; US: Bayard and Troske, 1999) and in developing countries (Mexico: Bargain et al., 2013; Pakistan: Nasir, 2009). Combined with the productivity cut-off, the firm size wage-premium generates a distribution of employee employment shares which is increasing over deciles of the income-distribution. This model fully generates the qualitative features that I observe in all within-country employee-shares distribution over income-deciles, consistent with stylized fact #1. The development process (across countries or within-country over time) is modeled as a right-shift of the revnue productivity distribution. In this model, such distribution-change will lead to a leftward shift of the profile of employee employment shares over deciles, consistent with stylized fact #2.

The tax-structure is characterized by the exemption threshold K such that all agents with income $s \geq K$ are liable to pay income taxes at the marginal rate $\tau \leq 1$. K is the government's choice-variable on which I focus here.

3.2 Main prediction

I model the decision to increase the income tax-base by locally lowering the threshold $dK < 0$ as an optimal choice if the marginal revenue gain outweighs the marginal cost of the local reform. I focus on the distortions to agents' behaviour caused by the local expansion of the base as the main source of marginal cost. The deadweight loss caused by dK due to distortions is summarized by the set of behavioural responses dB. One behavioural response to an expansion of the tax-base is an extensive margin response, $dB^{Extensive}$ whereby a fraction of the agents liable under the new tax-base will incur a real cost, or a reporting cost, in order relocate income below the new threshold. If I assume the presence of income effects from

changes to the tax-schedule, then $dK < 0$ can also introduce behavioural responses on the intensive margin, $dB^{Intensive}$: agents who remain in the expanded tax-base but who incur a statutory increase in total liability may pay a cost to under-report part of their income and partially offset the statutory tax increase. A simplifying asusmption is that I only focus on agent responses to tax base expansions, conditional on occupation category. A fuller model would incorporate a switching-margin between self-employed and employee occupation status into the set of behavioural responses.

The key assumption is that employees have lower elasticities of reported income with respect to the tax-schedule, which I summarize here as $dB_{\varphi} < dB_{1-\varphi}$. There is robust micro-based evidence to support this assumption both in developed countries such as Denmark (Kleven et al., 2011) (le Maire and Schjerning, 2013) and the US (Saez, 2010); and, in developing countries such as Pakistan (Kleven and Waseem, 2013; Best, 2014). The total set of distortions due to an expansion of the tax-base, summarized by dB, can be decomposed into the behavioural responses of self-employed and the behavioural responses of employees

$$dB = (1 - \varphi_s \mid s \geq K - dK) \cdot dB_{1-\varphi} + (\varphi_s \mid s \geq K - dK) \cdot dB_{\varphi} \tag{1}$$

where $(\varphi_s \mid s \geq K - dK)$ denotes the employee-share of employment for income above the new exemption threshold, which is equal to the old threshold, K, minus the decrease in the threshold due to the reform, dK. Equation (1) makes clear that the higher is $(\varphi_s \mid s \geq K - dK)$, the lower will be the distortions caused by the tax-base expansion. Since reform-caused distortions are part of the marginal cost of the reform, it follows that higher employee-share above the new exemption threshold lowers the marginal cost of tax-base expansions which I write as (abusing notation)

$$\frac{\partial MC\,(dK < 0)}{\partial \varphi_{s|s \geq K}} \leq 0 \tag{2}$$

Using (2) leads to the main prediction of the model

Prediction 1: 'development'-induced emloyee growth leads to an expansion of the income tax base through decreasing the marginal cost of lowering the income tax exemption threshold.

Since development is here modeled as an increase in employee share in all deciles s, it will in particular lead to an increase in employee-share above the post-reform exemption threshold, which in turn lowers the size of reform-induced behavioural responses (again abusing notation)

$$\frac{\partial B}{\partial \varphi_s \mid s \geq K - dK} = dB_{\varphi} - dB_{1-\varphi} < 0 \tag{3}$$

Smaller reform-distortions (3) make it less costly to lower the threshold, which leads to a improved marginal gain-cost trade-off from base-reform and causes the optimal threshold $K^*$to decrease.

3.3 Extension: optimal tax mix over the development path

Motivated by the observation in the introduction that across levels of development, the tax-mix (i.e. the composition of tax revenue shares across tax instruments) differs widely, I provide the intuition for how my employee-based development-channel can address this empirical fact. If the government's objective is to maximize welfare of agents subject to a government budget constraint over a set of tax-instruments, say personal income tax, PIT, and a selective sales tax, SST, then optimal PIT^* and SST^* structures will be set to equalize their marginal cost of funds (Mayshar, 1991; Slemrod and Yitzhaki, 2002)

$$MCF_{PIT^*} = MCF_{SST^*} \tag{4}$$

By definition, the marginal cost of funds is increasing in the marginal excess burden, which in turn is increasing in dB. In a representative developing country where, as I document in Section IV, employee-share of employment is very low in all lower deciles of the income-distribution, the marginal cost of funds from setting K in the lower deciles would be large, possibly larger than MCF_{SST}: hence the government sets a high K (where employee share is prevalent) such that

$$MCF_{PIT^*}^{Developing}\,(\text{High } K) = MCF_{SST^*}^{Developing} \tag{5}$$

In turn, since K is high, the income-tax base is low and resulting PIT take is small, relative to the SST take. Equalizing MCFs in (5) leads to predicted optimal tax-mix which is consistent with the tax-structure in a developing country. In a developed country, on the other hand, PIT take is high and SST take is. In terms of the model, this can be explained by the fact that due to the large increase in employee-share in deciles further down the income-distribution, the marginal cost of funds of setting K in a lower decile. Assuming development has not changed the distortions caused by the SST, this development-induced employment change implies optimal tax-mixes in developed and developing countries which satisfy

$$MCF_{PIT}^{Developed}(\text{Low}K) = MCF_{PIT}^{Developing}(\text{High}K) = MCF_{SST^*}^{Developed\,(Developing)} \tag{6}$$

In turn, since $K^{Developed} < K^{Developing}$, PIT tax take is higher in the developed than in the developing country. The distortions relating to SST have not changed, hence its optimal structure is unchanged. (6) leads to the following prediction

Prediction 2: 'development'-induced employee growth leads to a change in optimal tax-mix, towards greater reliance on income taxes and substitution away from more distortive taxes, such as selective sales taxes

Income taxes increase as a share of total taxes and as a tax take over development levels, and the selective sales tax decrease in tax-share and remain constant/decrease as a tax take over development levels. These predictions are consistent with the observed variation in tax-mix across development levels identified in Kleven, Kreiner and Saez (2014, NBER) and re-iterated in the introduction. In the empirical setting using within-State variation in U.S. individual States and a plausibly exogenous increase in employee employment share, I find that income tax take increases and selective sales tax take decreases, consistent with prediction 2.

3.4 Competing model: marginal revenue-horizontal inequity trade-off

Finally, I briefly discuss an alternative channel distinct from the deadweight loss story by which employee employment share may lead to an expansion of the income-tax base. This model is also based on the assumption that self-employed have larger reported earnings reponses than employees. Assume in the extreme case that self-employed can fully evade any tax liability, while employees cannot evade at all. This difference in evasion-opportunities will cause a gap between the employee-share of employment on the statutory base, and the employee share of employment on the effective tax base. Indeed, while the tax-base statutory employee-share is still $(\varphi_s \mid s \geq K - dK)$, the employee-share of the effective tax-base will be 1 - since all self-employed in the statutory tax-base evade taxes and do not appear in the effective tax-base. Under these assumptions, the ratio $\left[\frac{\text{employee-share in effective tax-base}}{\text{employee-share in statutory tax-base}}\right]$ is always weakly greater than 1, and the larger the ratio the larger the 'horizontal inequity' between employees and self-employed on the effective tax-base. Since $Corr\,(\varphi_s, s) \geq 0$, horizontal inequity (always weakly) worsens as K is lowered. Modeling horizontal inequity as cost to government (or society), the reform $dK < 0$ will be undertaken if the trade-off betwen marginal revenue gain and marginal increase in horizontal inequity improves. The model prediction is observationaly equivalent to Prediction 1: developmend-induced increases in employee-share φ of deciles weakly above the new threshold, $\varphi_s \mid s \geq K - dK$, will decrease the horizontal inequity associated with lowering K and lead to optimally expanding the tax-base by $dK < 0$. This channel may be complementary to my proposed DWL-driven and incorporated in a decision rule which lowers K whenerver marginal gain outweights the generalised (DWL+horizontal inequity) marginal cost. But the horizontal inequity model does not in any intuitive way deliver the prediction which relates changes in employee-share to changes in optimal tax-mix, though it is an important empirical regularity which is consisent with the DWL-driven model (Prediction 2).

4 3 stylized facts on employee employment, PIT instruments and PIT take over the development path

In this section, I outline three stylized facts about employee employment, the instruments of personal income tax and PIT take over the 'development path'. To establish these facts as robust, I proxy for development using micro-data based either on a current cross-section of 84 households surveys, or on long-run historical data within the US (1870-2010).

4.1 2 stylized facts on changes to employee shares and PIT exemption thresholds wihtin the income-distribution over the development path

In this sub-section, I show how the employee employment share is increasing is the deciles of the income-distribution, and that this profile moves left over the develoment path: this is styllized fact #1. I show how the personal income tax exemption threshold K locally moves down deciles of the income distribution and tracks employee growth in those local deciles; this results in a location of K in the income-distribution such that the employee share in deciles above K is constant and high, at $\approx 80\%$. I label this stylized fact #2.

4.1.1 Stylized fact #1 and #2: household micro data across 84 countries

Data and methodology My cross-country collection of micro-data sets is a set of household surveys, drawn from various sources including the Luxembourg Income Study and the databases of the World Bank. In the data Appendix, I provide a complete description of each country micro dataset that I use. Importantly, the household surveys are well-balanced across levels of per capita income, as I have an almost equal number of surveys in the four WB income-group (low-income, lower-middle income, upper-middle income, high income).

In each household survey, at the individual level I observe the occupation category, the industry category and total earned income. I define an invidual to be an employee if he/she reports having an employer/being the employer; and, works in a firm of size strictly greater than 1. I define a self-employed individual as an individual who reports working for his own account; as an employer in a firm of size 1; as a member of a family-business without employer. Though family-businesses include more than 1 worker, I code them as self-employed due to underlying lack third-party verifiable information trail that may be used to detect under-reporting of earned income.

Within each survey, I first rank individuals according to their income and construct a nationally representative income-distribution, which I partition into 10 deciles. Denote each decile $s = 1, .., 10$. Within each decile s, I compute, using populaiton weights, the agricultural share of total employment, agr_s and I compute, within agriculture and within non-agriculture $1-agr_s$, the employee-share of employment, denoted φ_s and the self-employed employment share of employment $1 - \varphi_s$. Throughout, I will display the decile agriculture employment share of total employment agr_s and the employee and self-employment shares of non-agricultural employment, respectively $[\varphi_s \mid 1 - agr_s]$ and $[1 - \varphi_s \mid 1 - agr_s]$. I condition on non-agriculture because it allows me to study in a consistent way the same tax-base over all countries. Indeed, in some developing countries, including China and Pakistan at the federal level, agricultural income is entirely exempt from the personal income tax schedule. I can therefore document on the non-agricultural employee share over the income-deciles to show where the third-party reported and taxable income is concentrated, and I can document on the location of the importance of agricultural employment over income-deciles.

With such a set of data points -s, agr_s, $[\varphi_s \mid 1 - agr_s]$ and $[1 - \varphi_s \mid 1 - agr_s]$ - in hand for each country, I construct 'development representative profiles. First, I group all survey

data into 10 bins, based on the per capita income of the country in the year of the survey. I denote these as 'development levels', ranging from \$277 per capita to \$53,234 per capita. Then, within each development-level bin, I construct the average shares of the three key variables within each the ten deciles, using as country-weights the nationally representative sample of the country in the total representative sample of the per capita income bin. I label the the resulting profiles as 'development representative' profiles, because they represent the average income-distribution profile for the set of countries which have similar development-levels.

Stylized fact #1 The results of this exercise are reported in Figs.4-8. The change to the employee share of non-agricultural employment over income-deciles is very gradual over development levels. In the lowest income profiles (Figure 4), representative at \$277 per capita and \$650 per capita, employee-employment share is entirely concentrated in the top deciles. As the development level increases, the employee-share increases in deciles locally to the left of the top deciles, and remains very low in the bottom deciles. At an average per capita income of \$6,945 (Figure 6), employee share has reached a plateau at 80 percent of non-agricultural employee everywhere down to the 4th decile. The remaining increase in employee share as development occurs will take place in deciles below the 4th, until the employee-share is roughly uniformly distributed across deciles, in the highest per capita income profile at \$53,234 (Figure 8). The employee-share of non-agricultural employment is thus everywhere weakly increasing in the income-decile, and the profiles moves to the left over the development path: this is stylized fact #1.

The graphs also allow us to study the importance of agriculture and non-agriculture self-employment in the transition into employee employment. In particular, at low levels of development, the transition is driven both by movement out of agriculture and out of non-agricultural self-employment: both agricultural share and non-agricultural self-employment shares are steeply decreasing over income-deciles. At higher development levels, agriculture is less prevalent and is uniformly distributed over income-deciles; consequently, at these levels of development the employment-transformation is entirely due to a transition within non-agriculture from self-employment to employee status.[1]

As a possible robustness check, I can compare the agricultural employment share estimates in my sample of countries relative to external databases. This is reported in Figure 29 of the Appendix, where I compare agricultural employment shares by groups of per capita income to agricultural employment shares from the WB agriculture data-base, for the same set of countries: the two sets of estimates are very similar, at all levels of average per capita income.

Stylized fact #2 For the set of country-years where I have micro-data on income, occupation and industry, I coded the national income tax schedule to be able to locate K, the personal income tax exemption threshold, in all countries' respective income-distributions:

[1]It is probable that at low levels of development, the majority of low-earning agriculture is characterised by self-employed occupation status - hence if I recomputed self-employment shares including agriculture and non-agriculture, the transition into non-agricultural employee would be entirely due to a transition out of self-employment throughout all levels of development. I will produce these graphs in the online Appendix.

this is illustrated for the four selected countries India, Indonesia, Brazil and the US in Figure 9. Though this finding is descriptive in nature, the location of K in each country is consistent evidence with the prediction of the DWL-driven K-location model of section 2: K is constantly located such that the non-agriculture employee share above K is never lower than 75-80 percent. Hence while the aggregate employee employment share and the distribution of employee mass over income-deciles changes dramatically across development levels, the employee mass in the statutory income tax base remains constant and high throughout development. I systematize this observation in Fig. 10. The graphs plot average observations for the ten 'development level' groups used to display the profiles in Figs.4-8. The left-hand panel shows the average value of K in terms of per capita income, y. This ratio K/y is extremely high at low levels of development: in the average country at \$277 per capita, the exemption threshold is approximately twenty times higher than per capita income. The ratio drops as the development level increases. The right panel shows, for each 'development level', two points: the aggregate non-agricultural employee share, and the non-agricultural employee share in income tax base (in deciles above K). While the aggregate employee employment share increases progressively from 10 percent to 90 percent, the employee share of employment in the income tax base remains remarkably flat, varying only from 80 percent to 90 percent. This is stylized fact #2. It is consistent with the within-country panels in Figure 9: over development, K moves down the income-deciles to track growth in employee employment share, resulting in a constantly high employee share on the statutory tax-base.

4.1.2 Stylized facts 1 and 2: long-run micro data within country US 1870-2010

To establish that these observations are not unique to the choice of household surveys, nor to a cross-country measure of development, I will show that the same stylized facts are observed within-country over the long-run. The argument here is that if the same stylized facts are observed across development today, and within-country over the long-run, then the facts may reflect equilibrium outcomes along the 'development path'.

The methodology to produce the graphs is exactly the same as in the setting of the household surveys. In terms of the data, the main difficulty lied in the fact that income-occupation observations at the individual level are were not publicly available before 1950 for nationally representative samples (after 1950 the US Census provides the required data). Relying on administrative tax returns (which date back to 1913) will not work, since I need to observe income and occupation for households that are located below the threshold K and hence may not file tax returns/may evade filing. I consrruct two historical pre-1950 profiles. For 1935, I use the Study of Income and Consumer Purchases, accessed through the historical records of the US Dept of Labor Statistics and the former US Bureau of Home Economics. The survey design developed there was the fore-runner to the design adopted by the Census in 1950; the survey "interviewed a sample of all families in the United States 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 farms." I construct an additional profile in 1870, using the historical Census 1 percent sample. This sample includes occupation category at the individual level which allows a consistent definition of agriculture, self-employment and

employee status. The income variable is constructed by collecting sub-State, local sources of information on earnings in these same occupation categories. The income-variable is thus varying at the sub-State geographical-occupation level, where I match it with the occupation and industry classification data.

All surveys contain nationally representative weights, and I construct the U.S. Federal profile over time using the exact same methodology as in the household survey cross-section. Profiles for 1870, 1935 and 1950-2000 are shown in Figures 11-12. The main point is how strikingly similar the US long-run changes to the employee, self-employment and agriculture profiles are to the cross-current income levels profiles. In 1870, on the eve of the 2nd Industrial Revolution, the employee share of non-agricultural employment is only substantial in the very top decile; both self-employment and agriculture are steeply decreasing over the income-deciles. By 1935, agricultural employment is low and uniformly distributed across income-deciles; the transition is entirely between non-agricultural self-employment and employee mass; and the employee share has reached a plateau around 75-85 percent in all deciles above the 4th decile. In the following decades, the employee share increases predominantly in lower deciles, until it becomes uniformly distributed at 85% over deciles by 1970. This long-run within-US evolution of the profile is entirely consistent with stylized fact #1.

Coding the U.S Federal income tax in all years where I can show the profile allows me to study the movement in K over the years where the profile changes. Again, K seems to closely move down the income-distribution as local employee share growth occurs, resulting in a tax-base employee share equal to roughly 85-90%. This is entirely consistent with stylized fact #2.

In the Appendix, I document on the change to the employee and self-employed profiles within Brazil over 40 years between 1970 and 2010 (Figure 29). The qualitative features of changes to the profile are also entirely consistent with stylized fact #1, suggesting my results are generalisable from current cross-income and within high-income countries over time to lower-middle income countries over time.

4.1.3 Stylized facts #1 and #2: pooling all US historical and current cross-country profiles on a constant per capita income line

As a final exercise in this subsection, I pool together all US historical profiles and all current household survey profiles, using the Maddison historical income dataset to assing comparable 'real per capita income' to all profiles. For each historial US profile, I find the country in the cross-section which has the closest real per capita income, and plot the two profiles. For US 1870/1935/1950, these countries were India/Brazil/Argentina. Figure 13 displays in sets of three panels US historical and the cross-section profiles at same real per capita income. The close resemblance is striking, both in terms of the distribution of employee, self-employed and agriculture, and in terms of the location of K. Again, to systematize this observation, I segment the Maddision real per capita income line into bins, and construct for each bin, the average non-agricultural employee share in total employment and in employment above K in the statutory tax base, for the historical US profiles and for the cross-section profiles. These results are in Fig.14. The upper panel shows how, conditional on a real income level,

the historical aggregate US employee share in employment and the average cross-sectional employee share in employment almost exactly coincide. What's more, the shares follow a very similar path over increasing income levels. The similarity of aggregate employee employment shares in the US long run and in a current cross-development section over the real income line both in terms of levels and in terms of trends is suggestive evidence of a structural employment-transformation that takes place over the development path. The right panel plots the average non-agricultural employee share of employment in the statutory income base, at different real per capita income levels, for the US historical series and for the current cross-development. The constant, high employee share in the taxbase that overlaps in the two series is another piece of evidence of stylized fact #2.[2]

4.2 Stylized fact #3: PIT base and PIT take over development path

To complete this section on stylized facts, I document on the observed correlation of the PIT base and cross-development differences in PIT take. Given the omission of exemption threshold from studies of total and income tax studies, these are amongst the first basic facts to document on the importance of statutory PIT base as an instrument in explaining PIT and total tax take. I present basic correlations which revert previous studies' findings (including Gordon and Li, 2005) and show that variation in income tax instruments *is* associated with variation in onserved tax take variation both wihtin the group of less developed countries (unlike in previous studies) and in more developed countres (like in previous studies); I show that the difference in findings is entirely driven by previous omission of the size of the income tax-base, which is highly (negatively) correlated with the total tax take *both* within developing countries *and* within developed countries. I label this the third stylized fact. This 'stylized fact' suggests previous studies' flawed conclusion that income tax analysis was irrelevant in less-developed countries and should be reserved for higher-income countries stemmed from the failure to account for the impact of the income tax-base instrument on total tax take.

Previous research has pointed out that marginal income tax rates hardly explain any of the observed varation in total tax take for lower income-countries, while they explain a significant part in higher-income countries. Gordon and Li (2005) suggest these differences in tax policy can be explained by greater tax enforcement problems in poorer countries. While enforcement capacity undoubtedly varies across levels of development and impacts total tax take, part of this observed difference in tax policy could also be explained by the extreme variation in statutory size of the tax base in less-developed countries that we observed in the previous subsection. I present correlations in Table 1 to support this idea. Cols (1)-(2) replicate the 'Gordon Li' analysis: splitting the sample at median per capita income, the correlation between marginal income tax rate and total tax take entirely insignificant, and the R-squared is 0.0052 (Column 1), while in higher-income countries there is a strong

[2]As a robustness check, in Appendix Figure 30 I plot for all overlapping years, the employee share of employment in the taxbase based on my sample calculation, and the employee (wage-earnings) share of total reported taxable income using IRS data. The two series are very close in levels and track each other over the sample-years.

and positive correlation with an associated R-squared of .4207 (Column 2). In Cols 3-4, I replace the statutory tax-rate by K/y: I find a large, 5% significant negative impact, with an R-squared of .1367 in the set of low-income countries, while in high-income countries I find a large negative significant impact with an R-squared of .4901. When I include both statutory instruments, I find in the low-income sample that tax rates remain insignificant, while the size of the tax-base continues to be highly correlated with lower total tax take; in the high-income sample, both tax instruments are significant, though the marginal tax rate only marginally so, and the absolute magnitude of the tax-base coefficient entirely dwarfs the tax-rate coefficient by a factor of nearly 40 to 1. These results are robust to using the average tax rate instead of the marginal tax rate, as calculated by Peter et al. (2010)

Turning to the specific personal income tax take, in the full sample of countries I find a negative significant correlation between PIT take and size of tax-base in Column 7, with an R-squared of .3157. This negative correlation remains significant when one includes the marginal tax rate as a regressor; the tax base coefficient again dwarfs the tax rate coefficient and is economically very large: a 1 percent increase in the ratio of exemption level to average income is associated with a 2.04 percentage points decrease in PIT take, or an 18.7 percent decrease. In Column 3 I study the reduced-form impact of variables which are hypothesized to lead to higher income tax take: share of country years in external war (from Besley and Persson, 2013) as a proxy for demand for public good; the ratio of the 9th to the 1st decile income, as a proxy for income inequality; a dummy for withholding on wages, as a proxy for income tax enforcement capacity; and, the channel studied in this paper, the employee share of total employment, to proxy for third-party reported enforceable mass. The reduced-form correlation between employee share and PIT take is large and the only significant correlation at 5% or less. Interestingly however, when one controls for the full statutory tax structure (tax rate and size of tax base), the reduced-form correlations entirely lose their significance.

These findings suggest that the size of the income tax base is an important correlate with observed variation in total and personal tax take, and that variation in the size of the base tax take can account for a signifcant portion of observed variation both across the full sample of countries, and within the groups of low-income and high-income countries. Stylized fact #3 implies that stylized facts #1 and #2 are potentially determinants of changes to tax take both along the 'full' development path, and more incrementally over development changes within income-groups. Taken together, the three stylized facts suggest it may be equally important to study the impact of employee growth on the income tax base and PIT when relative to a baseline development profile at $1,500 or at $15,000.

5 U.S. States as a taxation-development laboratory

In this section, I use the setting of U.S. individual states to study changes to the employee employment profile and to the State PIT base. I focus on a policy where a legally-uncertain take-up process led to some States earning the right to engage in industry-subsidies - which was historically referred to as the era of 'industry experimentation' in the US (Cobb, 1993). I try to extract exogenous variation in employee employment off the variation in industry-

subsidy take-up. In turn, I correlate the exogenous employee increase with within-State changes to the State PIT base, and observe an associated decrease in the State income tax exemption thresholdwhich is consistent with the DWL-model of Section 1. The subsidy-based increase in employee employment also correlates with an increase in income tax take and a substitution away from disttortive taxes such as selective sales taxes, while I find no substitution away from less distortive taxes, such as the general sales tax. These findings are consistent with model Prediction 2.

5.1 Stylized facts within-States over time

In this subsection, I provide documentation on the evolution of employee employment growth and State tax structures. I show that in all State PIT-years (1945 onwards), the within-State changes to employee employment profiles are very similar to the cross-development changes (stylized fact 1), and that the decrease in State PIT exemption threshold K, moves down the income distribution to track employee growth in local deciles, while maintaining a consistently high employee share of employment above K (stylized fact 2). Finally I show that cross-State per capita income variation correlates with observed variation in tax-mix that is similar to the cross-country per capita income variation in tax-mix.

State-distributions over time and setting of K-state Focusing on within-State changes in Mississippi and in New York between 1950 and 2010, I show that changes to employee employment profiles and location-changes to K are consistent with the changes in profiles established in Section IV. During the years 1950-1980, Mississippi was experiencing rapid aggregate employee employment growth (Figure 15, Panel A). The employee-growth scatters across income-deciles much as across the development profiles: first there is an increase in the top deciles; then a plateau of high employee-share down to the middle deciles; finally, towards the end of the growth period, all employee mass increases are concentrated in the lower deciles. In 1980, when aggregate employee employment growth in Mississipi comes to a halt, the employee employment share is high at 85% and uniformly distributed across income-deciles. State-K in Mississipi moves down the income-distribution over the years of employee growth, and tracks increases in employee decile employment share to consistently maintain a high employee share above State-K, at around 80-85%. These findings are consistent with stylized facts #1 and #2.

The profiles does not change in Mississippi between 1990-2010, nor in New York between 1950 and 2010. The point of showing these profiles (panel B Fig 15 and Panels A-B Fig 16) is exactly to document that when aggregate employee mass has topped out at 90% and there is no change to the employee profile, State-K is located in the bottom deciles and remains located there. In 1950 New York, the employee employment share is already high at 90% and uniformly distributed across all deciles, and the New York-K is already located in the 2nd decile. Over the next 60 years, New York-K will remain almost perfectly constant in the 2nd income decile. This evidence is entirely consistent with the DWL-driven model of K-location.

This observation - decreases in K only observed in years where the employee employment profile is changing - thus seems to hold within-State. Figure 17 shows that it is also valid cross-State, for extreme (low/high) and for intermediate values of employee shares. It shows for the states Mississippi, Oklahoma, Colorado and New York the cross-sections of employee profiles and State-K in 1950 (Figure 17 Panel A) when the profiles were heterogeneous over the four States, and in 1990 (Figure 17 Panel B) when the employee profiles were identical. Again, the cross-State differences in the location of K is entirely consistent with the cross-State heterogeneity in State profiles, and when State profiles coincide, location of K coincides as well.

To systematize these observations, I take each State-year data-point on employee-share and on State threshold K relative to State average income y. I apply a deflator to all year-State income observations, and plot the employee-share and K/y in all State-years along this 'real income' line. Finally, I calculate the average employee share above K for all State-year observations within bins of this real income line. These are the three panels of Fig.18. The main point is that, like in the cross-development setting of Section IV where we compared countries, the U.S. individual States setting generates huge increases in aggregate non-agricultural employee share and large decreases in K/y over development levels, while the employee share of employment on the State PIT base remains remarkably flat, at $\approx 80\%$. Hence, within the setting of individual U.S. States, we observe the same stylized facts #1 and #2 as in the cross-development setting.

To finish this sub-section, I show that the cross-development variation in tax-mix observed in the setting of the States' tax structure closely resembles the patterns detected in the cross-country correlations (Figure 3). Figure 19 shows that across levels of development (constant per capita income proxy), the State-year individual income tax share of total taxes increases strongly, while the reliance on selective sales taxes decreases equally strongly: interestingly, the slope coefficients suggest changes in reliance exactly off-set each other for these two sources, which is also what I find in the regression analysis which exploits a shock leading to higher individual income tax take. Figure 19 also documents that corporate income share in total taxes remains almost perfecly constant whlie general sales tax share increases midly over development levels. These four facts (increased reliance on individual income, decreased reliance on selective sales, weakly increasing reliance on general sales, constant reliance on corporate income) perfectly line up with the cross-country observed variation in tax-mix (Figure 3).

Taking stock, the employee employment profiles and the tax structures at the State level generate cross-development patterns which are entirely and robustly consistent with the 'development path' stylized facts #1, #2 and #3. This suggests that the findings in the next section, relating exogenous employee growth at the State level to an expansion of the State PIT base (consistent with #1 and #2), an increase in State PIT take, and a substitution away from State selective sales taxes (consistent with #3), may be informative about the causal mechanism underlying the 'development path' stylized facts.

5.2 Variation in employee employment

In order for me to study the impact of increase in employee employment on the PIT-base, I have to find variation in employee employment which satisfies the exclusion restriction. In this setting, it implies exploiting employee employment variation over time within-State which does not explain changes to the personal income tax base other than through changing the labour market structure.

Institutional setting: 'industry experimentation' and development bonds I focus on a specifc State-time varying policy which was purposed to increase industry employment at the State level. From the mid-1940's, individual States across the U.S. engaged in the construction/renovation of industrial facility, which the State would then lease out to private enterprises. These subsidy programs were aimed at enhancing the attractiveness of locations as competition of industry intensified after WWII. (Cobb, 1993). Rather than subsidizing the operating cost of firms directly (through credit or tax subsidies per example), States enhanced their attractiveness by recognizing that availability of facilities was a key criteria in a firm's location-decision: "A study of the factors influencing industrial location is revealing about the role of the availability of buildings for lease in the decision process (...) from a survey of 5000 companies that had expanded or relocated in southern States during a five year period, the "availability of buildings or other property" ranked near the top in importance and financial aid near the bottom" (Cobb, 1993).

The State would step in to fill the credit gap and spur growth in supply of industrial facilities. To finance these facility developments, States invented the 'industrial development bond'. The State would emit either revenue-issues or general obligation bonds, and employ the debt-raised funds to finance the industrial facilities. Revenue-issues were secured only by the company's plant rental obligations. The smaller share of development debt was issued as general obligation bonds, where the emitting entity (most often a county) would pledge its 'full faith and credit' to service the debt. When issued as a general obligation bond, it was therefore more likely to be taken up in the market whenever the issuing entity proved more able to service the debt, i.e. whenever the outstanding debt to cash and securities holdings of the entity weas lower. In addition, in early periods the Federal income tax exempted interest received from development-bonds, which meant they commanded more favorable terms in the money market than comparable corporate debt (Dept Commerce Commission, 1965). Below, I will exploit exogenous variation along these two dimensions to create an instrument for successful bond issuance.

This use of development bonds is anecdotally referred to as the era of 'industry experimentation' (Cobb, 1993). Indeed, the States which chose to engage in industry-subsidizing had to do something they had historically never proceeded to do: engaging in lending of public credit for private purposes. As a consequence, implementing the ability to subsidize industry was costly, from a judicial-administrative point of view. On the 'extensive margin', all States had to rewrite their legislation to provide a legal right to issue; in 75% of the cases, this involved amending constitutional provisions which specifically prohibited the lending of public credit for private purposes. On the intensive margin of issuance, all States required

approval by State legislature (supervisory agency) for each intended industry-bond issuance; in most States, (Commission report) this required actual voter approval (most often at the county-level) of each bond-financed industry-project.

This peculiar institutional structure can be leveraged to generate quasi-experimental variation in timing of policy-reform across space and time. Indeed, because a subsidy-project often required participation of the citizens, the outcome of proposed bond-issuances was uncertain. Many proposed issuances only passed by narrow margins: "In some areas of Tennessee, however, (...) counties or sub-county districts have moved into the gap and proceeded to hold elections for the issuance of industrial development bonds resulting in approval by very narrow margins." (US Commission report, 1965) In addition, development bonds issued by individual counties were competing in the same capital market, meaning that marginal differences in liquidity/reservability of the debt between counties drove a large part of the variation in successful take-up of bonds. As a consequence, some States amended their legal setting to be able to issue bonds and were largely successful in take-up; some States amended the legal setting but did not manage to generate any take-up of bonds; and some States never eventually amended their legal setting. If the amending but non-issuing States are similar to amending and issuing States in all regards except the marginal success of bond take-up, then they potentially constitute a valid counterfactual for employee growth in reforming States under the no-reform scenario: I will exploit this feature in the regression model.

Why did the local governments engage in industry-subsidies? Many of the local governments which engaged in the industry-subsidies appear to have acted out of necessity to spur employee growth: "(...) the dubious distinction of being last or near last in every measure of industrial development irked many influential Mississippians." (Cobb, 1993) Indeed, large pockets of local labor markets in reforming States were 'under-developed' in the sense of being characterised by excess amounts of rural low-skilled, self-employed households mainly engaged in farming. The argument for state-supervised industry-subsidy programs was an absence of private credit markets which could finance the expansion of industry to reach these rural under-employed areas. Indeed, in regions of the reforming States, the private banking sector was often either geographically restricted by regulation, meaning it could not supply funds in the rural areas where credit was needed, or was simply not big enough to take on the default-risk commanded by the volume of loans needed to finance the industry buildings.

A key confounding hypothesis when relating the policy-impact to expansion of the PIT base is that the policy-reform itself was motivated by time-varying increase in taste for government revenue among reforming States. I provide several pieces of empirical evidence against this hypothesis. Here I simply highlight that many of the reforming States, noticeably in the South and Midwest, were historically ostensably conservative regarding the extent of government intervention. Historical accounts suggest "the role in state-supervised publicly subsidized economic development programs was not attributable to greater ideological flexibility (...) [among adopters] than among southerners in general (...) As other States enacted similar measures, southern development leaders remained staunch defenders of conservative government and the free-enterprise system." (Cobb, 1993)

To better understand the reasons why local governments chose to engage in the industry-

subsidies, I estimate a linear probability model of the State-time varying probability of reform. I model the probability of industry-reform as a function of a set of region-year fixed effects, State fixed effects and State-time varying covariates. This is also the baseline model in the regression analysis. I include a linear time-trend interacted with a cross-section of State-specific historical employee-share to model the fact that States at lower levels of industry development are more likely to reform. One might also expect that States where counties are more able to service their issued development bonds will have a higher likelihood of bond take-up and hence are more likely to implement the policy-reform. On the other hand, I want to focus the impact of debt-conditions on industry-reform in counties where there was genuine excess of low-skilled, self-employed workers. I use the county-level list of 'redevelopment areas' characterized by under-employment and excess low-skilled self-employed, drawn up by the federal Area Redevelopment Administration in the early 1950s. The ARA was set up in the early 1950 to provide a Federal definition of 'under-employment' in rural counties, where the industry-subsidies were meant to spur employee growth. I calculate the pre-reform debt service ratio, the ratio of debt service payments to cash and security holdings[3], at the county-level for all counties classified as redevelopment areas according to the ARA. I compute the average of this ratio at the State-level and define a State s as 'debt healthy' if its average redevelopment-areas' debt service ratio is below the median ratio in region j

$$1\,(\text{Healthy Debt})_{sj} = \begin{cases} 1 & \text{if} \left[\frac{\text{Debt}}{\text{Cash+Securities}}\right]_{s1950}^{RedevCounties} \leq Median_{j1950} \left[\frac{\text{Debt}}{\text{Cash+Securities}}\right]^{RedevCounties} \\ 0 & \text{o/w} \end{cases} \tag{7}$$

Over my period of study, both the limit on the bond issuance amount and the exemption of the earned interest from development bonds on Federal personal income tax changed in the mid-1960s, which caused a change in the attractiveness of development bonds relative to other State and corporate debt. (Cobb, 1993) I interact this change in Federal tax law with the State cross-section of $1\,(\text{Healthy Debt})_{sj}$ and hypothesize that States with more 'debt healthy' development areas are more likely to engage in industry-reform, in the period where the industry-bonds generated a more favorable net-of-tax return.

One might also expect that changes to the political environment affect the decision to reform. Besley, Persson and Sturm (2010) show that political competition intensified over the sample of years in my study, and it is plausible that industry-reform was made more likely as political parties come under stronger pressure to deliver growth-oriented policies. I include the exogenous determinants of political competition used in BPS to study this hypothesis. Finally, I include lagged values of per capita income, income tax take and total tax take to model the hypothesis that the decision to reform may be triggered by local economic and or tax-shocks. I lag these variables both 3 and 5 years; the lag-choice is mainly because the length of time required since the decision to reform until actual bond-issuance occur suggests industry-reform cannot respond to contemporaneous shocks. I cluster all standard errors at the State level.

Results are reported in Table 2. First, Column (1) shows that within-region, States with lower pre-reform levels of employee-share are more likely to engage in policy-reform, which confirms the hypothesis that States subsidized industries to spur employee growth and catch

[3]The debt service ratio is used in financial economics and government finance statistics as a benchmark to gauge the health of a country's debt (see OECD database, per example).

up with the non-reforming States. Second, this effect is estimated conditional on a decreasing likelihood of reforming over time, which is occuring in all regions, as evidenced by the (not shown) region-year dummies. In the second column, I include the interaction between $1\,(\text{Healthy Debt})_{sj}$ and time-varying Federal tax treatment of development-bond earned interest. This State-time varying measure of debt-conditions explains a very large portion of the decision to reform, while the pre-reform employee linear-trend remains signifcant and hardly changes size. In Column 3, I include all potential political and socio-economic determinants. None of the exogenous determinants of political competition predict State-time variation in reform, nor do any lagged shocks to the local economy or to the State income tax take or total tax take. The State-time exogenous variation in debt-conditions continues to significantly and positively predict timing of policy-reform. Taking stock, these results suggest that historical low levels of employee-share and advantageous debt-conditions of counties targeted by the industry-reforms are the main predictors of policy-reform. In the empirical model below I always insert a historical employee linear time-trend, and I will instrument for policy-reform using the exogenous variation in county-time varying debt-conditions.

Graphical evidence: first stage impact and diff-in-diff parallel-trends Before turning to regression analysis, I first provide graphical evidence that legal reform and issuance of development bonds had a strong impact on non-agricultural employee growth, and that most of the increase in the non-agriculture employee employment can be accounted for by movement out of self-employment. As such, the policy-variation causes changes to employment structure which mimics the development-path transition from self-employment to employee employment studied in Section 2.

In Figure 20, I plot the raw data of wage-salary share of resident income over the long-run (1925-2005), by three groups: early reformers, late reformers, and placebo reformers. In the graphs, these groups are clustered at the region level. The shaded areas denote the periods of reform for each group; the placebo reform States regroup, within each region, the set of States that amended their legal setting at the State level to allow development bonds, but where no take-up of development bonds was observed at the sub-State level (usually county-level) was observed. This 'placebo' definition follows the classification of States in the historical Commission Reports of the US Department of Commerce.

The positive impact on wage-salary share of income seems to be concentrated in the early reforms. Further, there seems to be an immediate impact of the reform, albeit small in magnitude, and a long-run impact through an increase in the growth-rate relative to the placebo group. The basic regression setting allows for fully non-parametric regional year effects, such that the diff-in-diff impact is estimated off comparison between the reform-States and the placebo-reform States (and the late-reform States) within each region. The graphs in Figure 20 thus provide the closest 'visual equivalent' of the main regression model that I will employ. Note also that using the late-reformers as a control group for the early-reformers brings the regression model closer to satisfying identification assumption of pre-reform parallel trends.

Comparing reform-States to placebo-States only within the same region may appear a bit arbitrary, so I pursue a robustness strategy. For each reform-State I construct a synthetic

control State, using the set of placebo States as the donor-pool, and matching on State-varying characteristics, allowing a 'control group' for each reform-State which is independent of geographical location. In the graphs of Fig 21, I show the results of this exercise for the early-reform States, both when pooling all reform-States and when decomposing the reform-States by region. In these graphs, I construct the synthetic control by matching on log per capita income, employee share of employment and log population in the pre-reform periods. Using this method, the departure from trend of the reform-States is more clear, while the control and treatment are similar both in terms of levels and in terms of trends for most pre-reform periods. In the regression setting, I find, reassuringly, that the synthetic control diff-in-diff estimate is very close to the within-region diff-in-diff estimate, which suggests that the within-region placebo State is potentially a valid counterfactual of the within-region reform State. Fig 22 shows, using the raw data, the policy-reform impact for a selected subset of the early-reform States together with the placebo State.

The industry-subsidies targeted firms predominantly in the manufacturing sector (Cobb, 1993). Using the synthetic control method, Fig 23 shows that the impact of the reform does indeed seem to be concentrated in manufacturing. Both for the set of southern State-reformers, and for the average early reformer, the policy leads to a long-run increase of roughly 4 percentage point increase in manufacturing share of income. This corresponds very closely to the overall diff-in-diff estimated impact of the reform. This result alleviates concerns that my industry-reform diff-in-diff is only picking up changes in employment and earnings structure that are due to structural transformation, since this latter transformation impacts not only manufacturing but also services and other sectors.

Graphical evidence: impact of policy-reform over the income-distribution employee shares and location of K I now provide simple non-parametric graphical evidence that the policy-related increase in employee employment is scattered along the deciles of the income-distribution in exactly the same way as under a 'development-induced' change to employee mass, consistent with stylized fact #1 in Section 2. I also show that changes to the average location of the State personal exemption threshold in the two groups is associated with policy-induced changes in employee employment in exactly the same way as under stylized fact #2. Though entirely descriptive, this evidence provides an interpretation for how the regression-based identified variation in aggregate employee share locates over deciles of the treatment income-distribution; and how the change in aggregate employee mass may relate to the reduced-form identified impact of employee share on expansion of the income tax base.

Figure 24 shows, for the years 1950, 1960 and 1970, the average income-profile of employee employment shares in the amending and non-amending groups of States, within the South. These profiles are constructed in exactly the same way as those in Section 2 and 3.1. In 1950, at the onset of the industry-policy adoptions, the profile of the average industry-subsidizing State lied everywhere below the average non-subsidizing State, except for the two top deciles where employee employment shares exactly coincide. By 1960, the decile-shares of employee mass are indistinguishable down to the 5th decile. By 1970, when industry-subsidizing comes to a strong slow-down due to Federal regulation, the two profiles have converged down to the

1st decile.

The average locations of K in the industry-subsidizing (non-subsidizing) group is indicated by the black solid (dashed) line in Figure 24. Looking across the years profiled, the average location of the threshold in both groups is entirely consistent with the stylized facts of Section 2 under a MEB-driven location-choice of K: the employee-share above K is constant and high, at around 80%; growth in employee mass is associated with lowering of K down to a new decile, maintaining a constant employee share in the tax-base above K.

Based on these profiles, I can compute the simple diff-in-diff $DiD_j^{1960-70}$ over employee-share φ for income decile j, for the years 1960-1970 and for 1970-1980 as follows

$$DiD_j^{1960-70} = [\mathbf{E}(\varphi_j \mid T, 1970) - \mathbf{E}(\varphi_j \mid T, 1960)] - [\mathbf{E}(\varphi_j \mid C, 1970) - \mathbf{E}(\varphi_j \mid C, 1960)] \tag{8}$$

The set of decile diff-in-diffs for 1960-1970 and for 1970-1980 are plotted in Fig. 25. I overlay the average location of K in the treatment group in the 'before' and 'after' years. Though still descriptive, this graph suggests K moves down only to capture part of the employee share growth in lower deciles. The MEB-driven K-location model is consistent with this evidence: employee growth locally above and locally below K leads to a decreased marginal cost from lowering K, which is lowered until marginal cost is again equalized with marginal benefit.

These graphs also providence against the confounding-story whereby policy-subsidizing States were simply States with stronger taste for tax revenue. If the policy-subsidizing set of States were in fact revenue-maximizing States, there is no reason why K should not move further down the income-distribution (as far as below $K - Control$) when employee growth occurs in lower deciles. If subsidizing-States had larger taste for revenue, there is also no reason why in 1970, when the profiles have converged, average K in the subsidizing-group maintains K higher than in the average non-subsidizing State.[4]

This graphical diff-in-diff over deciles of the income-distribution provides an interpretation for how the regression-based identified employee growth is spread across income-deciles of the treated State; and, an interpreation for the identified reduced-form result that an increase in aggregate employee share is associated with a decrease in K and an expansion in the income tax base.

Regression analysis

Identification and estimation methods To estimate the impact of industry-subsidies on employee growth, I employ a difference-in-differences model of the form

$$Employee_{sjt} = \beta + \lambda_{tj} + \gamma_s + \alpha 1\left(Adopted\right)_{st} + \phi X_{st} + \varphi_s t + \varepsilon_{st} \tag{9}$$

[4]Not shown here, I have also computed the profiles across subsidizing and non-subsidizing States of average income across deciles. In 1970, the profiles of average income by income-decile have also perfectly converged across treatment and control States, yet K remains higher in the subsidizing State - inconsistent with the taste for revenue model.

where s denotes State, j denotes region and t denotes time. $Employee_{sjt}$ is the wage-salary share of income, $1\left(Adopted\right)_{st}$ is a State-time specific dummy which takes value 1 in all years when the State has amended its Constitutional setting to legally issue development-bonds, X_{st} is a set of control variables that vary across States and time, γ_s is State fixed effect, λ_{tj} is a set of region-by-year fixed effects. I include a set of State-specific linear time trends. In this diff-in-diff model, I compare changes in employee share in the treatment group before and after reform to the change in outcome in the control group. Because of the State-specific time-trends, the identification of the effects of the industry-reform comes from whether such policy-changes lead to deviations from preexisting State-specific trends. The graphical evidence suggested the impact of the policy-reform was sharp and immediately produced a structural break in the series, lending confidence to this identification strategy. Note that including the State-specific time-trends allow me to separate the effect of industry-reform from any impacts due to State-specific changes to the industry-environment which manifest themselves in the trend growth rate.

The difference-in-differences estimate α measures the average impact of the industry-reform on employee growth under the assumption that the change in employee growth in control States is an unbiased estimate of the counterfactual. The diff-in-diff estimator α may suffer from bias if there are some States in which reform took place, but there are no comparable States in which the reform did not take place. The peculiar institutional setting of the industry-subsidies helps me adresss this source of bias in different ways. As described earlier, successful industry-reform required both the legal amendment at the State-level and the take-up of issued development-bonds at the sub-State level. I observe States which legally adopted the framework for issuance, but never issued any non-trivial amount of bonds (US Dept Commerce reports). The adopting but non-issuing States should constitute an improved control group, because they are likely to share similar characteristics with the States that did reform, yet they did not receive the reform-treatment. I separate States that adopted the legal setting and issued bonds, $1\left(IndustryReform\right)_{st}$, from those that adopted but did not issue, $1\left(PlaceboReform\right)_{st}$, and as a first improvement I include the placebo-reform group of States in the diff-in-diff model

$$Employee_{sjt} = \beta + \lambda_{tj} + \gamma_s + \alpha 1\left(Adopt - Issuing\right)_{st} + \pi 1\left(PlaceboReform\right)_{st} + \phi X_{st} + \varphi_s t + \varepsilon_{st} \quad (10)$$

In this diff-in-diff model (10), the identifying assumption is that the policy-impact on employee share estimated off the structural break in series is uncorrelated with unobserved variables which exhibit the discontinuity around the reform-year and which impacts employee growth differentially across successful reform, legal-reform and non-reform States. As a second improvement, I construct a synthetic control group for each individual reform-State. The donor-pool for the synthetic control is the group of placebo-reformers. I match either on pre-reform covariates on pre-reform redevelopment counties' share of State labor force.

The diff-in-diff α now measures the impact of industry-reform on employee share by comparing changes in employee growth in successful reform States to non-successful reform States and to non-reform States, alleviating the concern over bias introduced by non-existing control groups. Figs 20-23 also suggested that secular time trends in reforming and placebon-reforming States were similar in pre-reform periods, which helps towards validating the basic difference-in-differences identification strategy. Below I will further adress this concern by showing that the results are robust to including only States on a 'common support'. The diff-in-diff coefficient on non-successful reforming States, π, also serves as a placebo check

as there should be no impact on employee growth in these States if my measure of policy-reform is genuine, that is, if legal reform and bond-issuance are both necessary conditions for successful industry-reform. . I cluster ε_{st} at the State-level.

Any characteristic varying at the regional level over time is fully captured by the flexible set of region-year dummies: this includes the labor market impact of the Civil Rights Act movement which began in the early 1960's in the South (Heckman and Payne, 1989). In the regressions, I always include the full set X_{st}: exogenous determinants of changes to political competition used in Besley, Persson, and Sturm (2009); the log of the population, to account for migration flows; and, log of per capita income, to control for any generalized growth which may be occuring over the timing of subsidy-adoption and impact employee growth.

Results: first stage In Table 3, I provide results from estimating variants of (10), where the outcome variabel changes across columns. In Column (1), the industry-reform is associated with a 4.034 percentage point increase in wage-salary share of resident income. There is no impact in the average placebo-reform State. The lower part of Column (1) tests for non-parametric pre-reform differential trends over the reform States: I find no such evidence that the reforming-States were on a differential pre-reform trend. In Columns (2) and (3), I find that the increase in wage-salary share can fully be accounted for by a transition out of self-employment income and agricultural income. As such, the industry-reform 'replicates' the basic transition between self-employment and employee employment that I document along the development path in earlier sections. Column (4) shows that the industry-reform led to an increase in the grouped sector of manufacturing-transportation-construction which is almost exactly eqautl to the total estimated increase in wage-salary share of income. I find no impact of the industry-reform neither on services, Column (5), nor on government wages, Column (6), which suggests my empirical model allows the reform-impact to be untangled from underlying State-varying income-shares due to structural transformation.

While the parallel pre-reform trends assumption seems to hold up in my setting, I perform a number of robustness checks for α^{DiD}. These are reported in Table 4. Column (1) repeats the DiD FE estimate from Column (1) of Table 3. In Column (2) I instrument for the industry-reform dummy with the time-varying changes in the debt conditions at the State-level, $1\,(\text{Healthy Debt})_{sj}$. This varying measure of favorable debt conditions was found to positively and significantly predict industry-reform in the reform decision-model (Table 2); the first stage F-statistic is equal to 24.03. The instrumented impact of the industry-reform is significant, and at a 6.6 percentage point increase in wage-salary share of income, is fairly close to the DiD FE estimate. In Columns (3) and (4) I construct a synthetic control for each reform-State, where the donor-pool is the set of placebo-reform States. I then estimate a diff-in-diff across pairwise treatment-synthetic control groups, with a full set of State fixed effects, pairwise-year fixed effects, and cluster at the State-level. In Column (3) I match on log per capita income, log population and employee employment share to construct the synthetic control, while in Column (4) I match on the pre-reform redevelopment counties' share of labor force in total State labor force. Using either set of covariates, I find an impact of the reform which is very similar to the DiD FE estimator. Finally, in Column (6) I use a propensity-score matching estimator to estimate the impact of the reform, matching on log

per capita income, log population, employee share of employment, redevelopment counties' share of employment, and restricting estimation the common support across treatment and control. At 5.27 percentage points, the propensity matching estimator is only slightly larger than the DiD FE estimator. The results of Table 4 together suggest that the basic DiD FE model constructs a valid counterfactual by use of the within-region average placebo reform State behavior.

Results: PIT base and 'filing base' expansion I now proceed to estimating the impact of the policy-reform on the State PIT base and tax-returns filing, where the effect should be operating through changes to employment structure. The econometric specification remains the same as for the employment outcomes (10), although I can no longer include a State-specific linear time trend: tax instruments do not exhibit enough non-linearity to estimate an impact of any break from pre-reform trend. Instead, I inlude linear time trends interacted with the cross-section of historical employee share, $t \cdot EmployeeHist_s$, and the cross-section of historical per capita income, $t \cdot PercapIncome_s$. I now include as an economic control variable the average income in all deciles of the State income distribution. This helps me separate the impacts of employee growth on state PIT base due to changing employment structure from the change in incomes that is associated with employment changes.

In Column (1) of Table 5, where the outcome variable is the log ratio of the State PIT exemption threshold K to State per capita income y, the policy-reform is associated with a 8.9 percentage point decrease in this ratio. There also appears to be no differential pre-reform trends between groups. Columns $(2) - (3) - (4)$ provide robustness checks for the estimated impact using respectively the same estimation technique as Columns $(2) - (4) - (5)$ of Table 3. The robustness estimates come out very similar to the DiD FE estimate. In Columns (5), I instrument for manufacturing income-share using the industry-reform dummy. The exclusion restriction now becomes that the policy-reform only impacts PIT base expansion through changes to employment structure; given that I control flexibly for changes to the income-distribution, this may seem a plausible assumption. Policy-reform is strongly correlated with manufacturing increase in income-share (F-statistic of 11.26). The IV shows that manufacturing growth is significantly associated with an expansion of the PIT base, consistent with the basic DWL-model of optimal setting of the tax-base.

To provide some corroborating evidence for the hypothesis that transition into wage-salary employment leads to an expansion of the PIT base by increasing the 'taxable' share of earners, I show in Columns $(6) - (11)$ that the industry-reform is robustly associated with an increase in the share of the population that files a tax return. In Column (6), the industry-reform is associated with a 2.31 percentage point increase in the share of the State-population that files a (taxable or non-taxable) return with the IRS, relative to a 34 pre-reform percent share. It should be noted that filing a return with the IRS is associated with compliance on the State PIT schedule, but also with compliance on the Federal PIT and other income bases. Columns $(7) - (9)$ document on the robustness of the tax filing result, and Column (10) shows that instrumented increase in manufacturing share of income is positively correlated with an increase in tax filing. Finally, in Column (11), I restrict the regression to the set of States where in the reform-years, the exemption threshold for State

PIT lied below the exemption threshold for Fed PIT: in this case, any increase in tax-filing due to lowering of the threshold can be interpreted as due to an expansion of the State PIT base. The instrumented expansion of the State PIT base does seem to be robustly associated with an increase in the filing-share of the population.

Results: tax take outcomes I turn finally to the effect of industry-reform on tax take outcomes. The effect should be that, by decreasing the MCF_{PIT} from lowering the exemption threshold, employee growth should lead to an expansion of the PIT base (Prediction 1), and an increase in PIT revenue relative to State GDP. Prediction 2 of the model states that if the Government is revenue-constrained there should be no impact from lowering MCF_{PIT} on other tax-bases while if the Government is revenue-unconstrained and seeks to minimize tax-distortions over the full set of tax-instruments, there should be a decrease in reliance on distortive tax-sources. I do not actually observe how government values the MCF of any tax-instrument. Instead I argue by 'revealed preference', that if a properly identified decrease in the proxy for MCF_{PIT} leads to a decrease in reliance on tax g, then I infer that $MCF_g > MCF_{PIT}$.

Changes to the MCF-ranking of tax-instruments over development due to structural factors including employment structure provides a theory to interpret observed cross-development variation in tax-mix, as outlined in Prediction 2. In the full-sample regressions, I find that the industry-reform leads to a decrease in selective sales tax revenue, which is consistent with employee growth caused by the reform leading MCF_{PIT} to fall below $MCF_{SelectSales}$. This finding in turn is consistent with the interpretation that the shift in tax-mix from selective sales taxes to personal income taxes observed across development of States (Figs 19) and cross-country (Fig 3) is in part due to employee growth causing MCF_{PIT} to fall below $MCF_{SelectSales}$.

The econometric specification is the same as for PIT base and tax filing outcomes. In Column (1) of Table 6, State PIT take is associated with a statistically significant .54 percentage point increase in industry-reforming States; this impact is large, relative to a pre-reform mean PIT take of .18. In Columns (2) and (3), I show that the industry reform is associated with statistically significant decreases in both selective sales taxes and licence taxes - consistent with partial substitution away from distortive taxes, as in Prediction 2 of the model. In Column (4), I do not find a statistically significant impact on total tax take, but the coefficient is positive and corresponds very precisely to the difference between the increase in PIT and the decrease in selective sales taxes. Finally, in Columns $(5) - (6)$ I find no impact on general sales tax or corporate income taxes, which are throught to be (much) less distortive tax-bases than both selective sales and licences. These null-results on general sales and corporate income lend further confidence to interpreating the diff-in-diff coefficients across PIT and selective-licence taxes as due to the MCF based substitution between bases of Prediction 2. Note, reassuringly, that across all tax takes, I do not find any significant pre-reform differential trends across groups. In Table 7, I show that the DiD FE estimated impacts on PIT, selective sales tax and licence tax are robust to instrumenting for the industry reform: respectively Columns $(2) - (5) - (8)$. Finally, in Columns $(3) - (6) - (9)$, I find that instrumented manufacturing income-share growth is positively (negatively) as-

sociated with PIT take (selective sales and licence tax takes), which is consistent with the hypothesis that industry-reform is associated with tak-take variation through its impact on income-composition.

To provide some support of the finding on substituting away from selective sales and licences, in Table 8 I decompose these total effects into the sub-components of the respective tax-bases. I use the basic DiD FE model to estimate reduced-form impact of the industry-reform. In Columns (1) to (4), I study the impact on the principal components of selective sales taxes: motor-fuel, public utilities, alcohol, and pari-mutuals. I find that the industry-reform is associated with a large decrease in motor-fuel tax and public utilities, but is uncorrelated with changes to the alcohol or pari-mutual tax take. This suggests the industry-reform is not simply picking a trend-decrease in overall selective sales tax, that occurs differentially across reform and non-reform States; it appears reform-States decrease reliance on selective sales tax sources which are arguably the most distortive and serve no purpose beyond simple revenue-raising. In Columns (5) to (8) I find a similar pattern for the sub-components of licence taxes. The left hand side variable is the decile of the State-year tax take of a particular licence source, over the decile-distribution of all State-year observations for that licence tax take. I find no impact on decile-location of the State in terms of alcohol licence, but I find that the industry-reform is associated with a 1 to 2 decile decrease in the importance of corporation licences, occupation licences, and public utility licences: again, the latter licences are arguably distortive and serve only a revenue-raising purpose, while the alcohol licences may serve objectives in addition to revenue-raising. Taken together, these results suggest the decrease in selective and licence taxes can be interpreted as due to the substitution-mechanism of Prediction 2, and are not due to differential decline in the tax-takes across reform vs non-reform States.

6 Conclusion

The ratio of total tax to GDP increases dramatically over levels of development. I propose an explanation to this positive correlation which runs from development to tax structures, over the long-run: development leads to structural transition from self-employment to employee occupation status, which from a tax collection point of view, respresents an increase in the enforceable mass; government captures the additional enforceable mass by expanding the income tax base, which in turn leads to higher personal income tax (PIT) take.

The starting point for my working hypothesis was that while employee share in total employment varies significantly across development, employee share above the PIT exemption threshold in these countries does not. To reconcile these two observations, I first provide two stylized facts: employee share is increasing in income-deciles of the income-distribution; and that, the profile moves left over the development path of the country; and, the decile-specific employee growth relates to changes to the PIT tax-base because I observe that the PIT exemption threshold consistently moves down a country's income-distribution to capture growth in deciles situated locally further down. I provide extensive documentation to show that this process is highly progressive throughout the development path, where development

path is proxied for either by using a cross-section of 84 household surveys, or by using within-country long-run data in the US (1870-2010).

I set up a model consistent with these stylized facts, where the threshold will be locally lowered if the marginal revenue gain outweights the marginal cost of such base-expansion, and where, as a proxy for increased enforceable mass, growth in employee mass leads to decreased marginal cost of such expansion. In an extension to the stylized model, I show that employee growth will lower the MCF of the personal income tax; and, that if the government maximizes household welfare then this decrease in PIT-MCF should lead to an optimal higher reliance on PIT and a decreased reliance on more distortive taxes. This is a model which can fit the observed tax-mix over development levels without resorting to arguments about cross-development variation in investments in enforcement capacity or in demand for public goods.

I use the setting of individual States within the U.S. to attempt to capture exogenous variation in employee employment at the individual State level and correlate this employee growth with changes to State PIT base and State PIT take. Importantly, I first show that within-State over time, the three stylized facts are also verified and remarkably robust. I then exploit a State-time specific industry-reform which I show has a large and immediate positive impact on employee employment growth. I provide several empirical strategies, including diff-in-diffs and synthetic controls, to alleviate concerns over violations of the exclusion restriction. Using the diff-in-diff estimator, I find that industry-reform leads to higher employee employment share; is associated with a large decrease in the the location of the State PIT threshold; and, is associated with higher PIT take, a nil change to total tax take, lower selective sales tax take, and a nil change to general sales tax take. These findings are consistent with the extended model of optimal tax-mix, but go against a potential confounding story of time-varying increased taste for revenue in policy-reforming States. Because the stylized facts #1, #2 also hold within-State over time, the diff-in-diff estimated impact of employee growth on PIT base expansion and PIT take may carry some external validity and shed light on the causal employee-driven channel of PIT base expansion over the development path.

This paper has studied the impact of the employment transformation between self-employed and employee status on PIT base expansion adopting a long-run approach. In future research, a complementary short-run study could seek to identify the behavioural responses to PIT base expansions, separately by occupation category.

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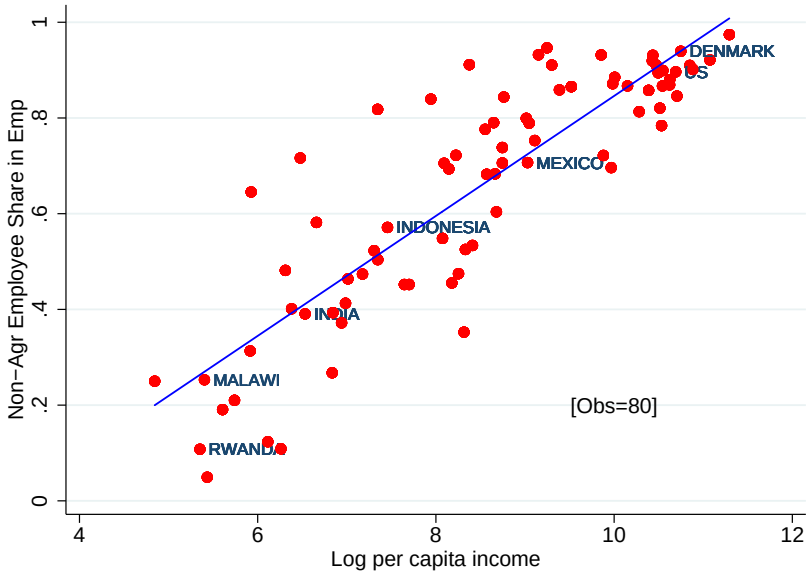
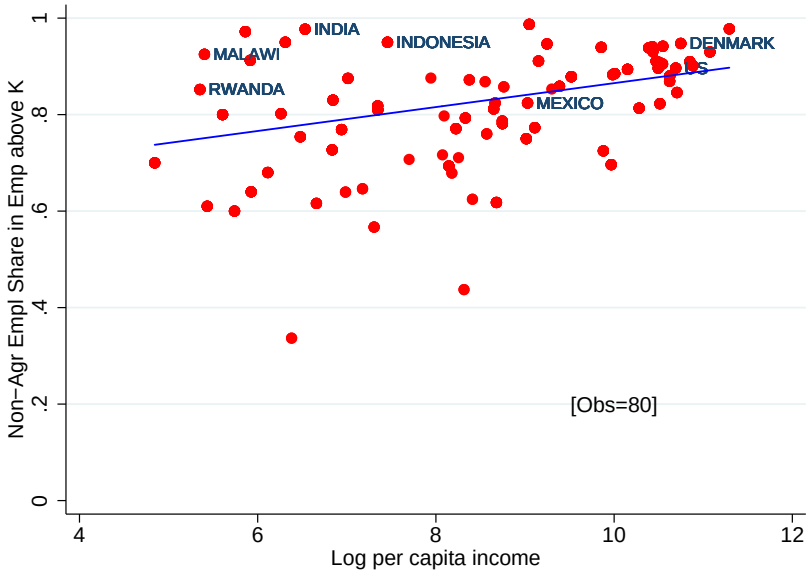
7 Figures and Tables

Figure 1: Cross-development variation in employee share in total employment and share in employment above the personal income tax exemption threshold

Panel A: Cross-country variation in non-agricultural employee share in total employment



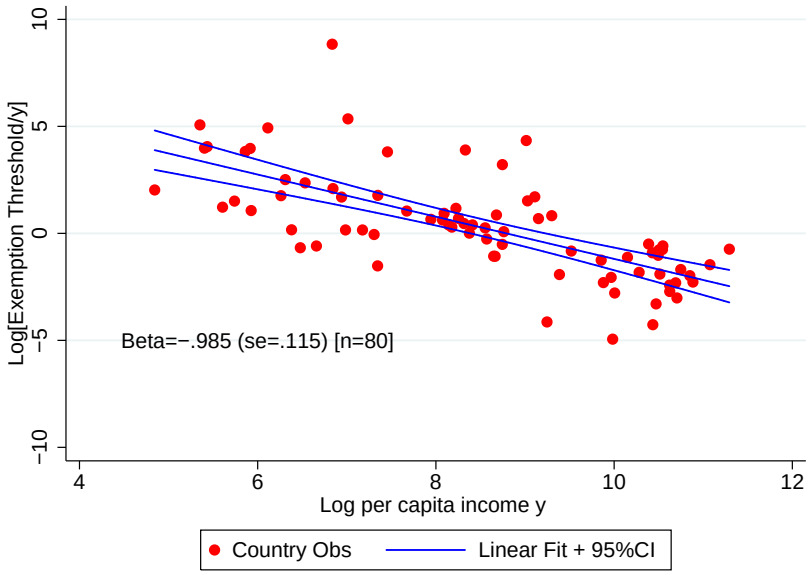
Panel B: Cross-country variation in non-agricultural employee share in total employment



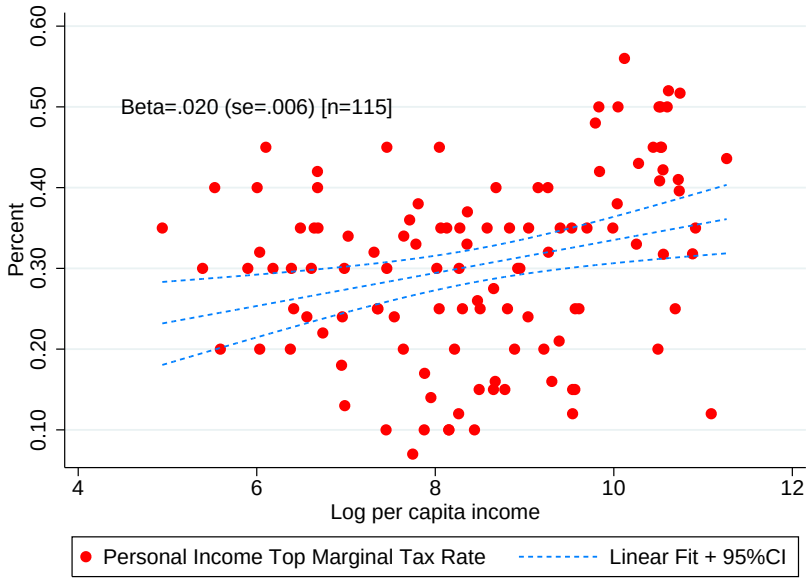
These graphs plot cross-country correlations between log per capita income and respectively non-agricultural employee share in total employment and non-agricultural share of employment above the personal income tax (PIT) exemption threshold, for a set of 80 countries in my analysis. The solid line is the linear fit on the underlying 80 observations. For details on definitions of employee and self-employment categories and of the personal exemption threshold, please see Section IV.

Figure 2: Cross-development variation in the normalised PIT exemption threshold and the top PIT marginal tax rate

Panel A: Cross-country variation in the log of the ratio [country personal income tax exemption threshold]/[country per capita income]

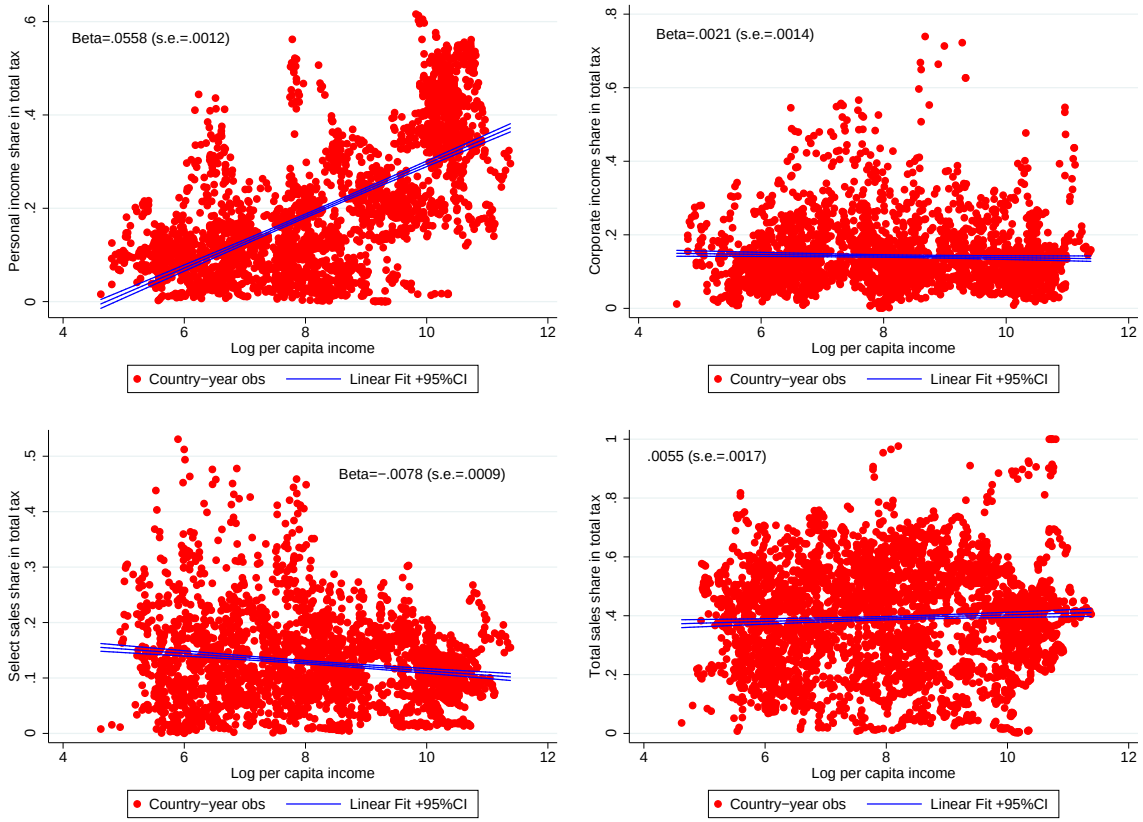


Panel B: Cross-country variation in the top marginal tax rate for personal income



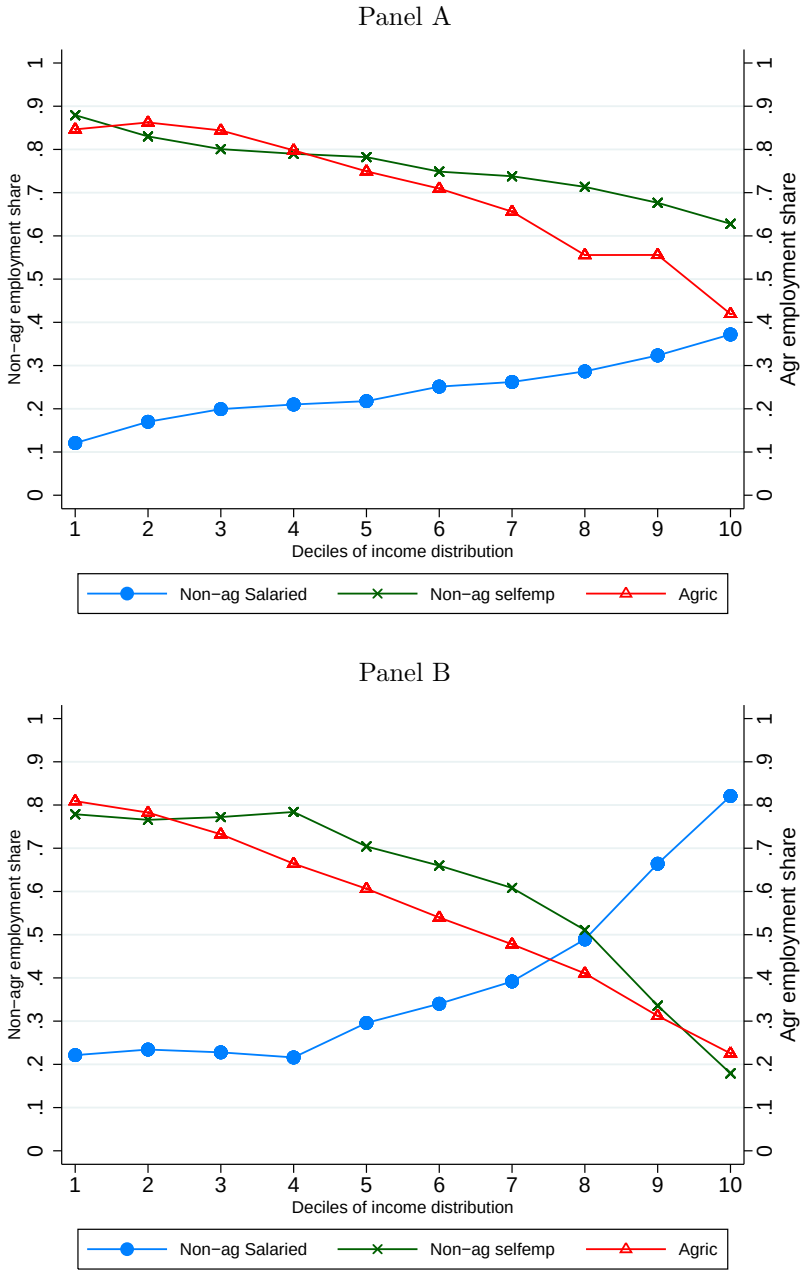
These graphs plot cross-country correlations between log per capita income and respectively the log of the ratio [country personal income tax exemption threshold]/[country per capita income] and the the top marginal tax rate for personal income. The solid line is the linear fit on the underlying scattered observations. In Panel A, the plot is based on the 80 countries which are in the core sample of analysis. In Panel B, the plot is based on 115 countries, and data is taken form Bachas and Jensen (2015). For definitions of the personal income tax exemption threshold, please see Section IV.

Figure 3: Cross-development tax-shares of personal income tax, corporate income tax, total sales taxes, and selective (excise) taxes: country-year observations



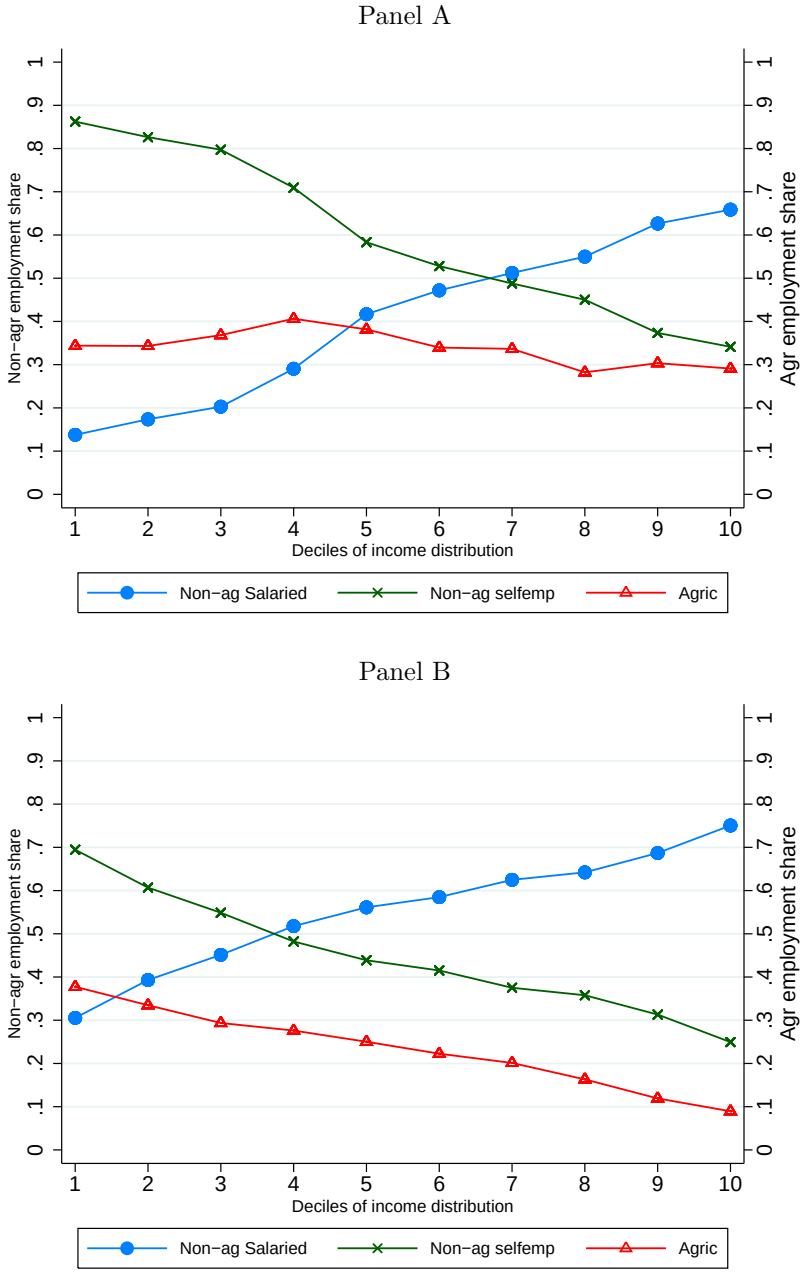
This graph plots cross-development correlations between log per capita income and personal income tax share of total taxes (NorthE quadrant); corporate income tax share of total taxes (NW q); selective sales tax (excises) share of total taxes (SE q); and, total sales tax share of total taxes. Lines denote the linear fit and the 95% confidence interval on the underlying observations, and Beta denotes the OLS-coefficient from the linear regression. The sample pools all country-year observations from the ICTD panel-dataset, which collects extensive revenue-data across all levels of per capita income. For more details, please see Bachas and Jensen (2015) database.

Figure 4: Employee and self-employed profiles: representative at $270 per capita (Panel A) and $650 per capita (Panel B)



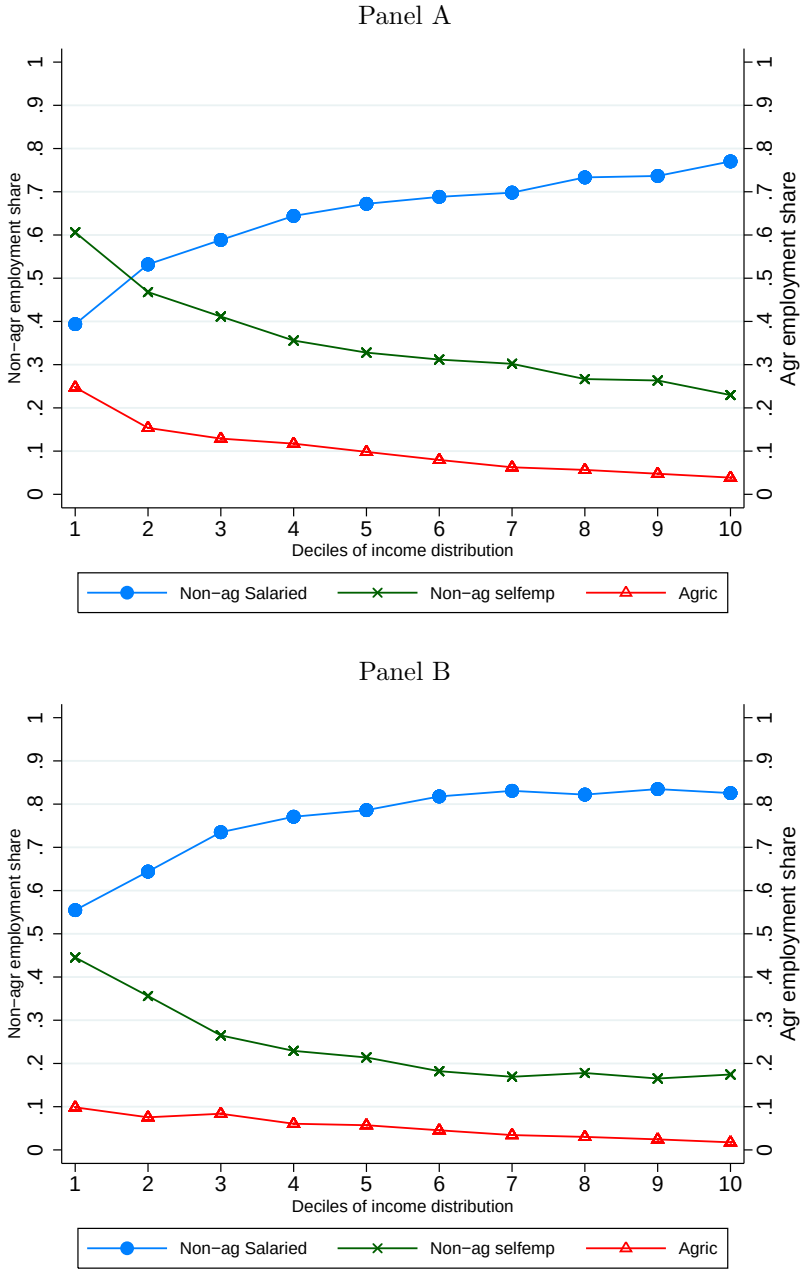
These panels depict the average employment-structure profiles over deciles of the income-distribution. Blue dotted (green cross) observations indicate the employee (self-employed) share of non-agricultural employment in an income decile. Red triangle observations denote the agricultural share of total employment in a given decile. This profile is construced for 84 individual countries; then an average profile is constructed over the profiles of countries that lie in a given per capita income bin. Panel A (B) depicts the average profile of the set of countries which lie in bin that has an average per capita income of $270 per capita ($650 per capita). For more details on the construction of these profiles, please see Section 4.1

Figure 5: Employee and self-employed profiles: representative at $1,260 per capita (Panel A) and $2,800 per capita (Panel B)



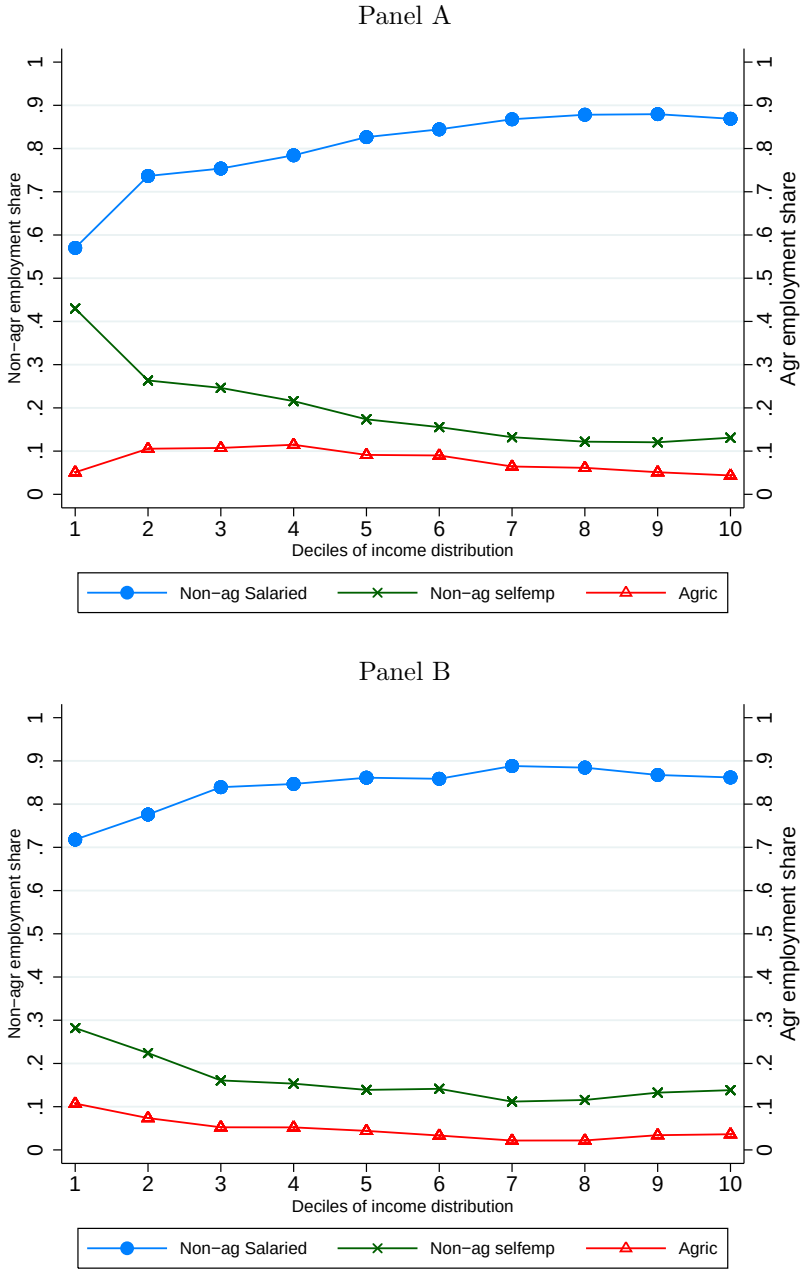
These graphs are constructed using exactly the same methodology as described in Figure 4. Panel A (B) depicts the average profile of the set of countries which lie in bin that has an average per capita income of $1,260 per capita ($2,800 per capita). For more details on the construction of these profiles, please see Section 4.1

Figure 6: Employee and self-employed profiles: representative at $4,300 per capita (Panel A) and $6,600 per capita (Panel B)



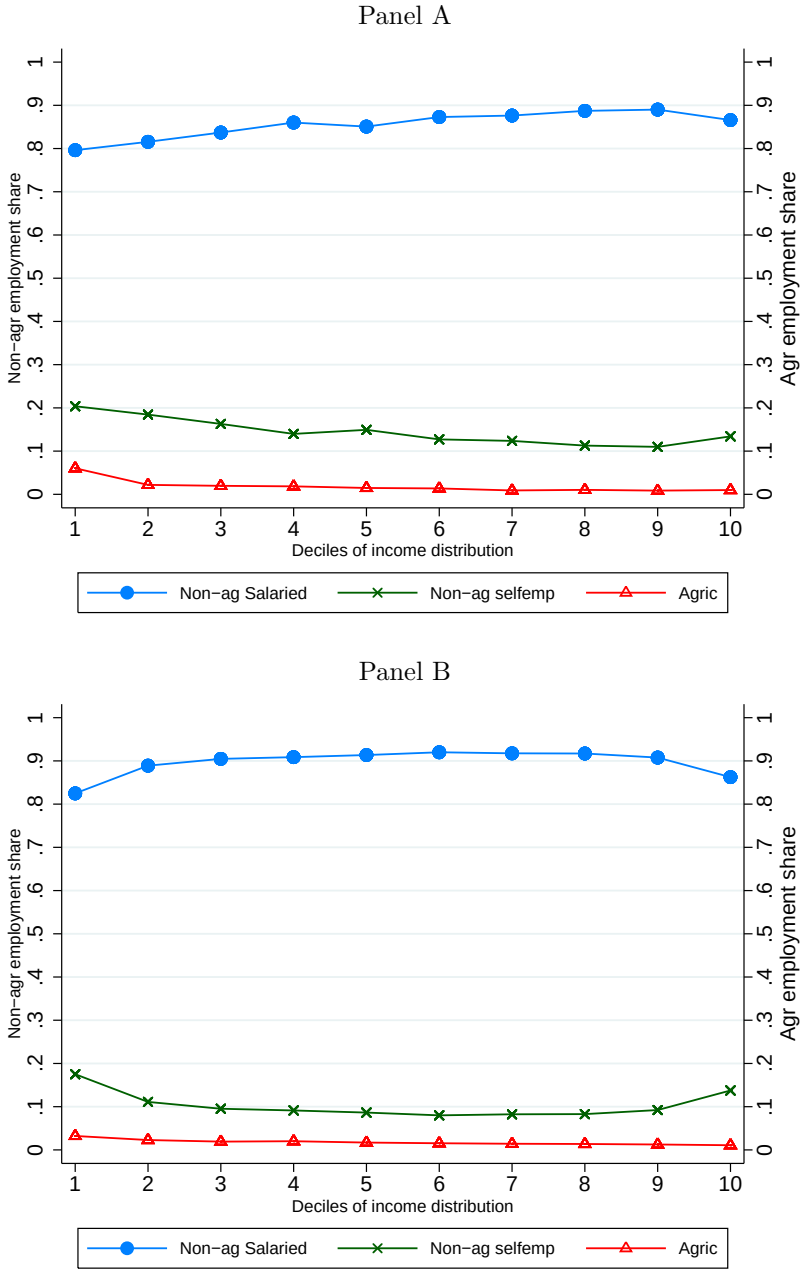
These graphs are constructed using exactly the same methodology as described in Figure 4. Panel A (B) depicts the average profile of the set of countries which lie in bin that has an average per capita income of $4,300 per capita ($6,600 per capita). For more details on the construction of these profiles, please see Section 4.1.

Figure 7: Employee and self-employed profiles: representative at $11,800 per capita (Panel A) and $25,700 per capita (Panel B)



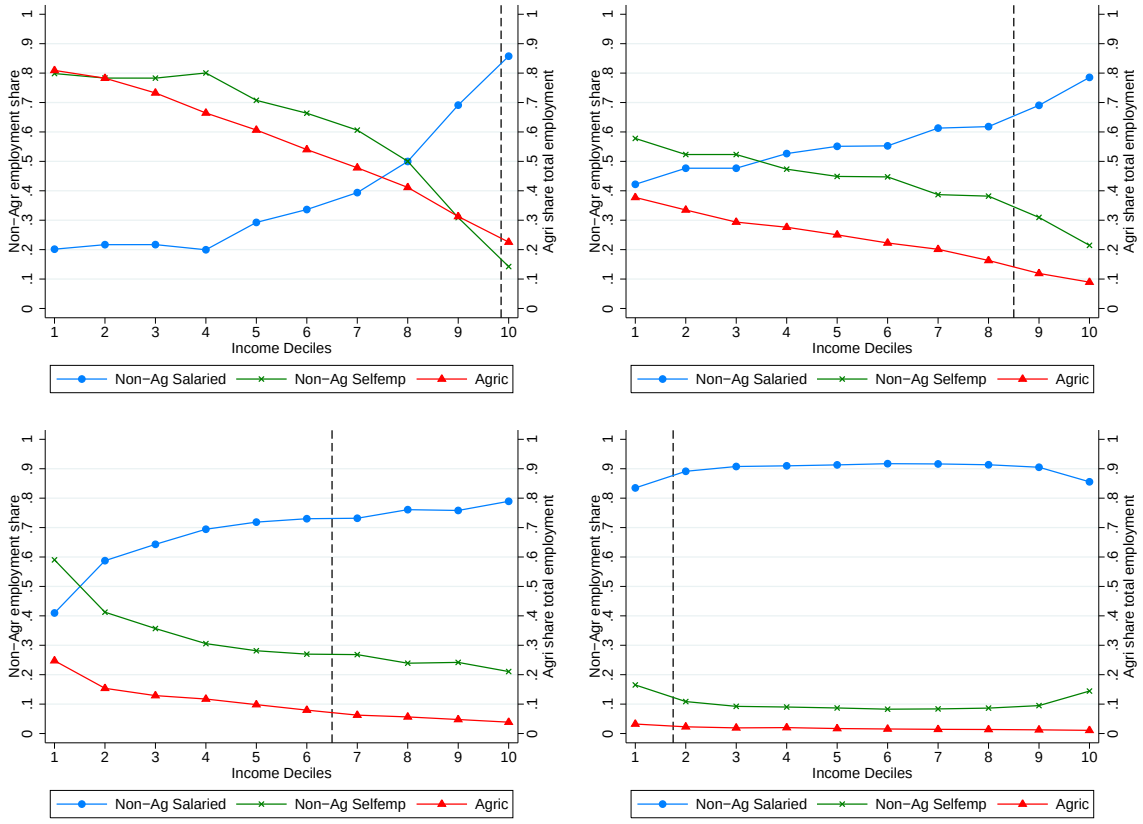
These graphs are constructed using exactly the same methodology as described in Figure 4. Panel A (B) depicts the average profile of the set of countries which lie in bin that has an average per capita income of $11,800 per capita ($25,700 per capita). For more details on the construction of these profiles, please see Section 4.1.

Figure 8: Employee and self-employed profiles: representative at $37,000 per capita (Panel A) and $53,200 per capita (Panel B)



These graphs are constructed using exactly the same methodology as described in Figure 4. Panel A (B) depicts the average profile of the set of countries which lie in bin that has an average per capita income of $37,000 per capita ($53,200 per capita). For more details on the construction of these profiles, please see Section 4.1.

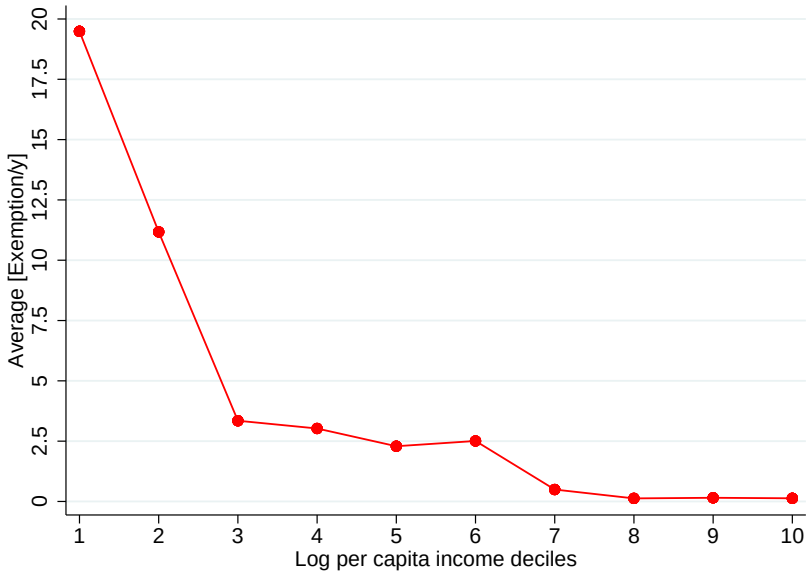
Figure 9: Employee and self-employed profiles: India, Indonesia, Brazil and US



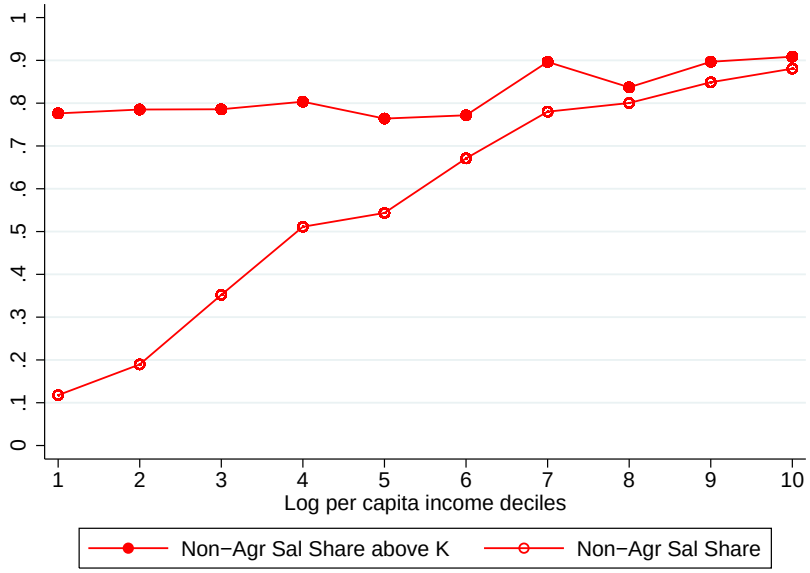
These profiles are constructed in exactly the same way as in Figure 4, but on the basis of individual country data: India (NorthE quadrant), Indonesia (NorthW quadrant); Brazil (SouthE quadrant) and the US (SouthW quadrant). In each profile, the black dashed vertical line denotes the location of the country personal income tax exemption threshold, using the value of the threshold in the year of the country household survey. For more detail on the construction of the profiles, pleae see Section 4.1

Figure 10: K/y and employee employment shares 'development averages'

Panel A

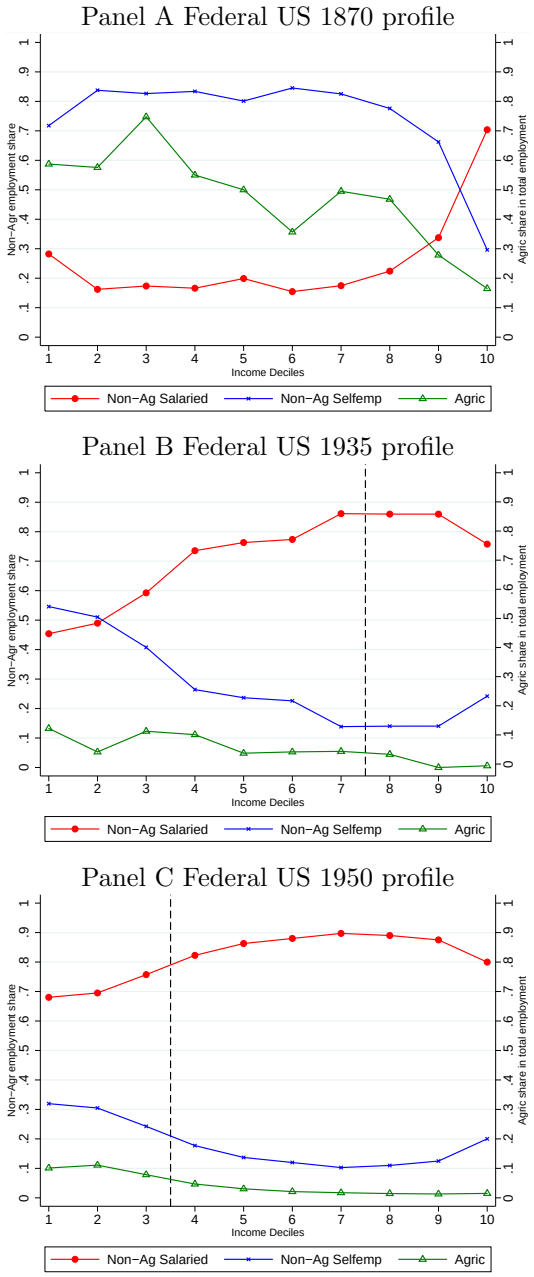


Panel B



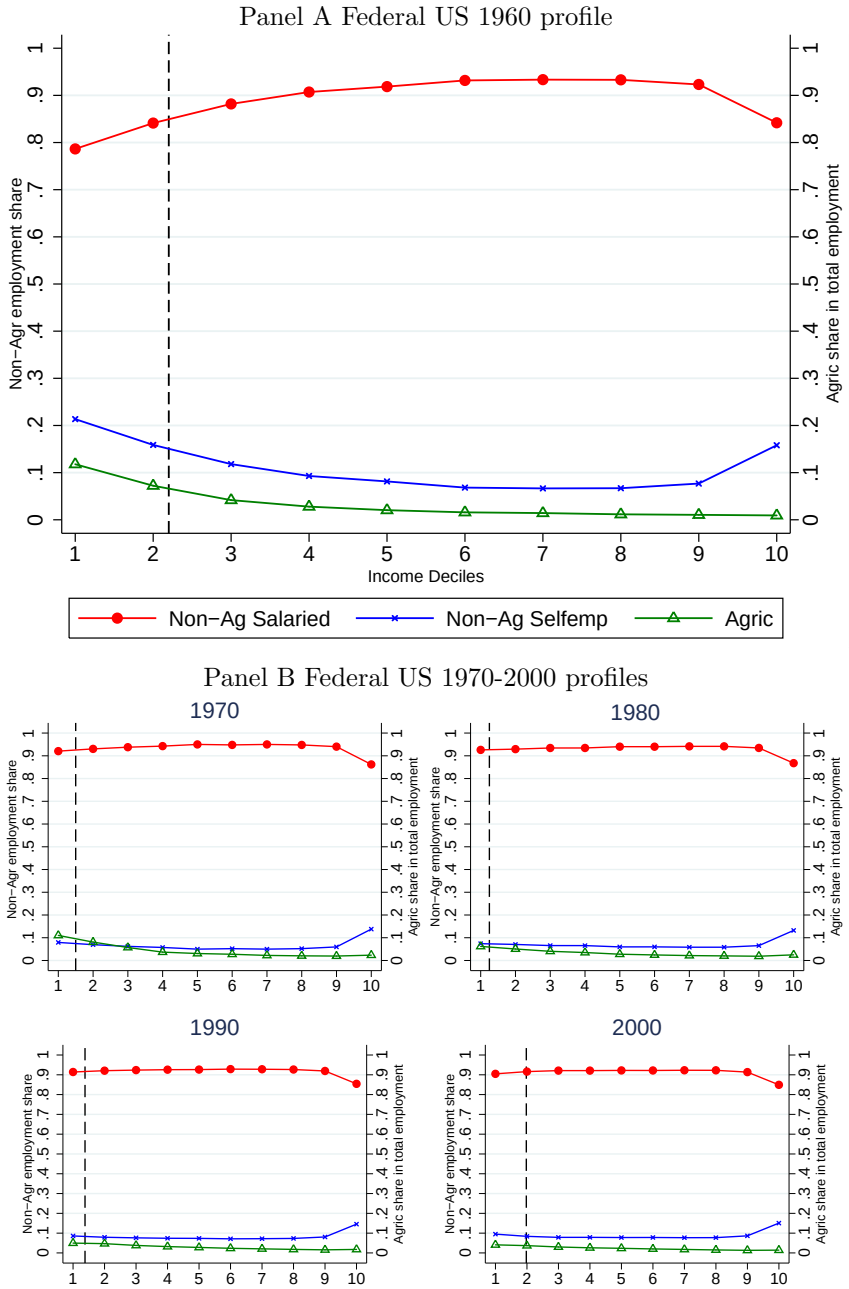
Panel A shows the average value of the logarithm of the ratio [country personal income tax exemption threshold/country average per capita income], in each of 10 decile-bins over the cross-country per capita income distribution of my sample of 84 countries. Panel B shows, by decile-bin, the average non-agricultural employee share of total employment (hollow circle observations), and the average non-agricultural employee share of employment above the personal income tax exemption threshold. See Section 4.1 for more details.

Figure 11: Employee and self-employed profiles: nationally-representative in the US in 1870 (Panel A), 1935 (Panel B), 1950 (Panel C)



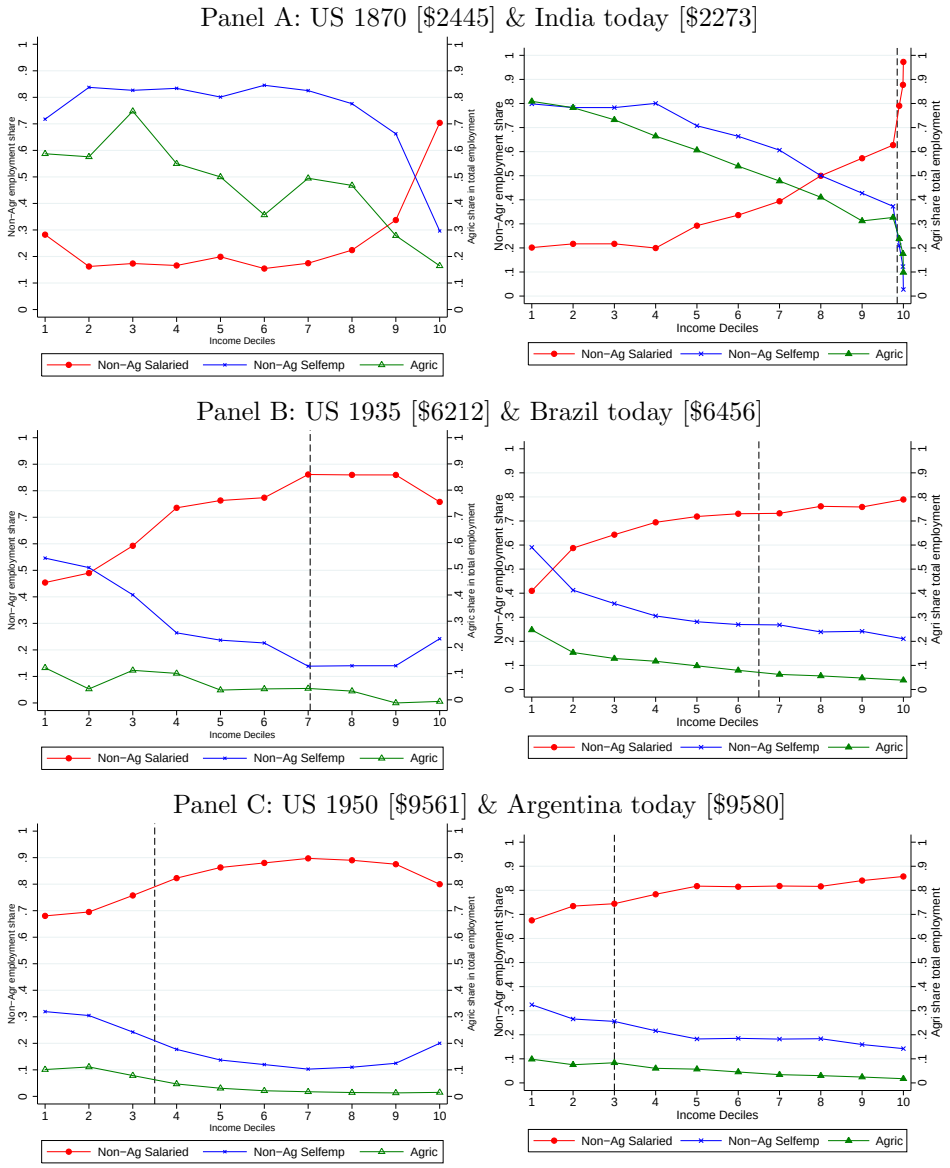
These graphs are constructed in exactly the same way as the profiles in Figs.4-9, but for a nationally representative sample of the U.S. employed population in 1870, 1935 and 1950. In the years where the Federal exemption threshold exists, its location in the income-distribution is denoted with a black dashed vertical line. For details on the construction of the individual profiles, please see Section 4.2

Figure 12: Employee and self-employed profiles: nationally-representative in the US in 1960 (Panel A), 1970-2000 (Panel B)
Panel A



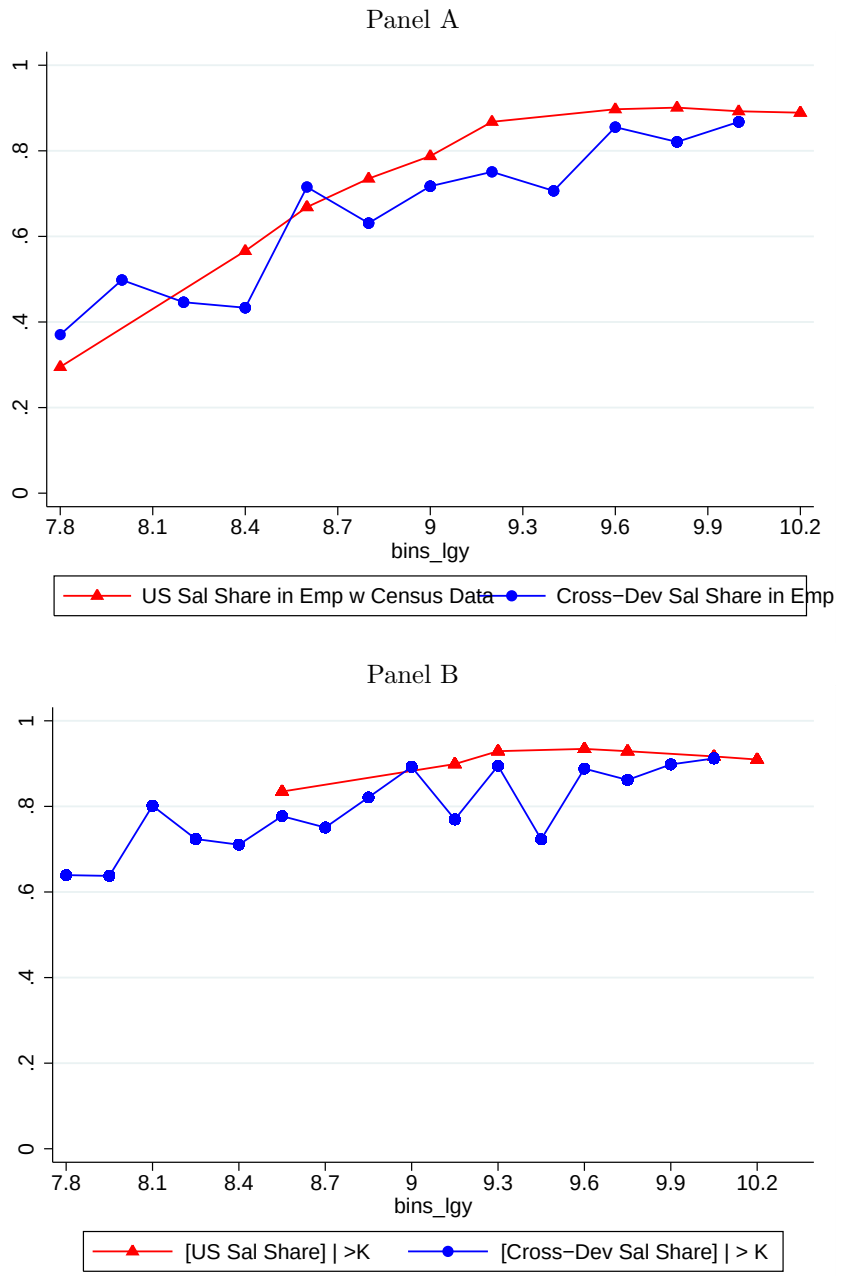
These graphs are constructed in exactly the same way as the profiles in Figs.4-9, but for a nationally representative sample of the U.S. in 1960, 1970, 1980, 1990 and 2000. The location of the Federal exemption threshold is denoted by a black dashed vertical line. For details on the construction of the individual profiles, please see Section 4.2.

Figure 13: Employee and self-employed distributions: historical US and current country profile at closest real constant per capita income



The individual country-profiles are constructed in exactly the same way as described in Figure 4. I pool all historical US profiles and profiles from the cross-section of country household surveys, and assign to each profile-year a constant per capita income value using the historical per capita income dataset of Maddison (2001). In Panel A (B) (C), I show the 1870 (1935) (1950) historical US profile and the current country-profile for the country which lies closest to the selected U.S. historical profile on the real per capita income line, which is India (Brazil) (Argentina). In bracketed value I show the average per capita income in the profile-year according to the Maddison dataset. The black dashed line denotes the location of the personal income tax exemption threshold in the year of the particular profile.

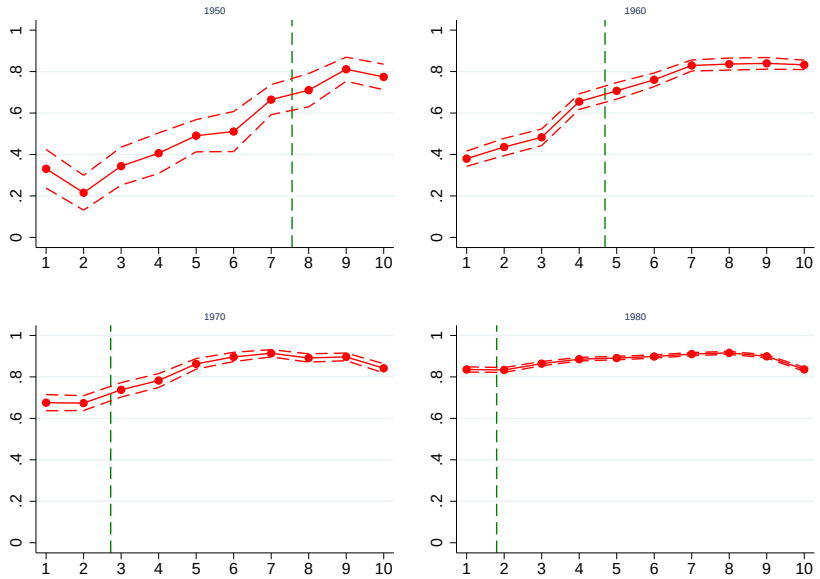
Figure 14: Pooling all historical and contemporaneous observations on a constant per capita income line



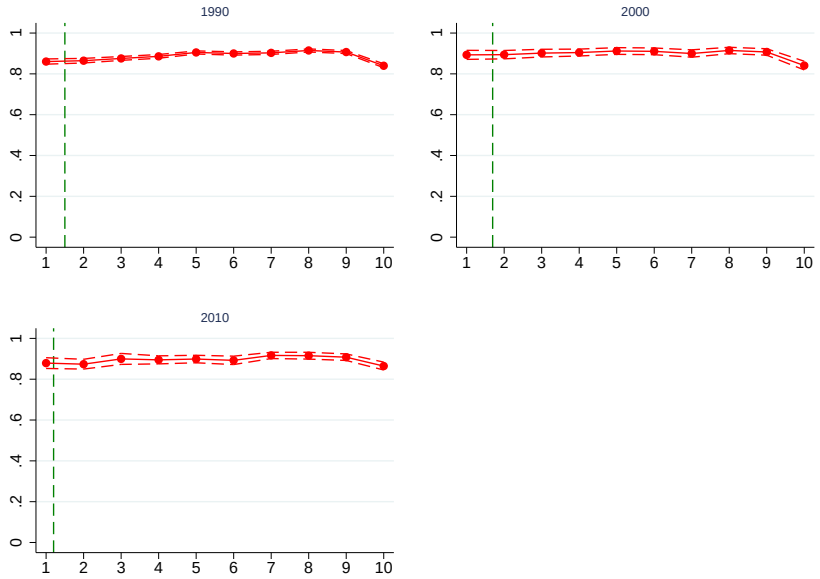
In these graphs, I take all historical US observations and all current cross-country observations based on the set of 84 household surveys. I assign a constant per capita income value to all observations using the Maddison data-set. I then segment the pooled constant per capita income distribution into ten decile-bins. In Panel A, I compute within each decile bin the average non-agricultural employee share of total employment, over US historical values and separately over current household survey values: the average employment share corresponds respectively to the red triangles and the blue circles. In Panel B, I repeat this exercise, but instead plot the average non-agricultural employee share of total employment above the personal income tax exemption threshold, for US historical values (red triangles) and for current cross-country household surveys (blue dots). Please see Section 4.1.3 for more details.

Figure 15: Mississippi 1950-2010: employee profiles and State income tax threshold K (dashed line)

Panel A: 1950-1980: large variation in profile and in K



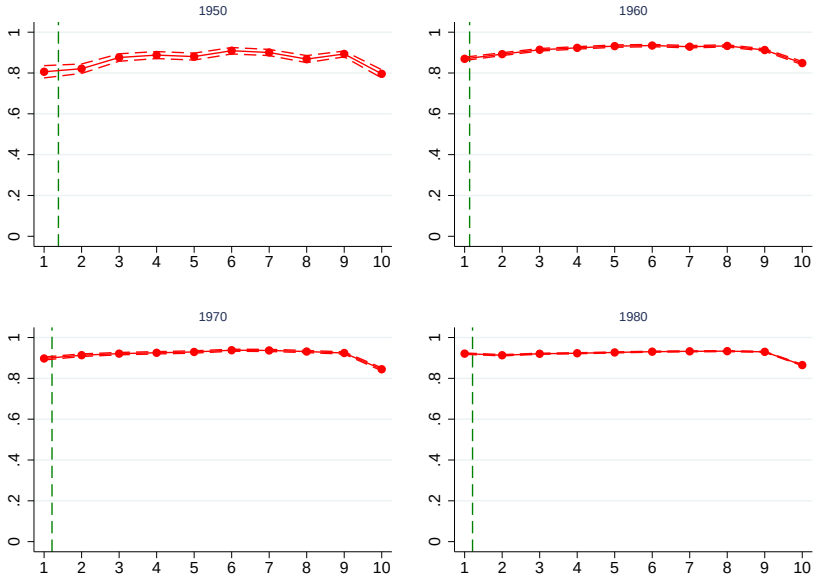
Panel B 1990-2010: little variation in profile and in K



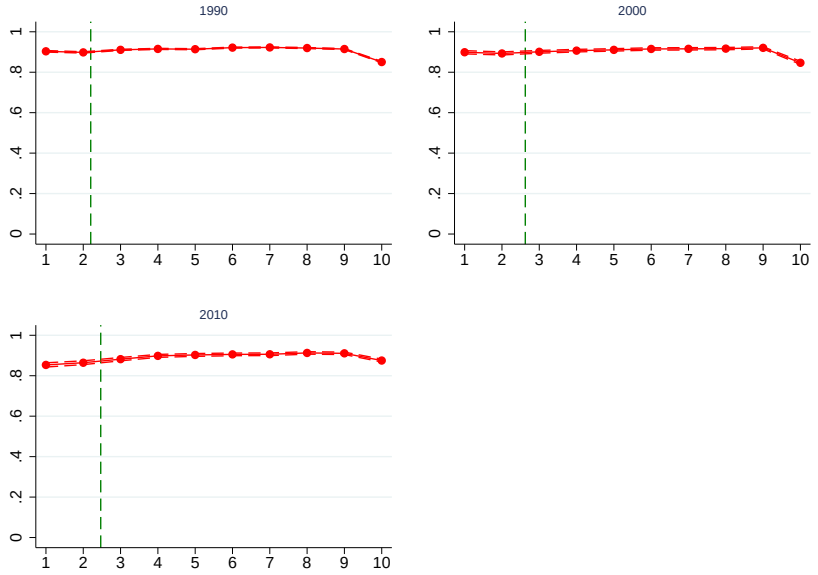
These graphs depict the non-agriculture employee share of employment in all deciles of the Mississippi income-distribution, between 1950 and 2010. The dashed vertical line denotes the location of the Mississippi State individual income tax exemption threshold in the relevant year. Historical observations on State income tax statutory structure are kindly borrowed from Bakija (2014). Please see section 5.1 for more details.

Figure 16: New York 1950-2010: employee profiles and State income tax threshold K (dashed line)

Panel A: 1950-1980: little variation in profile and in K



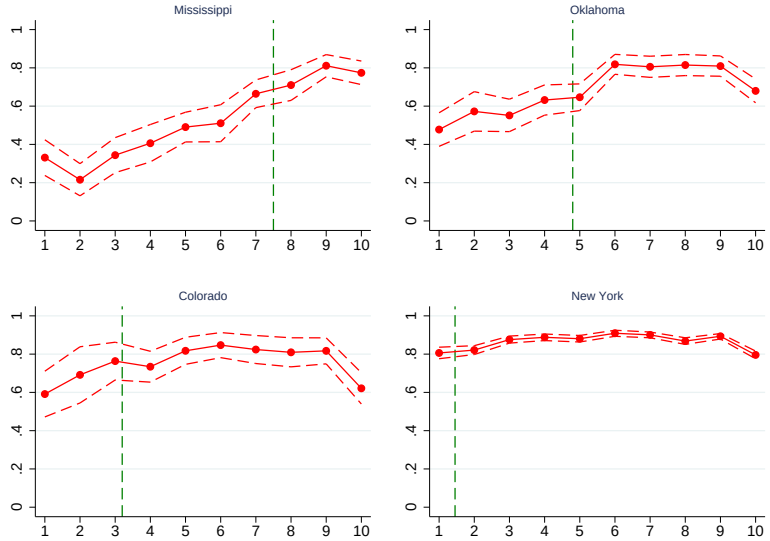
Panel B 1990-2010: little variation in profile and in K



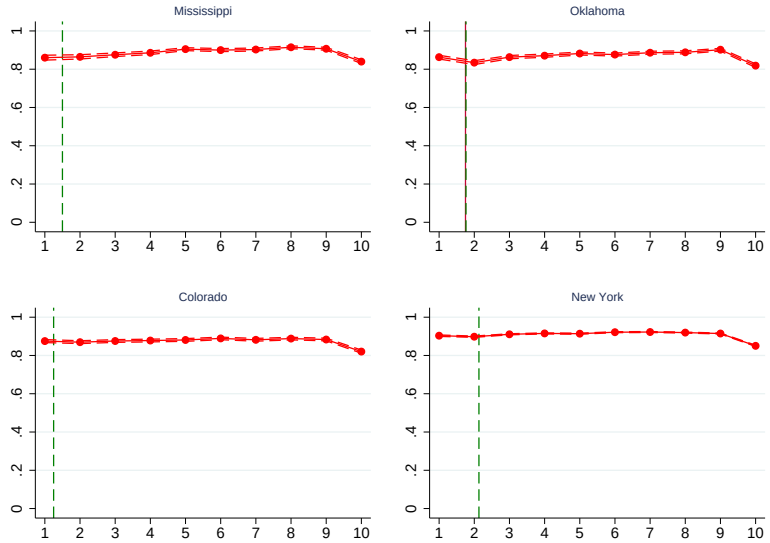
These graphs depict the non-agriculture employee share of employment in all deciles of the New York income-distribution, between 1950 and 2010. The dashed vertical line denotes the location of the New York State individual income tax exemption threshold in the relevant year. Historical observations on State income tax statutory structure are kindly borrowed from Bakija (2014). Please see section 5.1 for more details.

Figure 17: Cross-section of selected States: 1950 and 1980

Panel A : 1950: large variation in employee profile and in K



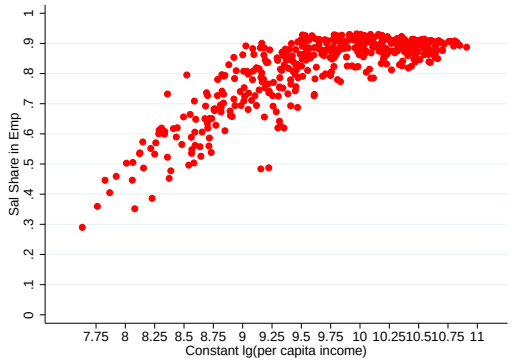
Panel B: 1990: little variation in employee profile and in K



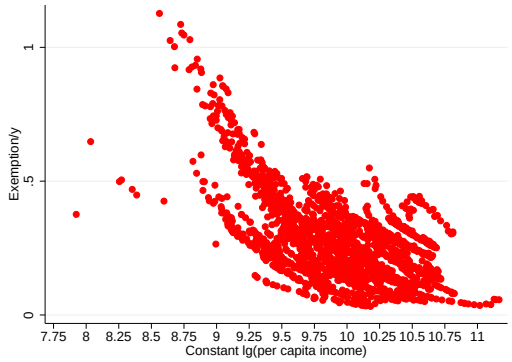
These graphs depict cross-sections of the non-agriculture employee employment-share profiles in Mississippi, Oklahoma, Colorado, and New York, in 1950 (Panel A) and 1980 (Panel B). The dashed vertical line denotes the location of the selected State individual income tax exemption threshold in the relevant year. Historical observations on State income tax statutory structure are kindly borrowed from Bakija (2014). Please see section 5.1 for more details.

Figure 18: US States: variation in employee employment and personal income tax structure

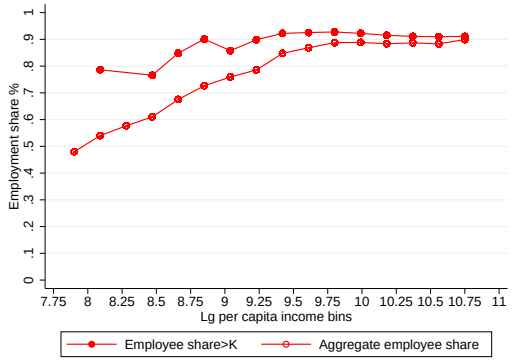
Panel A



Panel B

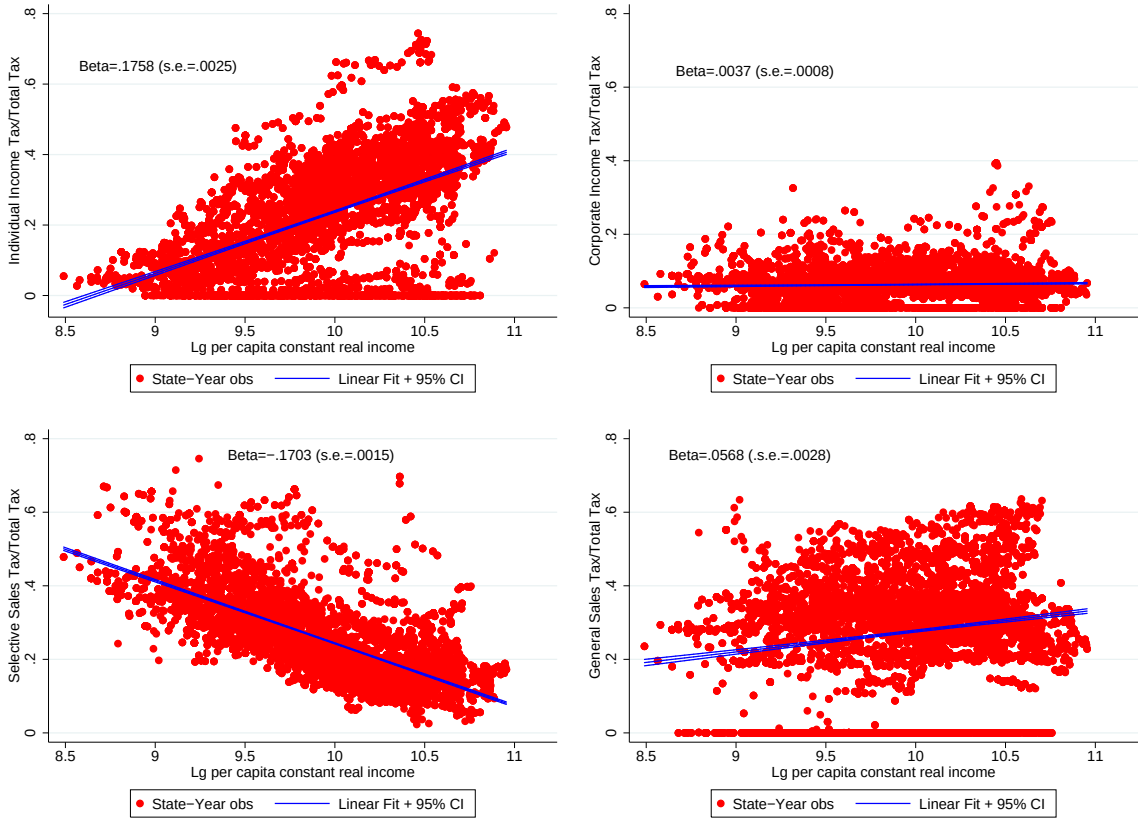


Panel C



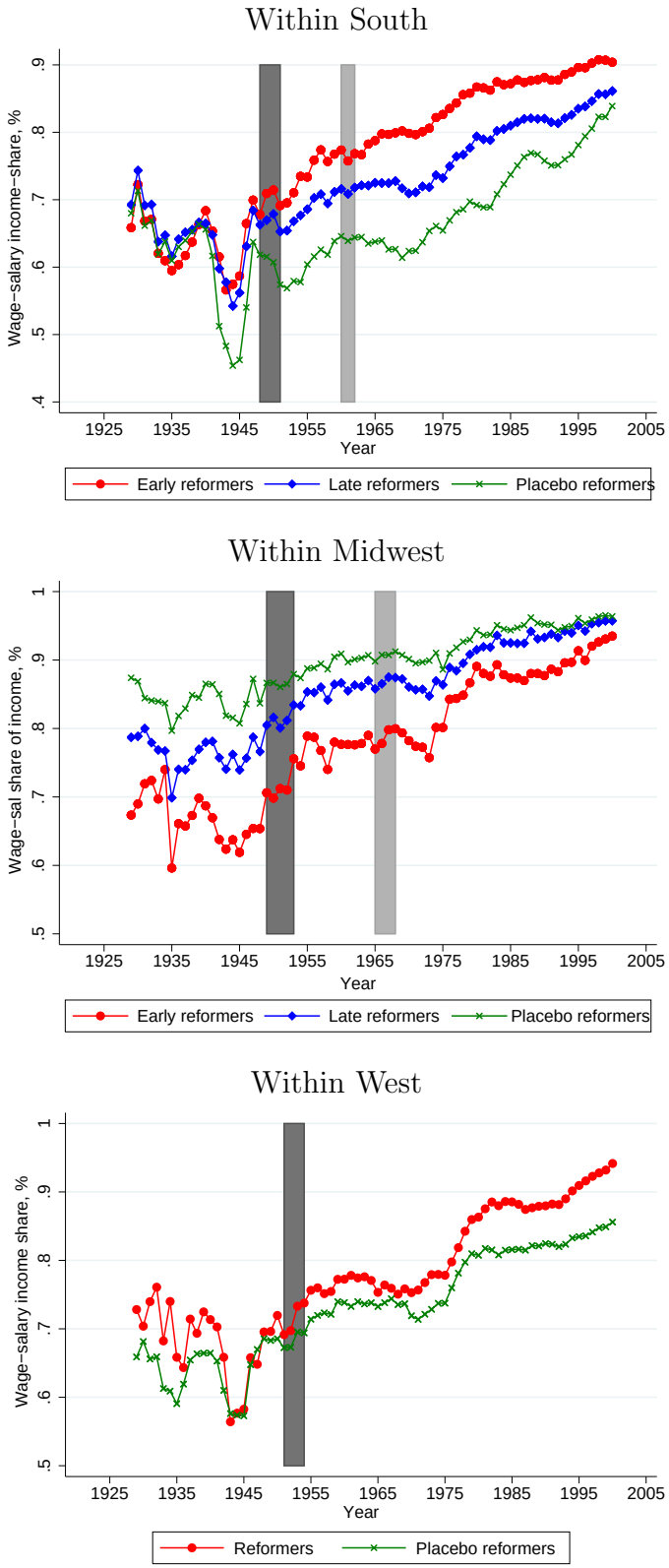
These graphs use the entire sample of State-year observations in the US over the years where my sample records observations on employee employment shares, and on State PIT exemption thresholds. I reconvert all State-year per capita income to constant per capita in income, and show scatter plots over this constant income distribution. In Panel A (B), each observation denotes a State-year value of non-agricultural employee share in total employment (ratio of PIT exemption threshold to State per capita income). In Panel C, I segment the constant per capita income distributon into equal sized bins; by bin, I then plot the average non-agricultural employee share of total employment (hollow circles) and of employment above the PIT exemption threshold (full circles). For more details, please see Section 5.1

Figure 19: Cross-development tax-shares of personal income tax, corporate income tax, selective sales taxes (excise) and general sales taxes: State-year observations



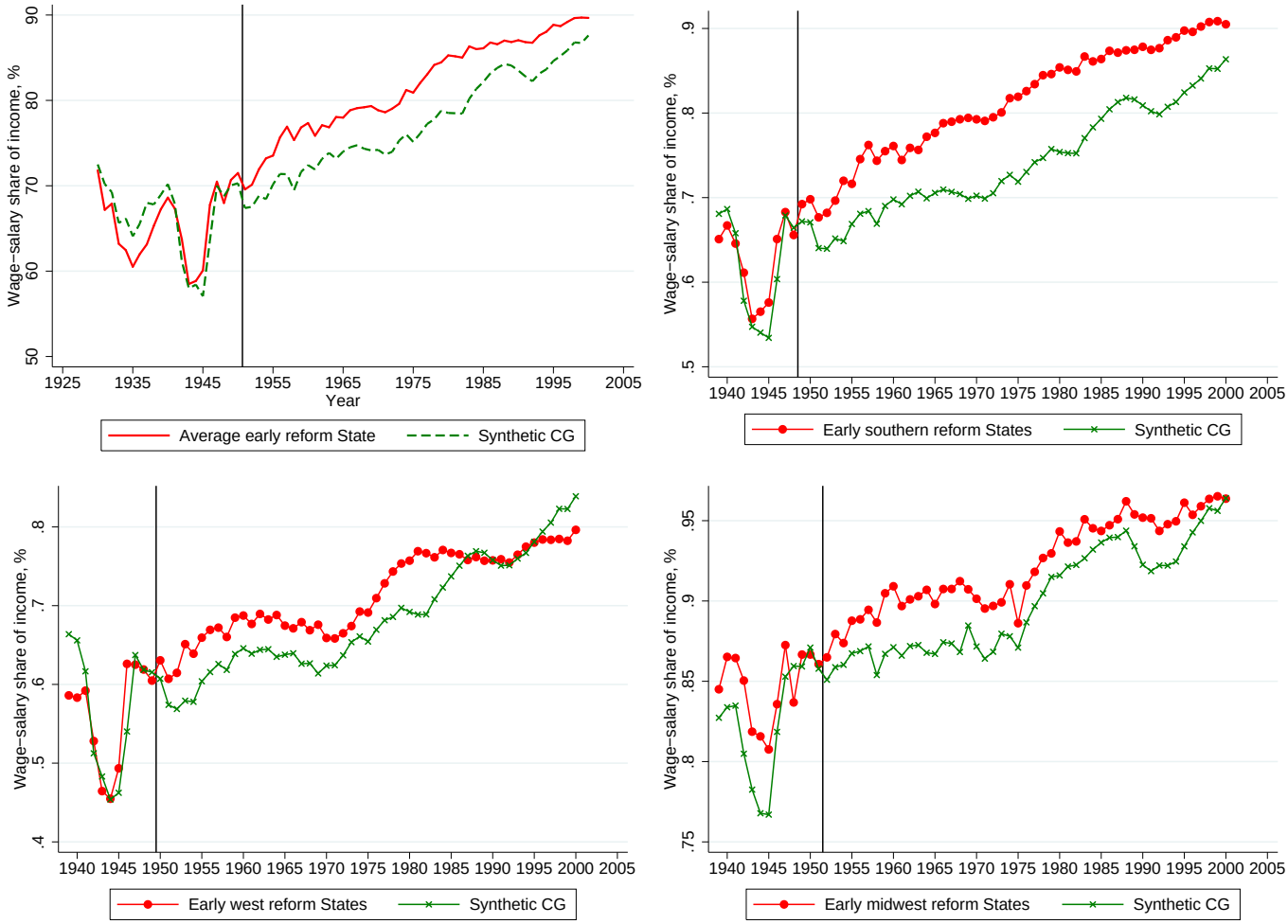
These graphs use the entire sample of State-year observations in the US over the years where my sample records observations on State tax sources. I reconvert all State-year per capita income to constant per capita in income, and show scatter plots over this constant income distribution. Each observation denotes a State-year value of individual income tax to total tax (NorthW quadrant); corporate income tax to total tax (NorthE quadrant); selective sales taxes to total tax (SouthW quadrant); general sales taxes to total tax (SouthE quadrant). For more details, please see Section 5.1. Note that the 'cross-development' variation in tax-take (increased reliance on individual income tax, decreased reliance on selective sales taxes, constant reliance on corporate income taxes) is entirely consistent with the observed cross-development variaiton of tax-mix in the cross-country data (Figure 3).

Figure 20: Industry reform impact on wage-salary income share: reformers versus within-region placebo



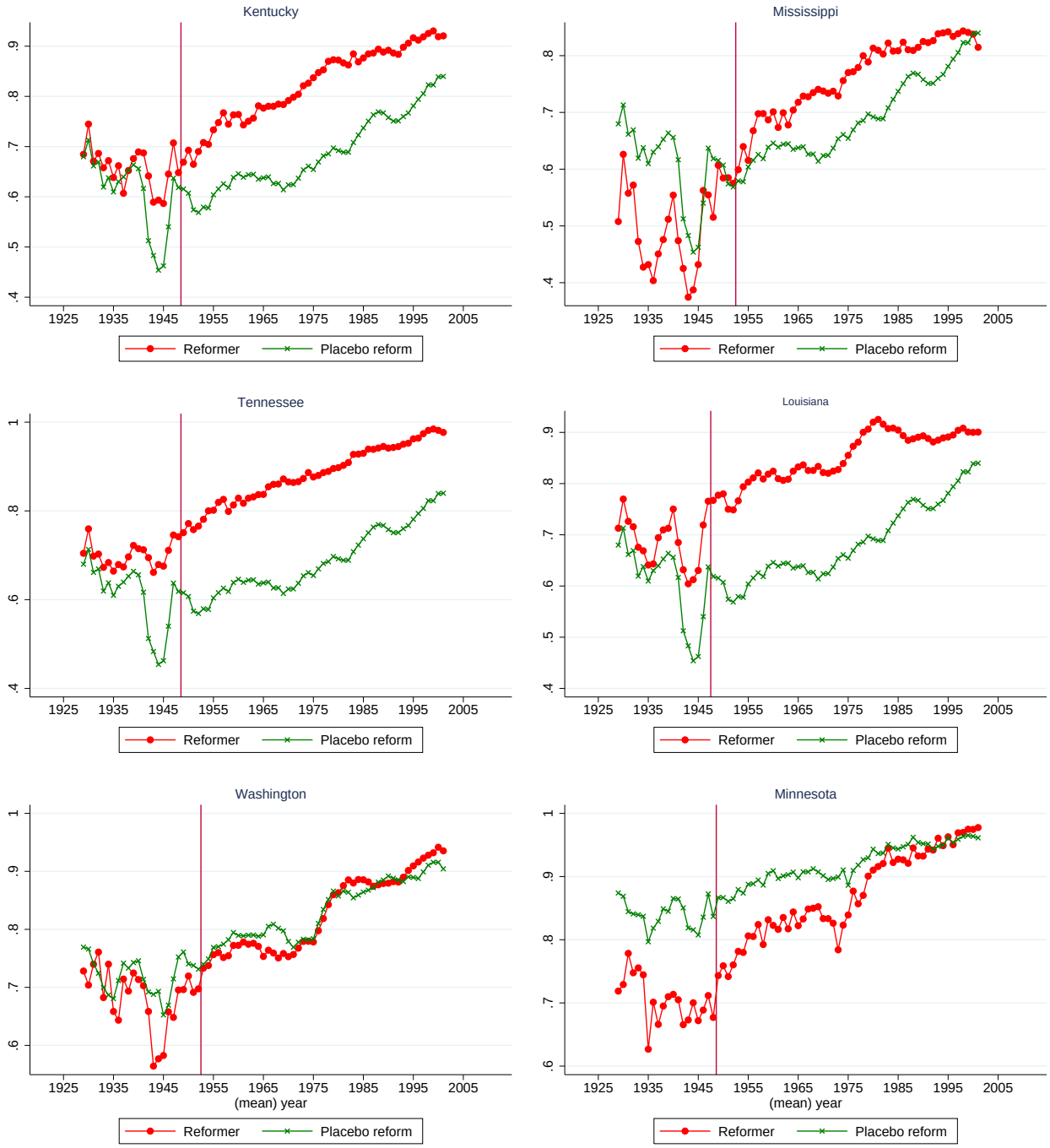
Wage-salary share of income is the ratio of wages and salaries to net earnings by place of residence. The denominator excludes contributions for government social insurance, dividends, interest, rent and current transfer receipts. Wage-salary excludes employer contribution to employee pension fund.

Figure 21: Industry reform impact on wage-sal share: early reformers versus synthetic placebo



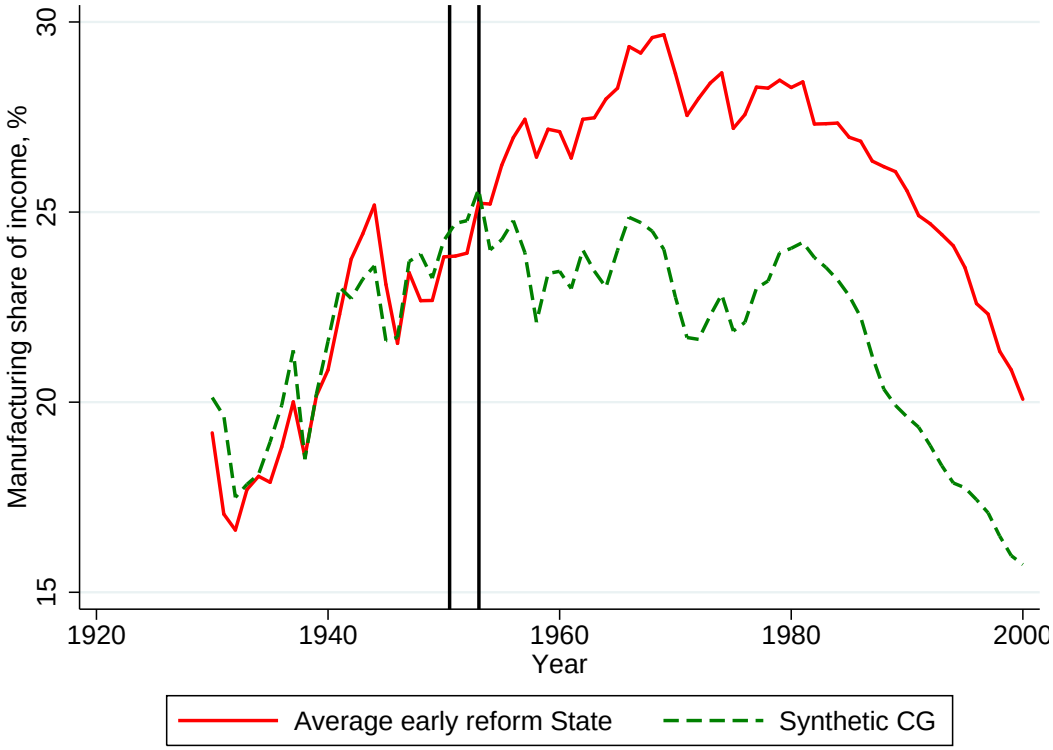
Wage-salary share of income is the ratio of wages and salaries to net earnings by place of residence. The denominator excludes contributions for government social insurance, dividends, interest, rent and current transfer receipts. Wage-salary excludes employer contribution to employee pension fund.

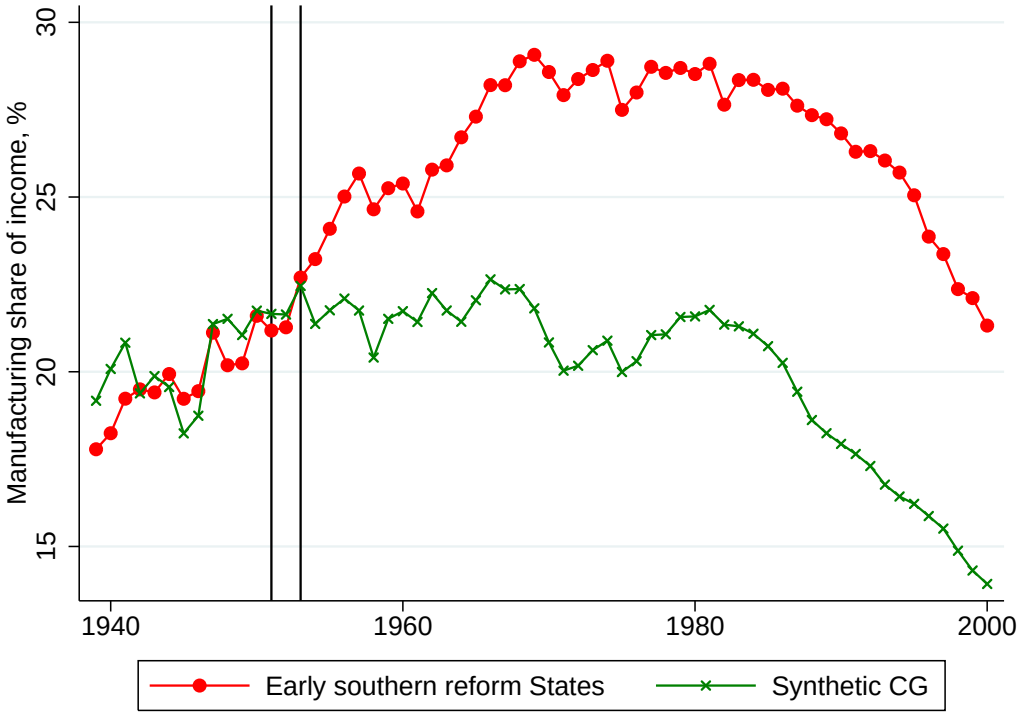
Figure 22: Industry reform impact on wage-sal share: early reformers versus within-region placebo



Wage-salary share of income is the ratio of wages and salaries to net earnings by place of residence. The denominator excludes contributions for government social insurance, dividends, interest, rent and current transfer receipts. Wage-salary excludes employer contribution to employee pension fund.

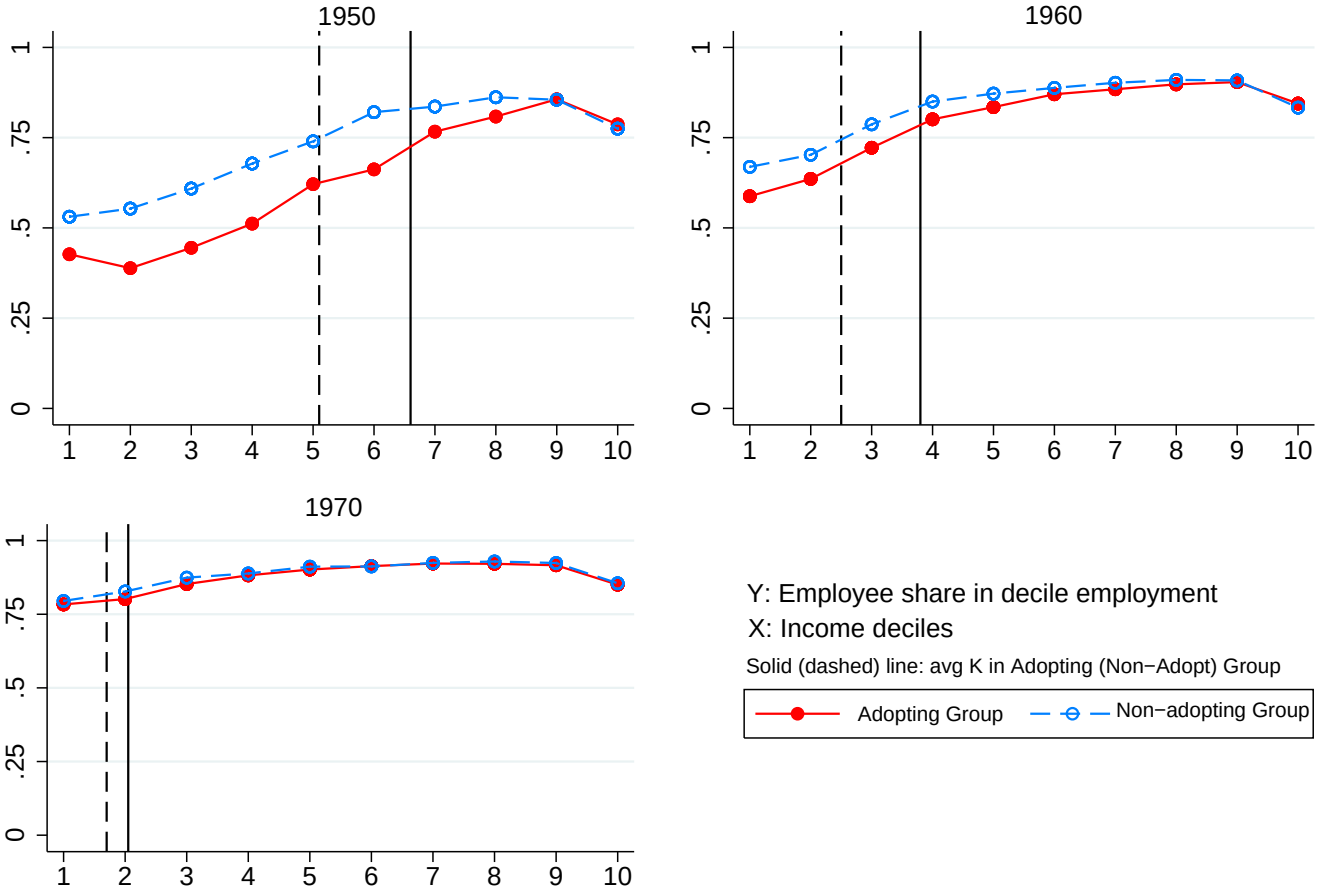
Figure 23: Manufacturing: early southern States and average early reformers versus synthetic placebo





Manufacturing share of income is the ratio of income earned in manufacturing sector, relative to net earnings by place of residence. The denominator excludes contributions for government social insurance, dividends, interest, rent and current transfer receipts.

Figure 24: Average subsidizing and non-subsidizing profiles: South, 1950-1970



In these graphs I limit the sample to the set of States in the South region (US Census definition). I take the TG-CG definition of whether a State has amended its constitutional and legal setting to be able to issue development bonds, and apply it to the three years: 1950, 1960, 1970. I then compute the average employee employment share in all income-deciles of a given year, over the States in the TG (CG), and plot this profile with red circles (blue hollow circles). The black solid (dashed) line represents the average location of the State K in a given year, averaged over TG (CG) States. Please see Section 5.2 for more details.

Figure 25: Within South decile diff-in-diff subsidizing vs non-subsidizing: 1950-60 and 1960-70

In these graphs I limit the sample to the set of States in the South region (US Census definition). I take the TG-CG definition of whether a State has amended its constitutional and legal setting to be able to issue development bonds, and apply it to the three years: 1950, 1960, 1970. I then compute the average employee employment share in all income-deciles of a given year, over the States in the TG (CG). In turn I do a diff-in-diff on employee employment share by income decile over years and TG-CG, and plot the diff-in-diff decile-coefficient. Panel A depicts the diff-in-diff over TG-CG and years 1950 to 1960; Panel B depicts the diff-in-diff over TG-CG and years 1950 to 1960. The black solid (dashed) line represents the average location of the State K in the TG, in the relevant post-diff (pre-diff) year. Please see Section 5.2 for more details.

	Gordon and Li		PIT threshold		Gordon Li and Threshold		PIT take			
Threshold/y			-.0164	-.1452	-.0154	-.0999	-.0316	-.0204		-.0357
			(.0071)**	(.0270)***	(.0072)**	(.0360)***	(.0051)***	(.0056)***		(.0114)***
MargTaxRate	.0005	.0053			.0005	.0025		.0031		.0020
	(.0014)	(.0011)***			(.0013)	(.0014)*		(.0031)***		(.0007)**
EmployeeShare									.1733	.0231
									(.0308)***	(.0449)
Inc90th/Inc10th									-.0009	.0001
									(.0005)*	(.0005)
1(Withholding)									-.0066	-.0043
									(.0263)	(.0235)
ShareYearsExtWar									.1410	-.0078
									(.0966)	(.0945)
R-squared	0.0052	0.4207	0.1367	0.4901	0.1507	0.5419	0.3157	0.4577	0.4222	0.5587
Sample	LowInc	HighInc	LowInc	HighInc	LowInc	HighInc	AllInc	AllInc	AllInc	AllInc
Sample mean LHS	.1761	.3202	.1761	.3202	.1761	.3202	.1086	.1086	.1086	.1086
Obs	42	42	42	42	42	42	84	84	84	84

Standard errors, clustered by State. *, **, *** denote 1, 5, 10 percent significance

Table 1: cross-country correlations

The sample of countries used in these regressions is the set of 84 countries for which I can construct the employee and self-employed employment share profiles.

Method	OLS	OLS	OLS	OLS	OLS
		LHS=1(IndustrySubsidy)			
	(1)	(2)	(3)	(4)	(5)
HistEmployee*Year	-.0155	-.0159	-.0001		
	(.0071)**	(.0068)**	(.0054)		
Year	.0169	.0238	-.0111		
	(.0050)***	(.0049)***	(.0126)		
1(HealthyDebt)*1(FedIncomeTaxTreatment)		.2741	.1832	.2078	.1441
		(.1149)**	(.0801)**	(.0899)**	(.0693)**
1(PollTax)			.0662		.0026
			(.1362)		(.1048)
1(LiteracyTest)			-.0095		-.0320
			(.1427)		(.1265)
Log GDP per capita$_{t-3}$			.0129		.0461
			(.1562)		(.1262)
Log GDP per capita$_{t-5}$			.1284		.1252
			(.1722)		(.1572)
Log population$_{t-3}$			.0191		-.0130
			(.0110)*		(.0148)
Log population$_{t-5}$			.0059		-.0059
			(.0141)		(.0069)
EmployeeShare$_{t-3}$			-2.3388		-1.2358
			(3.7925)		(3.3233)
EmployeeShare$_{t-5}$			2.5975		2.0479
			(3.7522)		(3.3418)
(PersIncTax/GDP)$_{t-3}$			2.9827		.6445
			(2.7184)		(3.2930)
(PersIncTax/GDP)$_{t-5}$			3.1820		1.7571
			(3.2383)		(3.5696)
(TotalTax/GDP)$_{t-3}$			-.9756		-.1073
			(1.2351)		(1.0967)
(Totaltax/GDP)$_{t-5}$			.0636		-.2104
			(1.5822)		(1.4157)
State-specific linear time-trend				x	x
Number State linear-trend significant at 5perc				27	10
State, Year-region dummies	x	x	x	x	x
Obs	3937	3595	2274	3595	2274

Standard errors in parenthesis, clustered by State. *, **, *** denote 1, 5, 10 percent significance

Table 2: who decides to reform?

1(Poll Tax) is a State-time specific variable indicating the share of the population subject to a poll tax; 1(Literacy Test) is a State-time specific variable indicating the share of the population subject to a literacy test. These were voting rights restrictions introduced in the early 20th century, and which were banned following the Civil Rights Act of 1965: see Besley, Persson and Sturm (2009) for more details.

Method	WageSalary OLS (1)	SelfEmp OLS (2)	Agric OLS (3)	ConstrManuf OLS (4)	Services OLS (5)	Govt OLS (6)
1(Industryreform)	.0404	-.0127	-.0292	.0400	.0165	-.0097
	(.0196)**	(.0043)***	(.0140)**	(.0142)***	(.0112)	(.0127)
1(Placeboreform)	-.0007	.0038	-.0037	-.0042	-.0021	-.0024
	(.0079)	(.0050)	(.0052)	(.0059)	(.0035)	(.0060)
State dummies	x	x	x	x	x	x
Year-Region dummies	x	x	x	x	x	x
State linear time-trends	x	x	x	x	x	x
State-time varying controls	x	x	x	x	x	x
F-test non-param pre-reform trend						
Short run	1.52	0.68	0.41	0.58	1.29	0.49
	[0.2296]	[0.5129]	[0.6685]	[0.5624]	[0.2862]	[0.6138]
Medium run	1.21	0.33	0.22	0.47	0.80	0.97
	[0.3230]	[0.8899]	[0.9501]	[0.7999]	[0.5553]	[0.4444]
Mean LHS pre-reform	.6972	.2358	.1445	.3758	.1122	.1730
R-squared	.9007	.8768	.8689	.6800	.9715	.7793
Obs	3169	3169	3169	3169	3169	3169

Standard errors, clustered by State. *, **, *** denote 1, 5, 10 percent significance

Table 3: impact of policy reform on employment structure

All outcome variables expressed as share of net earnings by place of residence, which excludes contributions for government social insurance, dividends, interest, rent and current transfer receipts. Wage-salary excludes employer contribution to employee pension fund. SelfEmp is nonfarm proprietors' income: total income earned from current production accounted for by unincorporated nonfarm businesses. State-time varying controls include: log State-population; log State per capita income; the 1st stage determinants of political competition used in Besley, Persson and Sturm (2009). The F-test [p-value] is from testing the joint significance of a set of pre-reform period dummies in the short run (5 years) or medium run (15 years) immediately prior to the State-specific reform.

			LHS = Wage-salary share of income		
Method	DiD FE	IV	Synthetic control 1	Synthetic Control 2	Propensity-score match
	(1)	(2)	(3)	(4)	(5)
1(Industryreform)	.0404	.0660	.0392	.0426	.0527
	(.0196)**	(.0193)***	(.0183)*	(.0183)**	(.0056)***
Instrument					
1(Good debt conditions)		x			
1st stage F-test		24.03			
Donor-pool			Placeborefom Sts	Placeboreform Sts	Placeboreform Sts
Match on			Income, employment, pop	Redev employment	Controls and redev emplt
s.e. clustered	State	State	State-reform	State-reform	
State dummies	x	x			
Year-Region dummies	x	x			
State linear time-trends	x	x			
State-time varying controls	x	x			
Mean LHS pre-reform	.6972	.6972	.6972	.6972	.6972
R-squared	.8897		.9781	.9834	
Obs	3169	2882	610	610	1460

Standard errors in parentheses. *, **, *** denote 1, 5, 10 percent significance

Table 4: Employment structure impact: robustness

Wage-salary share of income is the ratio of wages and salaries to net earnings by place of residence. The denominator excludes contributions for government social insurance, dividends, interest, rent and current transfer receipts. Wage-salary excludes employer contribution to employee pension fund. State-time varying controls include: log State-population; log State per capita income; the 1st stage determinants of political competition used in Besley, Persson and Sturm (2009). In Column (2), the instrument 1(Good debt conditions) is the interaction between a dummy which equals 1 in the period where development bonds earned interest was tax exempt from Federal income tax, and a dummy which equals 1 when the redevelopment counties in a State have average debt-service ratio below regional median in the pre-reform period. In Column (3), a synthetic control is created for every reform State by matching on income, employment and population in pre-reform period, where the donor-pool is the set of placebo reform States. In Column (4), the synthetic control is created by matching on the redevelopment counties' share of State labor force in the pre-reform period. In Column (5), the propensity score estimator matches on income, employment, population, and redevelopment counties' share of State labor force.

LHS			Lg[K/y]					[IRS returns/population]			
Method	DiD FE	IV	Synthetic control	Matching	IV	DiD FE	IV	Synthetic control	Matching	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1(Industryreform)	-.0896	-.0973	-.0636	-.0963		.0231	.0364	.0393	.0302		
	(.0381)**	(.0647)*	(.0229)***	(.0086)***		(.0039)**	(.0132)***	(.0155)**	(.0034)***		
1(Placeboreform)	-.1160	-.1242			-.1438	.0025	.0107			.0010	-.0289
	(.0852)	(.2464)			(.1074)*	(.0037)	(.0198)			(.0030)	(.0301)
Manuf share					-3.0924					1.2762	
					(1.1850)**					(.7738)***	
Lg[K/y]											-.2561
											(.1457)*
Instrument											
1(Good debt conditions)		x					x				
1(Industryreform)					x					x	x
1st stage F-test		33.06			11.21		40.69			9.93	6.78
s.e clustered	State	State	State-reform		State	State	State	State-reform		State	State
State dummies	x	x			x	x	x			x	x
Year-Region dummies	x	x			x	x	x			x	
Hist employee time-trend	x	x			x	x	x			x	
Hist per cap inc time-trend	x	x			x	x	x			x	
State-time varying controls	x	x			x	x	x			x	x
F-test non-param pre-reform trend											
Short run	0.00						2.46				
	[0.9629]						[0.2335]				
Medium-run	0.81						1.74				
	[0.4981]						[0.3143]				
Mean LHS pre-period	.8945	.8945	.8945	.8945	.8945	.3464	.3464	.3464	.3464	.3464	.3464
R-squared	.4780		.9085			.9287		.9575			
Obs	2204	2052	430	1407	1850	2209	2107	430	1101	2209	350

Standard errors in parenthesis. *, **, *** denote 1, 5, 10 percent significance

Table 5: PIT intermediary outcomes

$Lg[K/y]$ is the ratio of the State PIT exemption threshold to State per capita income. [IRS returns/population] is the ratio of all taxable and non-taxable returns filed with the IRS to the population count as per BEA data; non-taxable returns have no income tax remaining after tax credits. In Column (2) and (7), the instrument 1(Good debt conditions) is the interaction between a dummy which equals 1 in the period where development bonds earned interest was tax exempt from Federal income tax, and a dummy which equals 1 when the redevelopment counties in a State have average debt-service ratio below regional median in the pre-reform period. In Column (3) and (8), a synthetic control is created for every reform State by matching on the redevelopment counties' share of State labor force in the pre-reform period. In Column (4) and (9), the propensity score estimator matches on income, employment, population, and redevelopment counties' share of State labor force. In Column (5) and (10), manufacturing share of individual income is instrumented for using the State-specific reform dummy 1(Industryreform). State-time varying controls include: log State-population; log State per capita income in the ten deciles of the State income distribution; the 1st stage determinants of political competition used in Besley, Persson and Sturm (2009). The F-test [p-value] is from testing the joint significance of a set of pre-reform period dummies in the short run (5 years) or medium run (15 years) immediately prior to the State-specific reform. Hist employee (per cap income) time-trends are interactions between a linear time-trend and the 1940 cross-State distribution of employee share of employment (per capita income).

	[Individual Income Tax/GDP] OLS (1)	[Selective sales tax/GDP] OLS (2)	[Licence tax/GDP] OLS (3)	[Total Tax/GDP] OLS (4)	[General Sales Tax/GDP] OLS (5)	[Corp Income Tax/GDP] OLS (6)
1(Industryreform)	.0054	-.0028	-.0009	.0027	-.0002	-.0010
	(.0015)***	(.0009)***	(.0004)**	(.0029)	(.0022)	(.0008)
1(Placeboreform)	.0026	-.0014	-.0001	.0008	.0033	-.0010
	(.0017)	(.0009)	(.0005)	(.0024)	(.0020)	(.0006)
State dummies	x	x	x	x	x	x
Region-Year dummies	x	x	x	x	x	x
Hist employee time-trend	x	x	x	x	x	x
Hist per cap inc time-trend	x	x	x	x	x	x
State time-varying controls	x	x	x	x	x	x
F-test non-param pre-reform trend						
Short run	.68	0.42	0.52	0.13	0.02	0.30
	[0.5121]	[0.6593]	[0.5981]	[0.8817]	[0.9833]	[0.7428]
Medium-run	0.65	0.61	0.33	0.28	0.42	0.26
	[0.6299]	[0.6543]	[0.8573]	[0.8884]	[0.7967]	[0.9015]
R-squared	.7754	.7658	.5275	.7303	.6333	.4654
Pre-reform mean LHS	.0018	.0123	.0053	.0306	.0050	.0019
Obs	2634	2634	2634	2634	2634	2634

Standard errors clustered at the State. *, **, *** denote 1, 5, 10 percent significance

Table 6: Reduced-form policy impact on tax takes

State-time varying controls include: log State-population; log State per capita income in the ten deciles of the State income distribution; the 1st stage determinants of political competition used in Besley, Persson and Sturm (2009). The F-test [p-value] is from testing the joint significance of a set of pre-reform period dummies in the short run (5 years) or medium run (15 years) immediately prior to the State-specific reform. Historical employee (per cap income) time-trends are interactions between a linear time-trend and the 1940 cross-State distribution of employee share of employment (per capita income). Individual income taxes are levied on the gross income of individuals; selective sales taxes are impsed on sales of particular commodities or services or gross receipts of particular businesses; licence taxes are taxes exacted as a condition to the exercise of a business or nonbusiness privilege (at a flat rate or measured by such bases as capital stock, capital surplus, number of business units, or capacity); general sales taxes are applicable to all types of goods and services, whether at single or classified rates; corporate income is levied on the net income of corporations and businesses; total tax includes income taxes, general and selective sales taxes, property taxes, ldeath and gift taxes, document and stock transfer taxes, and severance taxes.

	[Individual Income Tax/GDP]			[Selective sales tax/GDP]			[Licence tax/GDP]		
	OLS	IV	IV	OLS	IV	IV	OLS	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1(Industryrefom)	.0054	.0038		-.0028	-.0042		-.0009	-.0012	
	(.0015)***	(.0017)**		(.0009)***	(.0023)*		(.0004)**	(.0005)**	
1(Placeboreform)	.0026			-.0014			-.0001		
	(.0017)			(.0009)			(.0005)		
Manuf share			.2135			-.3501			-.1479
			(.1283)*			(.1590)**			(.1153)
Instrument									
1(Good debt conditions)		x			x			x	
1(Industryreform)			x			x			x
1st stage F-test		34.65	11.12		34.65	11.12	34.65	11.12	
State dummies	x	x	x	x	x	x	x	x	x
Region-Year dummies	x	x	x	x	x	x	x	x	x
Hist employee time-trend	x	x	x	x	x	x	x	x	x
Hist per cap inc time-trend	x	x	x	x	x	x	x	x	x
State time-varying controls	x	x	x	x	x	x	x	x	x
R-squared	.7760			.7658			.5275		
Pre-reform mean LHS	.0018	.0018	.0018	.0123	.0123	.0123	.0053	.0053	.0053
Obs	2634	2393	2355	2634	2393	2355	2634	2393	2355

Standard errors clustered at the State. *, **, *** denote 1, 5, 10 percent significance

Table 7: PIT, selective sales tax, and licence tax: Robustness

State-time varying controls include: log State-population; log State per capita income in the ten deciles of the State income distribution; the 1st stage determinants of political competition used in Besley, Persson and Sturm (2009). The F-test [p-value] is from testing the joint significance of a set of pre-reform period dummies in the short run (5 years) or medium run (15 years) immediately prior to the State-specific reform. Historical employee (per cap income) time-trends are interactions between a linear time-trend and the 1940 cross-State distribution of employee share of employment (per capita income). In Column (2) and (5), the instrument 1(Good debt conditions) is the interaction between a dummy which equals 1 in the period where development bonds earned interest was tax exempt from Federal income tax, and a dummy which equals 1 when the redevelopment counties in a State have average debt-service ratio below regional median in the pre-reform period. In Column (3) and (6), manufacturing share of individual income is instrumented for using the State-specific reform dummy 1(Industryreform).

	[Motor-fuel tax/GDP]	[Public utility tax/GDP]	[Alcohol tax/GDP]	[Pari-mutuel tax/GDP]	Decile(Alcohol licence tax/GDP)	Decile(Corporation licence tax/GDP)	Decile(Occupation licence tax)	Decile(Public utility licences)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(Industryreform)	-.0017	-.0004	.0002	.0000	-.7360	-.7498	-1.9656	-1.5507
	(.0005)***	(.0002)*	(.0003)	(.0001)	(.7401)	(.3201)**	(.9454)**	(.8597)*
1(Placeboreform)	-.0006	-.0014	.0001	-.0012	-.3350	-1.0939	.0165	-.5437
	(.0005)	(.0046)	(.0003)	(.0026)	(.5938)	(1.4374)	(1.1768)	(.6997)
State dummies	x	x	x	x	x	x	x	x
Region-Year dummies	x	x	x	x	x	x	x	x
Hist employee time-trend	x	x	x	x	x	x	x	x
Hist per cap inc time-trend	x	x	x	x	x	x	x	x
State time-varying controls	x	x	x	x	x	x	x	x
F-test non-param pre-reform trend								
Short run	0.57	0.32	0.91	0.25	0.58	3.34	1.56	0.52
	[0.5707]	[0.7257]	[0.4114]	[0.7771]	[0.5666]	[0.0448]	[0.2221]	[0.5957]
Medium-run	1.09	3.00	0.54	0.31	0.41	1.98	1.26	0.51
	[0.3715]	[0.0286]	[0.7101]	[0.7301]	[0.8030]	[0.1307]	[0.3487]	[0.6135]
R-squared	.9010	.2545	.7043	.4777	.5075	.3068	.3137	.2153
Pre-reform mean LHS	.0077	.0006	.0020	.0003	7.6085	5.3274	4.8333	4.1458
Obs	2634	2634	2634	2634	2634	2634	2634	2634

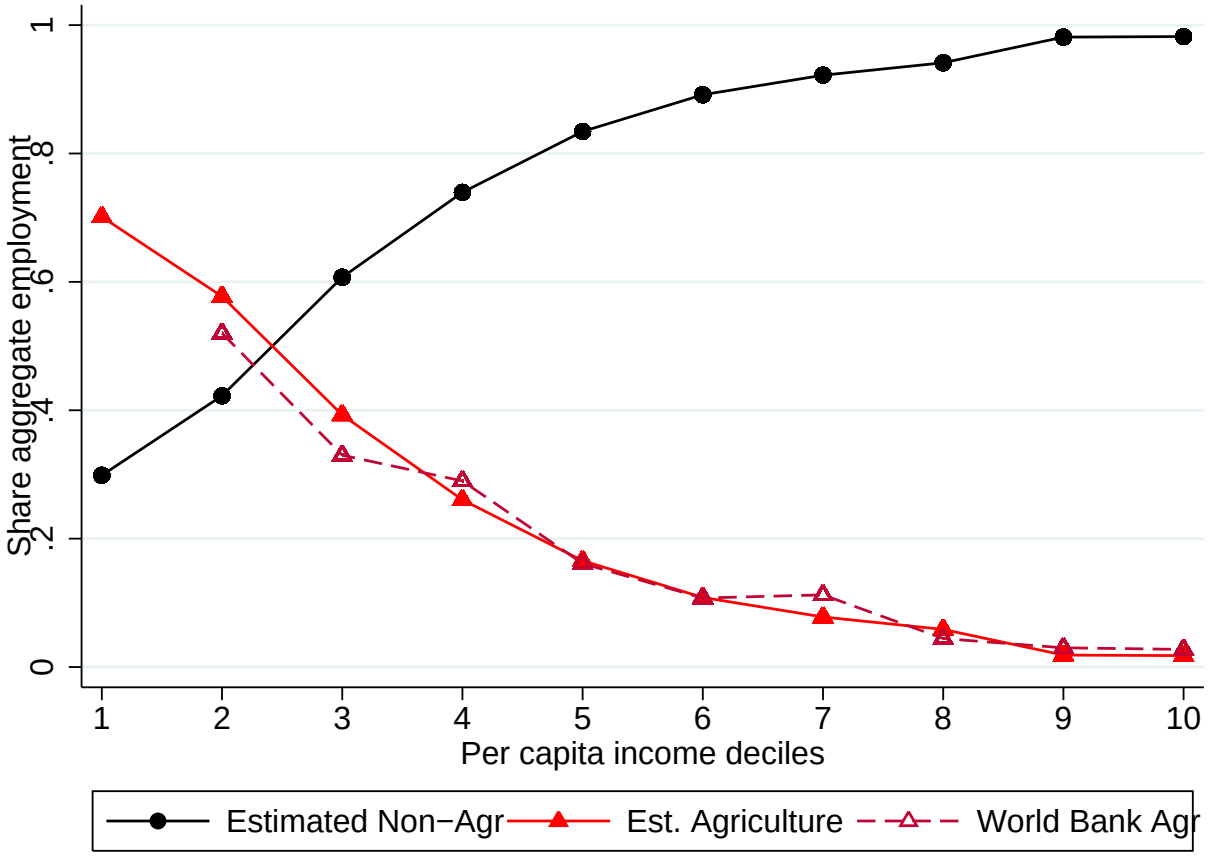
Standard errors clustered at State. *, **, *** denote 1, 5, 10 percent significance

Table 8: Selective sales and licence taxes: channels

State-time varying controls include: log State-population; log State per capita income in the ten deciles of the State income distribution; the 1st stage determinants of political competition used in Besley, Persson and Sturm (2009). The F-test [p-value] is from testing the joint significance of a set of pre-reform period dummies in the short run (5 years) or medium run (15 years) immediately prior to the State-specific reform. Historical employee (per cap income) time-trends are interactions between a linear time-trend and the 1940 cross-State distribution of employee share of employment (per capita income). Motor-fuel taxes are selective sales taxes and gross receipts taxes on gasoline, diesel oil, and other motor vehicle fuels; public utility taxes are taxes imposed distinctively on public passenger and freight transportation companies, telephone, telegraph and light and power companies by gross receipts, gross earnings or units sold; alcohol taxes are selective sales and gross receipts taxes on alcoholic beverages; pari-mutuel taxes are taxes wagered at race tracks and cardroom games. Selective sales taxes further include taxes on amusement activities; insurance premia; and tobacco. Alcohol licence taxes include licences for manufacturing, importing, wholesaling, and retailing alcoholic beverages (does not include taxes on volume or value of transaction); corporation licence include franchise licence taxes, organization, filing, and entrance fees (does not include taxes on value of property, net income or gross receipts); occupation licences include charges relating to inspection and marketing of commodities, chain store licences and licences relating to operation of particular business enterprises; public utility licence taxes include distinct taxes imposed on public passenger and freight transportation companies, telephone, telegraph and light and power companies (does not include taxes by gross or net income, units of service sold, or property tax). Licence taxes further include levies on amusement activities, hunting and fishing, motor vehicles.

8 Appendix

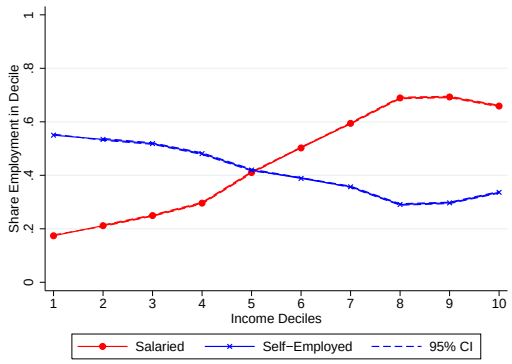
Figure 26: Robustness: own agriculture estimates vs World Bank estimates



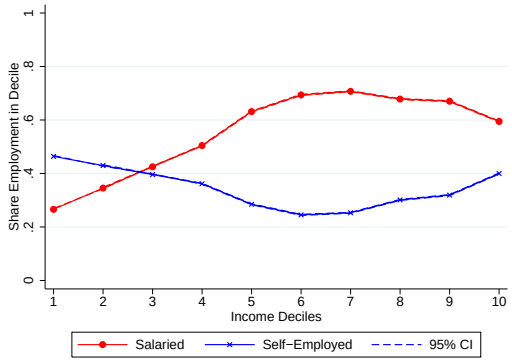
This graph shows estimated weighted employment shares of agriculture and non-agri in the 10 per capita income groups; dashed line shows equivalent estimates, using World Bank agricultural data (of my countries in first per capita income group, there exists no WB data)

Figure 27: Employee and self-employed profiles: Brazil 1970-2010

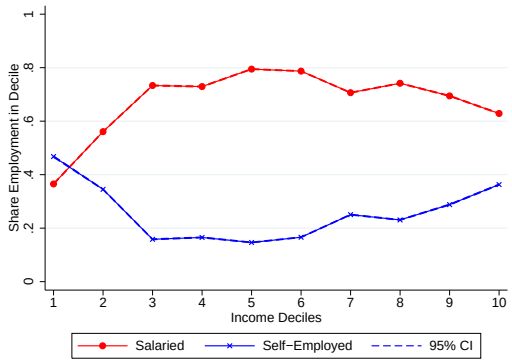
Panel A: Brazil 1970



Panel B: Brazil 1990



Panel C: Brazil 2010



These graphs construct country-year employee and self-employment profiles in exactly the same way as for the historical U.S. Federal profiles (Figs. 11-12), but for Brazil in 1970, 1990 and 2010. Data-source: IPUMS.