Is there an Anti-labor Bias of Taxes? A Survey of the Evidence from Latin America and Around the World

Adriana Kugler

Is there an Anti-labor Bias of Taxes? A Survey of the Evidence from Latin America and Around the World

Adriana Kugler

IDB

Inter-American Development Bank

2011

Adriana Kugler, Georgetown University and NBER.

1. Introduction

Governments often engage in two sorts of activities: (1) activities to overcome market imperfections, and (2) purely redistribute activities. For instance, governments may provide goods and services that would otherwise not be provided by the private sector because of public goods problems or natural monopolies. Governments may also engage in policies that help overcome information asymmetries and externalities. On the other hand, governments may just want to introduce transfers and policies that prevent people from fall below acceptable standards of living.

Whether government activities involve the provision of goods and services or transfers and subsidies, they require funding. Governments can obtain funding in various ways, but one key source of funds for governments is through the collection of taxes. Some taxes such as value-added taxes on consumption may not distort the decisions of firms or workers, although they may discourage spending and encourage informal sector activity. In addition, these taxes may be regressive if they are imposed on all goods and if the propensity to save is lower among the poor than the rich. At the same time, taxes that can be designed as to be proportional to income or revenues are typically imposed only on firms or workers and are likely to distort their decisions to create or destroy jobs, to participate in the labor market, and to engage in formal sector activities. Another key issue in the context of low- and middle-income countries, including Latin America, is that these taxes may be difficult to collect and may even encourage informal activity or reduce the scale of operations to make it easier to evade taxes.

This paper surveys the macro and micro empirical evidence on the effects of different types of labor taxes (in particular, payroll and income taxes) on firm performance and worker behavior. In particular, the paper surveys the impact on:

(a) Unemployment;

(b) Employment levels and Formal/Informal Employment;

(c) Job creation and job destruction;

(d) Entry and exit of firms;

(e) Labor Force Participation;

(f) Wages;

(g) Wage inequality;

(h) Productivity;

(i) Capital intensity, and

(j) Entrepreneurship.

There is some evidence on the impact of labor taxes in Latin American countries, but there is much more evidence for other countries and, in particular, for industrialized economies. Evidence on industrialized countries will also be included here because it can probably help to understand potential impacts of labor taxes in Latin American countries and can help these countries learn from policy mistakes in more developed countries.

In Section 2, I survey the theoretical literature on labor taxes to explain what one should expect the empirical impacts of labor taxes to be. In Section 3, I present the literature on the impact of payroll and income taxes on employment and unemployment, job and worker flows, and labor force participation. In Section 4, I review the literature on the impact of labor taxes on wages, and inequality. Section 5, I present the evidence on the impact of labor taxes on firm performance. In Section 6, I discuss areas on the impact of labor taxes that still need to be explored in the Latin American context and make specific recommendations on relationships that could be estimated to enhance our knowledge of the impact of labor taxes in Latin America. Section 6 concludes.

2. Theoretical Implications of Labor Taxes

This section describes the theoretical literature on the impact of labor taxes on labor market outcomes, firms, and entrepreneurship. I start by reviewing the literature on the impact of labor taxes in developed countries. Then, I describe the theoretical literature on the impact of labor taxes in the developing country context, where the informal sector plays a crucial role.

Daveri and Tabellini (2000) present a model that examines the impact of labor taxes in the context of developed countries. The model is a general equilibrium model of unemployment which includes labor and capital taxes. In this model wages are bargained between a monopolistic union and firms and the union is large enough to negotiate over wages but small enough to take fiscal policy as given. The main assumption in the model is that unemployment income is not taxed at the same rate as labor income. They justify this since they argue that: 1) much of unemployment income may be obtained from informal sector activities, and 2) in most countries income is taxed at a reduced rate or not taxed. Only in Canada, Norway and Sweden are unemployment benefits subject to social security contributions. In other countries, including the U.K. Australia, Finland, France, Spain, Italy, USA, Belgium Germany and Japan, unemployment benefits are either not subject to social security contributions or are subject to reduced rates. On the other hand, unemployment benefits are subject to income taxes in Canada, Norway, Sweden, the U.K., Italy, and the U.S. In Australia, Finland, France, Spain and Belgium unemployment benefits are subject to a reduced rate, and only in Germany and Japan are unemployment benefits not subject to income taxes.

The effects of higher labor taxes on various outcomes are summarized in Figure 1, which comes from Daveri and Tabellini (2000), and which assumes that taxes on

unemployment benefits are lower than for labor income. Higher taxes in this model shifts the labor demand curve to the left, but has no impact on the labor supply curve. Consequently, employment falls permanently. As firms cut employment, the capital-to-labor ratio rises. This raises the productivity of labor and causes real wages to increase temporarily. At the same time, this causes the return to capital to fall and, thus, investment and output to fall as well and real wages eventually falls because the capital-labor ratio goes back to its original level the returns on capital and labor are equalized.

The model by Daveri and Tabellini (2000) is restrictive in that it assumes that wages are bargained by a monopolistic union. Pissarides (1998) examines the effects of employment tax cuts on employment and wages in four different equilibrium models: 1) a competitive model, 2) a union bargaining model, 3) a search model, and 4) an efficiency wage model. The four models are partial equilibrium in that they ignore capital, migration of labor or capital, and the possibility of the emergence of an informal sector. However, the model is useful, as it shows that the results from Daveri and Tabellini (2000) are robust to different wage-setting mechanisms. In Pissarides (1998) an employment tax cut (increase) shifts the labor demand curve to the right (left), which raises (reduces) both real wages and employment. However, whether employment rises (falls) by a lot or not depends on the shape of the wage-setting function and how flexible real wages are. In particular, as in Daveri and Tabellini if the ratio of non-employment income to wages is constant (i.e., if non-employment income, including UI, is treated the same as wages), then the effect falls mainly on wages and there is little effect on employment. On the other hand, if UI is held constant in real terms, real wages are more rigid and the effect on employment will be large. These results hold under all four models of wage-determination. Moreover, Pissarides (1998) examines the impact of changing the structure of the tax system on employment. Pissarides' main finding is

5

that if tax cuts are targeted as to increase the progressivity of the employment tax, the wage-setting function shifts to the right and increases the positive impact of a payroll tax cut on employment.

Mortensen (1994) also uses the Mortensen-Pissarides matching model to calibrate the impact of different policies on unemployment, including a payroll tax cut. In this model, cutting the social security tax from 15% to 7.5% reduces average unemployment duration by a week and unemployment incidence by a small amount. As a result, unemployment rate falls by 0.67 percentage points.

The models by Daveri and Tabellini (2000), Pissarides (1998) and Mortensen (1994) are enlightening in terms of considering the effects of labor taxes on employment and wages, but they ignore that often payroll taxes are used to finance the provisions of benefits for workers. Part of payroll taxes in the form of mandatory contributions by employers are used in most countries to finance the provision of pensions, benefits for disability and maternity, and compensation for work injuries for employees.

The paper by Summers (1989) was the first to provide a conceptual framework to show the effect of payroll taxes when these are used to finance benefits for workers. Summers' argument can be easily summarized by showing labor demand and labor supply curves. Figure 2, which comes from Gruber and Krueger (1991), shows the effects of an increase in payroll taxes. An increase in payroll taxes shifts the labor demand curve to the left. If the labor supply was fixed as in Daveri and Tabellini (2000) then employment would fall from E_0 to E_1, and wages from W_0 to W_1. However, if workers value the benefits they are receiving, then the labor supply curve would shift to the right and employment would fall by a smaller amount to E_2. In this case, part of the

costs of increased payroll taxes is passed on to workers as lower wages and that is why the effect on employment is smaller.

Gruber (1997) and Kugler and Kugler (2010) provide theoretical models which illustrate this same point and show that the effects of payroll taxes are likely to be ambiguous. When workers value the benefits financed through payroll taxes as much as the contributions cost employers, changes in payroll taxes should be fully shifted from firms to employees in the form of lower wages with no disemployment effects. On the other hand, if wages are rigid or payroll taxes finance benefits not completely accrued by employees, there will be only partial shifting and employment should be affected by payroll taxes. The extent of shifting also depends on the elasticities of labor demand and labor supply. A larger labor demand elasticity increases the pass-through and reduces the impact on employment, but a larger labor supply elasticity has the effect of reducing the extent of pass-through and increasing the impact on employment. In addition, the ability to pass payroll taxes as lower wages will depend on the extent to which there are downward wage rigidities (for example, due to minimum wages or union bargained wages).

Income taxes, however, are not used to provide direct benefits and services to those that pay them, so that higher income taxes reduce net income unambiguously. At the same time, given higher income taxes workers may demand higher gross income to get the same take-home pay as discussed by Daveri and Tabellini (2000).

While these theoretical papers shed light on the impact of labor taxes in OECD countries, these models ignore the informal sector and are not as useful in explaining the impact of labor taxes in Latin America where the informal sector accounts for as much as 50% of total employment in many countries. Albrecht et al. (2008) develop a matching model of an economy with a formal and an informal sector, in which

formal/informal activity is a choice made by the worker. In this model, each has one

worker and there is heterogeneity, as there is worker-specific productivity in the formal-

sector. The effects of a rise in payroll taxes is to reduce the rate at which workers find

formal sector jobs and it reduces the average employment duration in the formal sector.

More workers accept informal sector jobs and fewer workers accept formal sector jobs.

This should predict reduced accessions and job creation in the formal sector and

increased accessions into the informal sector. In the model, unemployment among those

that accept formal sector jobs is higher and so it aggregate unemployment. Moreover, in

this model only high productivity matches are worth keeping with high taxes, so that

higher payroll taxes are associated with higher worker productivity. The model also

predicts that a rise in payroll taxes raises welfare (the sum of output and tax revenues),

because the taxes help to solve the inefficiency in search of too many workers turning

down informal-sector jobs and waiting for formal-sector jobs. However, this model does

not include capital, so there are no predictions on the effects of payroll taxes on capital.

Certainly, changes in the capital labor ratio would affect labor productivity. Moreover,

while the model does not consider the impact on inequality, an implication of the model

is that higher payroll taxes should decrease inequality due to increased formal-informal

wage differentials. Likewise, within formal sector inequality should fall if those with

lower productivity now move into the informal sector. However, overall income

inequality should increase as there is more unemployment and more individuals with

zero earnings.

Gentry and Hubbarb (2000) instead focus on the effects of labor taxes on

entrepreneurship. They develop a simple partial equilibrium model of entrepreneurship

with risk-aversion. In this model, the greater the difference in tax rates on entrepreneurs

and taxes on labor income the less entry into entrepreneurship. Second, greater tax

progressivity can offer insurance through the tax system against uninsured idiosyncratic risk and thus may increase entry, as progressivity reduces the spread of net profits. Finally, if entrepreneurial activity is seen as a way to avoid tax payments (as with the informal sector), then higher taxes will reduce entry into entrepreneurship.

3. Labor Tax Impacts on Employment, Turnover and Labor Participation

In this section I provide a survey of the empirical evidence on employment levels, employment composition and employment flows. As discussed above, the theoretical models predict that the magnitude of the impact of labor taxes on employment should depend on the tax treatment of non-labor income, on how much workers value the benefits received from payroll taxes, and on the degree of wage rigidities. However, since we expect for non-labor income to be treated differently from labor income, for workers not to fully value the benefits and for there to be some degree of wage rigidities, then one should expect that lower payroll taxes or payroll tax cuts should increase employment and decrease unemployment. Moreover, one should expect for payroll tax cuts to induce a shift towards formal sector employment and for flows from unemployment to employment and from informal to formal employment to increase.

3.1. Empirical Evidence on the Effects on Unemployment and Employment

In a survey on the impact of labor market rigidities, Nickell (1997) documents that while payroll tax rates in Europe are as high as 40% (France, Italy, and Sweden) but as low as 2.5% in Australia, 7% in Ireland and 13% in the U.K and Canada. Total tax rates, which is the sum of average payroll, income and consumption tax rates, are less variable and represents the tax wedge between real labor costs and real take-home pay. However, even here Nickell (1997) documents total tax rates of 70% for Sweden and

9

65% for Finland, France, and Italy, but much lower tax rates of 35% for Ireland, Portugal, Switzerland, Japan, Australia and New Zealand. Using data for 20 OECD countries using cross-sections for the period 1983-88 and 1989-1994, Nickell (1997) runs regressions using a random effects generalized least squares procedure where the dependent variables are the log of total unemployment, long-term and short-term unemployment. The control variables are the total tax rate, an employment protection index, the replacement rate, unemployment benefit duration, active labor market policies, union density, union coverage index, co-ordination index, the change in inflation and a dummy for the second time period, 1989-1994. The results show that an increase in the total tax rate increases overall unemployment mainly because of its effect on short-term unemployment. An increase in the total tax rate by 10% raises total unemployment and short term unemployment by 25%. However, Nickell (1997) emphasizes that the total tax rates have no impact on the long-term unemployment. At the same time, using data for 20 OECD countries, Nickell (1997) finds that an increase in the total tax rate is associated with lower employment-to-population ratios for the whole working age population but less so with the employment-to-population ratios for adult males. Blanchard and Wolfers (2000) use a sample of 20 OECD countries and eight period of time with five-year averages from 1960 to 1996. They use indirect least squares to estimate the relation between labor taxes and unemployment and find a smaller effect of 0.018. Daveri and Tabellini (2000) use data for 14 industrial countries over the period 1965-95 averaging five-year periods. However, unlike Nickell (1997) and Blanchard and Wolfers (2000), Daveri and Tabellini exploit the temporal variation in labor taxes and they separately estimate the relations between labor taxes and unemployment for continental European countries and Anglo-Saxon countries. Regardless of whether the relation is estimated using OLS, GLS or first-differences, the

estimated coefficient of labor taxes for continental European countries is always positive and significant and ranges between 0.46 and 0.54. By contrast, the coefficient is insignificant for the Anglo-Saxon and Nordic countries. The authors interpret this result as being due to the fact that labor taxes interact with minimum wages and union bargaining which impose downward wage rigidities and makes it harder to pass on taxes to workers as lower wages, thus increasing labor costs for employers.

By contrast, earlier studies panel studies for OECD countries, which do not control for the various factors included in the more recent studies of the 1990s and use simple OLS techniques, find no effects on employment. For example, Vroman (1974a) uses data for 19 OECD countries from 1958 to 1967 and finds only a small impact on employment. Similarly, Brittan (1972) uses data for 64 countries from 1957 to 1959 and finds no effect on employment. These are not as credible as the studies cited above.

Likewise, Botero et al. (2004) run OLS regressions of unemployment on social security benefits, using a cross-section of 85 countries. These regressions only controls for the average years of schooling, which the authors argue is included as a proxy for the quality of enforcement. They do not find that greater generosity of social security benefits (which include old age, disability, health, and unemployment benefits and which are financed through payroll taxes) are associated with higher overall unemployment or higher unemployment for younger individuals. Botero et al. (2004) also estimate these analysis for the sub-samples of countries with above and below the median per capita income as a way to proxy for enforcement and they find bigger effects for the above median per capita income sample. This analysis is also conducted with instrumental variables, using legal origins as instruments and the results are similar. However, legal origins are likely to affect growth and employment. Thus, this study is the least reliable as it uses only cross-country variation.

The studies that use aggregate data at the country level are likely to suffer from reverse causality, as unemployment and employment may determine tax rates. In addition, these studies are likely to suffer from omitted variable bias, as tax rates could be correlated to other institutional factors in a country that also relate to employment and unemployment.

Thus, more credible evidence exploits variation in tax rates within countries that apply differentially across groups of individuals, across sectors, across regions, or across firms and which allow to contrast within the same institutional environment how changing taxes affects employment for one group/sector/region/firm but not another. Evidence based on within country variation shows a wide range of results. For the U.S., the most reliable studies show evidence of no effects on employment at all (Gruber (1994), Gruber and Krueger (1991)). Gruber (1994) exploits a difference-in-difference-in-difference (triple difference) design to study the impact of the introduction of maternity benefits mandates in 23 states between 1975 and 1979. The analysis use Current Population Survey (CPS) data for 1974, 1975, 1977 and 1978 and compares child-birth aged women to older women and men who were unaffected by the mandates, in states that introduced maternity benefits and those that did not, before and after the introduction of maternity benefits. Gruber and Krueger (1991) exploit differences across states and activities (industry/occupation groupings) in workers compensations benefits using state-level employer-reported data from the Bureau of Labor Statistics (BLS) for the years 1979 and 1988 and find no effects of these mandates on employment.

However, studies for the U.S. which consider payroll tax subsidies on all payroll contributions and not specific mandates find that reducing payroll taxes do increase employment. A couple of studies of the New Jobs Tax Credit (NJTC) program which was in effect from mid-1977 to the end of 1978 show some evidence of increased

employment. The NJTC provided a credit of 50% of the first $4,200 of wages per employee for increases in employment of more than 2% over the previous year. Perloff and Wachter (1979) compare employment growth in firms that knew and did not know about the NJTC using a large employer survey. They estimate employer regressions that control for firm-size, tax filing status and region and industry effects, and find that the firms that knew about the credit increased employment by more than 3% compared to firms that did not know about the program. Bishop (1981) estimates labor demand equations, controlling for current and lagged output, current and lagged wages and other inputs, although it is not clear that one would want to control for current values of these variables. Bishop (1981) finds that the NJTC increased employment between 0.2% and 0.8%. Other studies use similar comparisons to study the Targeted Job Tax Credit (TJTC) which reduced taxes by 50% for the first year and by 25% for the second year for the first $6,000 of wages for member of a target group (economically disadvantaged youth, public assistance and SSI recipients, Vietnam-era veterans, certain ex-convicts, and disabled individuals). The study by Bishop and Montgomery (1993) uses a survey of 3,500 private employers and finds that each subsidized hire generates between 0.13 and 0.3 new jobs to a participating firm. However, these studies do not take account of selection in terms of who knew and who did not know about the program. Katz (1996) instead exploits the fact that the TJTC program initially allowed 18-24 year olds from disadvantaged backgrounds to be eligible, but in January 1989 it made 23-24 ineligible. Katz exploits the change over time for this group and compares it to the group of non-disadvantaged 23-24 year olds. It uses the groups the 18-22 year olds who continued to be eligible and the 25-29 year olds who were never eligible to control for cyclical changes that could potentially account for the before and after differences of the 23-24

13

year olds. The triple difference estimates suggest that the TJCT boosted employment for disadvantaged 23-24 year olds by 3.4 percentage points.

For the U.K, there are two studies that have used within country variation over time, but no cross-country variation. The results for the U.K. are mixed but rely on different type of data. For the U.K Beach and Balfour (1983) who rely on manufacturing quarterly data for the U.K. from 1956 to 1978 find substantial disemployment effects in England. On the other hand, Nickell and Bell (1996) estimate an unrestricted dynamic regression with five lags of log unemployment, the tax wedge (or total taxes), terms of trade, union power, the replacement ratio, the relative demand for skill, and the index of employment turbulence, using time-series data for the U.K. for the period 1964 to 1992. While the Nickell and Bell (1996) is better than Beach and Balfour (1985) in that it only covers a longer period and it covers all sectors of the economy, but also in that it controls for other institutional factors. However, the study still does not exploit cross country variation and thus makes it difficult to control for other potential omitted variables. The findings show that the effect of the tax wedge on unemployment is not significantly different from zero. The fact that there is no effect on unemployment is consistent with taxes being passed onto workers. On the other hand, while Nickell and Bell do not examine the impact of the tax wage on unskilled unemployment, they argue that a policy of reducing social security and income taxes on the unskilled would help to increase employment because of the downward wage rigidities that the unskilled are subject to.

Another reliable study is the natural experiment for Spain by Kugler et al. (2003) which exploits within country variation between different age groups. This study examines impact of payroll tax subsidies on the probability of permanent employment. In 1997 Spain introduced subsidies of 40% for workers under 29 years of age and of

60% for workers over 45 years of age who were hired with a permanent contract. Thus, in this study, I compare the differences in permanent employment for the young (under 29 years of age) and old (over 45 years of age) before and after the reform to the differences in permanent employment of middle age workers before and after the reform. Using this difference-in-differences methodology, I find that the reform increased permanent employment for young workers by 2.6% and of older workers by 2.1%.

The studies mentioned above do not include Latin American countries. However, the impact of payroll taxes in the countries in the region is likely to differ from those in Europe and especially from those in the U.S. First, minimum wages and other downward wage rigidities in Latin America are likely to be closer to Europe's than to the U.S.'s and this will make it difficult to shift the cost to workers. Second and, most importantly, the benefits from these payroll taxes may not necessarily go directly to workers or workers may not value the benefits as much as they cost, which means that these costs could not be fully passed on to workers. Finally, the presence of an informal sector means that workers can more easily move out of formal employment and thus the labor supply is likely to be more elastic, which will increase the effect on employment.

Heckman and Pages (2004) construct an unbalanced panel of 38 countries (23 in the OECD and 15 in Latin America) for the period 1983-1999 and estimate the effects of social security contributions on employment-to-population ratios. Their results suggest that a 10% increase in social security contributions reduces employment by 7% in the overall sample, by 10% in OECD countries, but only by 4.5% in Latin America. This is somewhat surprising, as one would have expected bigger effects in Latin America than in the OECD, given that the link between benefits and contribution is

likely weaker and that the labor supply is likely more elastic, one would have expected bigger effects in Latin America than in Europe.

Gruber (1997) and Kugler and Kugler (2010) exploit changes in payroll taxes over time in Chile (an increase) and Colombia (a decrease) that vary across firms to estimate the impact of payroll taxes on employment. As Gruber (1997) notes, however, "the applicability of the [U.S.] studies to other types of payroll taxation and to other countries is uncertain." Gruber (1997) considers a large reduction in payroll taxes in Chile which can be passed on as higher wages and finds no effect at all on employment. Cruces et al. (2010) exploit the changes in payroll taxes in Argentina across regions in the 1990s. Using administrative data from the Integrated Retirement and Pension System they find no effect on employment.

However, downward wage rigidities may make it more difficult to shift a large increase in payroll taxes on to workers. Also, contrary to the Chilean and Argentinean contexts, in many other countries the link between benefits and contributions is likely to be weak. Kugler and Kugler (2009) examined the effects of changes in payroll taxes on formal employment and wages in Latin America, using a panel of manufacturing plants from Colombia to analyze how the rise in payroll tax rates over the 1980s and 1990s affected the labor market. The results in this study indicate that a 10% increase in payroll taxes lowered formal employment by between 4% and 5%. In addition, they find less shifting and larger disemployment effects for production than non-production workers. These results suggest that policies aimed at boosting the relative demand of low-skill workers by reducing social security taxes on those with low earnings may be effective in a country like Colombia, especially if tax cuts are targeted to indirect benefits.

To summarize, Daveri and Tabellini (2000) and Blanchard and Wolfers (2000) are the best studies relying on cross-country panels, as they exploit both temporal and cross country variation in tax rates. Both find significant impacts of taxes on unemployment but Daveri and Tabellini find particularly that these effects only significant in continental Europe. Heckman and Pages (2004) use a panel of OECD and Latin American countries and find larger effects in the OECD than in Latin America.

The most reliable evidence uses within country variation, which allow holding constant other institutional factors within the country. Here the best studies show no employment effects of mandated benefits in the U.S. (Gruber (1994) and Gruber and Krueger (1994)), but positive employment effects of tax credits when applied to overall payroll taxes. Similarly, the results show positive effects of payroll tax subsidies in Europe (Kugler et al. (2003), Betcherman et al. (2010)). For Latin America, the effects are large in countries with weak links between benefits and contributions and where minimum wages are binding (Kugler and Kugler (2009)) but not in countries where the link between benefits and contributions is strong and minimum wages are likely to bind (Gruber (1997), Cruces et al. (2010)).

3.2. Empirical Evidence on the Effects on Formal and Informal Employment

Payroll taxes increase the cost of employment for firms and workers. Similarly, income taxes increase the cost of working for individuals. Thus, labor taxes may induce firms and workers to engage in informal sector activities in which they do not obey labor market regulations. There is, of course, a cost to not complying with these regulations, but if firms operate a small scale they may be able to go undetected and still avoid paying taxes. Even if they go undetected, the fact that they have to operate at a small and possibly sub-optimal scale would also impose costs. Nonetheless, if the taxes

are high enough the costs of operating in the informal sector may still mean that firms may prefer this option. Levy (2008) has argued that the funding and design of social programs give workers incentives to seek low-productivity jobs in the informal sector and for firms to create these jobs.

Using cross-country data for 85 countries, Botero et al. (2004) show that an increase in the social security benefits is associated with a smaller size of the unofficial economy but with larger employment in the unofficial economy (after controlling for average years of schooling), though the effects are not significant.[2] The analysis is also conducted using legal origins as instrumental variables and separately for the sample of above/below median per capita income countries. The results are similar in both cases.

There are hand-full of studies that exploit within country variation. Betcherman et al. (2010) exploit a natural experiment in Turkey which affected some provinces but registered employment. In particular, this study exploits the introduction of Law 5084 in 2004 and Law 5350 in 2005, which covered 15 and 13 provinces respectively and which reduced employer's social security contributions and income taxes on wages. The study uses difference-in-differences by comparing the changes of covered provinces before and after the change in legislation to the changes of uncovered provinces before and after the legislation. They find that the subsidies increased the number of registered establishments and the number of employed workers registered. In particular, the first reform increases employment between 5%-13% and the second between 11%-15%, although there are substantial deadweight losses due to the subsiding of jobs which would have been created regardless of the program. Bussolo, Kugler and Medvedev (2011) use micro-data from Colombia together with a general equilibrium model and

---

[2] The size of the shadow economy comes from averaging all estimated reported in Schneider and Nest (2000) and is estimated as a percentage of GDP. The employment of the unofficial economy is the share of the total labor force employed in the unofficial economy in the capital city of each country as a percentage of the official labor force.

show that a reduction in payroll taxes of 10% would increase formal employment by 5%. Mondragon-Velez et al. (2010) show that non-wage labor costs in Colombia are positively associated with the size of the informal sector (whether using the ILO definition that combines size and occupation or the definition based on health contributions), i.e., a 10% increase in non-wage labor costs increases informality by 8%. One concern with this study is that the variation in non-wage labor costs is mainly temporal, but the study does not control well for cyclical factors.

On the other hand, Almeida and Carneiro (2007) use administrative data from the Secretary of Inspections at the Ministry of Labor in Brazil and the 2000 Census to estimate the relation between labor inspections and various variables. They instrument the number of inspections (enforcement) with distance to regional offices and number of inspections in each office and they find that they find that enforcement of payments of mandated benefits to formal workers is associated with a higher proportion of formal employment (a standard deviation increase in inspections in the city leads to a 15 percentage point reduction in the proportion of informal employment). Thus, increasing the cost of non-compliance does have the desirable effect of increasing the size of the formal sector in Brazil.

3.3. Empirical Evidence on the Effects on Worker and Job Turnover

Labor taxes affect the costs of working for both firms and workers and should reduce accessions and job creation. Moreover, if they are large enough, they may also reduce firm entry.

Kugler et al. (2003), described above, also studies the impact of payroll tax subsidies on the probability of transitioning from unemployment to permanent employment using a difference-in-differences methodology. I, thus, compare the differences in transitions for the young (under 29 years of age) and old (over 45 years of

age) before and after the reform to the differences in transitions of middle age workers before and after the reform. I find that the reform increased transitions from unemployment to permanent employment by 0.04 for young workers and by 0.05 for older workers, even after controlling for age-specific cyclical effects.

Mondragon-Velez et al. (2010) instead document the link between non-wage labor costs in Colombia and turnover from formal to informal and from informal to formal activities. In particular, they find that high non-wage labor costs are associated with increased transitions from formal to informal employment and with decrease transitions from informal to formal employment. According to their results an increase of 10 percentage point in non-wage labor costs increases the probability of transitioning into informality by 8.7 percentage points, but as I mentioned before this analysis does not control well for cyclical factors.

Betcherman et al. (2010), described above, also documents increased registered establishments as a result of the subsidies introduced in Turkey, thus showing job creation and establishment entry into the formal sector as a result of the generous subsidies. The results show suggest that the subsidies increased the number of establishments by between 2.5%-4.1% and the establishment growth rate increased by 0.5 percentage points, above the control group.

3.4. Empirical Evidence on the Effects on Labor Force Participation

Both payroll and income taxes can reduce labor force participation if workers find it costlier to give up their leisure time or their informal sector activities (this is the substitution effect). On the other hand, taxes may increase labor force participation if workers' incomes are reduced and they are now in need of working more to keep the same standard of living (this is the income effect).

Botero et al. (2004) use cross-country data on 85 countries and find that greater generosity in social security benefits is associated with lower male and female participation. While the effect is larger for women, the effect is only significant for men. Nickell (1997) also finds that the total tax rate is negatively related to labor supply, but the effect is not significant for the overall sample of men and women. As mentioned before, however, this study only includes one control and only uses variation in benefits across countries, so it is likely to suffer from omitted variable bias.

The literature on the impact of income taxes on labor force participation is very extensive but almost exclusively focused on OECD countries. The pioneering paper of Kosters (1967) examined the impact of taxes on both participation and hours of work in the U.S. and found small tax effects on both of these margins. Later work that accounted for selection bias also in the U.S., confirms weak tax effects on female hours of work (Mroz (1987), MaCurdy et al. (1990)). However, the work by Triest (1992) which takes into account the effect of deductibles on participation finds that most of the effect of taxes works through this channel. A study for the U.K. by Blundell et al. (1998) which exploits the tax reforms during the 1980s also finds evidence of small wage and income elasticities. These effects focus on adult men, so it is not that surprising that the results show little responsiveness of labor supply to taxes.

Recent work on tax credits for those at the lower end of the income distribution shows that tax credits do provide important incentives to participate in the labor force. Eissa and Liebman (1996) examine the impact of the Earned Income Tax Credit (EITC) introduced in the U.S. through the 1986's Tax Reform Act and find that single women with children increased their relative labor force participation by up to 2.8 percentage points. However, since the EITC is based on family income, it has been found to provide disincentives for second earners in the household. Eissa and Hoynes (2004) find

that while the labor force participation rate of married men increased by about 0.2 percentage points after the EITC expansions, the labor force participation of women decreased by just over a full percentage point. However, while separate taxation is preferable from the perspective of raising women's labor force participation, it generates a cost in terms of less horizontal equity.

While beyond the scope of this review, it is also possible for taxes to discourage marriage and fertility. First, as discussed in the previous paragraph, the tax structure may make it unfavorable for people to marry. Second, the high unemployment, especially among the young, likely postpones marriage and fertility as well. If this were the case, this would of course feedback on taxes as there would be fewer people to contribute taxes and pay for social security of those retiring.

4. Labor Tax Impacts on Wages and Wage Inequality

This section describes the empirical literature on the effects of labor taxes on wage levels and wage inequality. As described in the theoretical section, the incidence of taxes on wages will be greater if the tax treatment of non-labor income is treated more similar to that of labor income, if wages are flexible, and if the labor supply is more inelastic. The fact that the previous section shows that there are no employment effects in the Anglo-Saxon countries and bigger employment effects elsewhere indicate that the incidence of payroll taxes on wages should be much bigger in the Anglo-Saxon countries and smaller in continental Europe and Latin America.

4.1. Empirical Evidence on the Effects on Wages

Evidence looking at payroll tax variations shows a range of results on the impact on wages. The initial studies looking at pass-through used time-series data and exploited temporal variation in taxes, and thus were unable to separate other factors changing

22

simultaneously. For the U.S., Gordon (1972) uses quarterly data from 1954-70 and finds evidence of full-shifting. Vroman (1974b) uses manufacturing quarterly data from 1956 to 1974 in the U.K. and finds that only about 40% of taxes are shifted. Hamermesh (1979) uses data for the U.S. for the period from 1967 to 1973 and finds that only about a third of the contributions for social security are shifted.

For Sweden, Holmlund (1983) uses annual data from 1951 to 1979 for mining and manufacturing and finds that about a third of the payroll taxes get passed on as lower wages. By contrast, Weitenberg (1969) uses annual data from 1950 to 1966 for the Netherlands and finds that 80% is passed on to workers.

However, all of the studies exploit temporal variation within a country and that may be confounding the effect of taxes with the effects of many other factors. The best studies instead exploit both cross-section and time series variation and tend to find full shifting. For example, Gruber (1994, 1997) and Gruber and Krueger (1991), which rely on cross-section and time-series variation in Chile for social security contributions and in the U.S. for disability insurance and maternity benefits, find full wage shifting of employer contributions. By contrast, Betcherman et al. (2010) find no shifting at all of the labor tax subsidies in Turkey also using a difference-in-differences methodology. However, they do not have individual wage or earnings data but rather approximate earnings per worker by dividing the total taxable earnings by the number of workers in each province.

For Latin America, Heckman and Pages (2004) show a zero pass-through in OECD countries, but a 36% pass-through in Latin America. Thus, while some of the costs are borne by workers, social security contributions still imply large costs for employers in Latin America.[3]

---

[3] Hamermesh (2004) provides a summary of results in a recent series of country studies for Latin America. Many of the studies for Latin America use individual micro or sectoral data and compare the

Using micro-data and within country variation due to payroll tax reforms in Chile and Colombia, Gruber (1997) and Kugler and Kugler (2010) also find very different effects. Gruber (1997) finds full shifting of the payroll tax reduction in Chile. By contrast, Cruces et al. (2010) find that only 55% of the payroll tax is shifted to workers. This less-than-full-shifting is a puzzling result, given that Cruces et al. (2010) find no effect on employment. If all of the cost of payroll taxes is not shifted to wages, then there should be some effect on employment as costs increase for employers. Kugler and Kugler (2010) instead find less-than-full shifting and employment effects. Kugler and Kugler (2010) find that formal wages fell by between 1.4% and 2.3% as a result of a 10% rise in payroll taxes in Colombia. This "less-than-full-shifting" in Colombia is likely to be the result of weak linkages between benefits and taxes and the presence of downward wage rigidities induced by a binding minimum wage in Colombia. Thus, the difference between the two studies is likely due to two factors: (1) the link between benefits and contributions is much stronger in Chile than in Colombia, making Chilean workers more willing to pay for the benefits, and (2) minimum wages are binding in Colombia but not in Chile (Maloney and Nunez (2004), making it difficult to pass on taxes as lower wages to workers in Colombia.

Thus, the best evidence finds evidence of pass-through, although the amount passed on to the workers is much larger in the Anglo-Saxon countries than in continental Europe and Latin America.

---

wages of formal and informal sector employees (e.g., Cox and Edwards (1997), McIsaac and Rama (1997), Mondino and Montoya (2004), and Vargas (2004), Bernal and Cardenas (2004)) to infer the pass-through. As pointed out by Kugler (2004) and Marrufo (2001) a problem with comparing formal and informal sector workers is that they likely self-select into the sectors, though Kugler (2004) shows that these results are likely downwardly biased. Moreover, there are many other differences between formal and informal workers so it these differences may be capturing many other factors as well.

4.2. Empirical Evidence on the Effects of Taxes on Wage Inequality

As described in the previous section, the evidence for Latin America is that payroll taxes reduce wages for formal sector workers. Thus, this should contribute to decreasing wage inequality as the wage differential between formal and informal sector workers should decline. On the other hand, to the extent that less formal sector jobs are created as a result of increased costs of employment, this would put more people into non-employment and increase earnings inequality. By contrast if the cost of non-compliance with labor taxes increases, more workers will be hired in the formal sector and fewer in the informal sector. Thus, the formal salary should decrease and the informal salary should rise, decreasing the formal/informal salary differential. On the other hand, if more workers become unemployed and have zero earnings, income inequality should increase. In their study for Brazil, Almeida and Carneiro (2007) find that stricter enforcement of the payment of benefits reduces the formal sector wage premium. Moreover, while they find that stricter enforcement increases unemployment they do find that it also increases income inequality (perhaps because the fall in the within formal sector wage differential and the fall in the formal/informal wage differential dominate the effect on greater income inequality due to those unemployed).

5. The Impact of Labor Taxes on Entrepreneurship and Firm Performance

5.1. Empirical Evidence on the Impact on Investment

There is surprisingly little evidence on the impact of labor taxes on capital-to-labor and investment. The only study that looks at the impact of both capital and labor taxes on investment is the working paper version of Daveri and Tabellini (2000). This paper uses 2SLS and instruments with all the exogenous variables and the lags of the

endogenous variables. The findings show that while the capital taxes reduce investment, the effects of labor taxes on investment are insignificant regardless of the country-type.

For Latin America there is no similar evidence on the impact of labor taxes on capital and investment. Bernal and Cardenas (2004) show a graph of skilled and unskilled employment, capital and non-wage labor costs in transportation from 1980 to 1996, which shows capital rising sharply in 1994 when payroll taxes increased in Colombia. However, this study shows no regressions of the capital-to-labor ratio on labor taxes. Instead, the regression they estimate is a regression of employment on labor costs, the price of materials, the capital stock, growth in production, and a time trend. Unfortunately, the capital stock is endogenous, but the regression takes it to be exogenous as they use the capital stock to instrument for lagged unemployment. Also, even if instrumented this specification would not allow examining the impact of labor taxes on the capital labor ratio.

5.2. Empirical evidence on the Impact on Productivity

There is some evidence on the impact of payroll taxes on productivity. Almeida and Carneiro (2006) find that stricter enforcement of labor regulations, which affects the payment of mandated, reduces labor productivity in Brazilian cities. Thus, in this case higher enforcement prevents substitution and increase formal sector employment thus reducing rather than increasing labor productivity.

5.3. Empirical Evidence on the Impact on Entrepreneurship

There is an extensive literature examining the impact of taxes on entrepreneurial activity. Taxes may increase entrepreneurial activity because higher taxes may induce individuals to take advantage of tax avoidance opportunities, much like taking advantage of informal sector activity. On the other hand, tax progressivity can offer

insurance through the tax system against uninsured risk and may enhance entry into entrepreneurial activity.

Most studies in this area use time-series data. Some of these studies use OLS regression analysis on time-series data, which is problematic, and find a positive relation between tax rates and self-employment rates (Long (1982) and Blau (1987)). More recent studies use more sophisticated techniques that take account of cointegration (i.e., the existence of a common stochastic trend among 2 or more variables). Surprisingly, most of these studies also find a positive correlation between tax rates and entrepreneurial activity which they attribute to workers willingness to go into entrepreneurial activities in which they can more easily avoid taxes (Parker (1996), Cowling and Mitchell (1997), and Robson (1998)). The only exception to this result is the study by Bruce and Mohsin (2003), which finds a negative relation between payroll taxes and the share of those with a small business/profession using data from the Internal Revenue Service (IRS).

A number of studies have also examined the impact of taxes using microdata. Bruce (2000) uses the Panel Study of Income Dynamics (PSID) and finds that reducing the individual marginal tax rate reduces the probability of entry into self-employment. Similarly, Schuetze (2000) uses microdata for the U.S. and Canada and finds that taxes increase self-employment. Others instead examine the impact of the progressivity of taxes on entry into entrepreneurial activity using micro data. Gentry and Hubbarb (2000) use the Panel Survey of Income Dynamics (PSID) and find that great progressivity reduces entrepreneurship. On the other hand, Cullen and Gordon (1997) use tax records and find that greater progressivity increases the willingness to engage in entrepreneurial activity.

In addition, another set of studies look at the effect of taxes on the growth of small entrepreneurs and at the longevity of entrepreneurial activity. Carroll et al. (2001) use tax record for 1985 and 1988 and find that higher tax rates reduce the likelihood that a small business records wage/salary payments. Unfortunately, this study cannot control for a lot of individual characteristics or for cyclical factors that may had differed in the two years. Using tax data too, Gurley-Calvez and Bruce (2008) instead find that the effects depend on the taxes being cut. They find that cutting wage and salary workers tax rates would reduce the duration of entrepreneurial activity, while cutting tax rates for entrepreneurs would prolong spells of entrepreneurship.

6. Unexplored Effects of Labor Taxes and Firm and Worker Behavior

6.1. Unexplored Impacts of Payroll Taxes

While there is much more evidence on the impact of payroll taxes than income taxes, there are many areas which remain unexplored.

In terms of the impact of payroll taxes, there is still little evidence on the impacts on turnover and, in particular, on job turnover with a particular emphasis on job creation. Data on job creation and job destruction, both within and across countries, could be used to explore this issue further. Similarly, there is no evidence on the impact of payroll taxes on firm entry, even though data exists both for individual countries over time and across countries.

On the firm side, the question of whether payroll taxes induce employers to substitute capital for workers is an important one, but there is very little evidence on this. In addition, there is only one paper looking at the impact of payroll taxes on labor

productivity and none at all looking at the impact on total factor productivity. This is an issue which needs to be explored further.

On the worker side, there is little evidence on the impact of payroll taxes on labor force participation. In addition, as mentioned above, the effects on wage inequality and earnings inequality are different and this should be explored further, but there is a single paper looking at the impact of enforcement on income inequality.

6.2. Unexplored Impact of Income Taxes

While there are holes in the literature on the impacts of payroll taxes on firms and workers, there is less evidence on the impact of income taxes. The existing evidence on the impact of income taxes focuses solely on OECD countries and analyses that include income taxes tend to also include payroll taxes or social security contributions, and also sometimes consumption taxes, as total labor taxes or total taxes.

Past evidence on the impact of income taxes has focused mostly on employment levels, unemployment and labor force participation in OECD countries. On the other hand, there is only one paper looking at the impact on informality, one paper looking at the impact of income taxes on investment, and one paper looking at wages using data from industrialized countries. On the other hand, there are a number of papers that examine the effect of income taxes on self-employment and entrepreneurship.

Income taxes can affect job creation, firm entry, productivity, and capital intensity by increasing the reservation wage at which individuals are willing to work. Similarly, worker turnover can be affected by changes in income taxes.

6.3. Suggested Analyses

In addition, the following analyses that have been done for other regions could easily be extended to Latin America:

1.   Carry out an analysis similar to Nickell (1997) or Daveri and Tabellini (2000) looking at unemployment and employment-to-population ratios, using total taxes as the explanatory variable.

2.   Carry out an analysis similar to Botero et al. (2004) but hopefully using a panel to explore the relations between total taxes and the size and employment in the unofficial economy.

3.   Carry out an analysis similar to Nickell (1997) examining the impact of total taxes on labor force participation, marriage rates and fertility rates.

4.   Examine the impact of total taxes on job creation/job destruction and net job creation.

5.   Examine the impact of total taxes on the wage levels, on formal/informal wage differential, the skilled/unskilled wage differential and on overall wage inequality.

6.   Examine the impact of total taxes on capital-to-labor ratios and investment, controlling for capital/corporate taxes.

7.   Examine the impact of total taxes on labor productivity and total factor productivity.

8.   Examine the impact of total taxes on self-employment.

The analysis could rely on a panel of Latin American countries covering the 1980s, 1990s, and 2000s to exploit changes in taxes over this time period, computing

five-year averages following Nickell (1997), Blanchard and Wolfers (2000) and Daveri and Tabellini (2000). Alternatively, the regressions could be estimated data, but controlling directly for the business cycle (with lagged GDP growth) or using a filter to take out the cycle. The basic regression would be:

$$Y_{jt} = \beta\text{Total Tax Rate}_{jt-1} + \alpha\text{Minimum Wage}_{jt-1} + \delta\text{Replacement Rate}_{jt-1}$$

$$+ \rho\text{Unionization Rate}_{jt-1} + \theta\text{Dismissal Costs}_{jt-1} + \tau_t + \psi_j + \varepsilon_{jt},$$

where Y_{jt} is the dependent variable in country j for period t, including all those listed above. The total tax rate is the sum of the statutory payroll tax rate, the marginal income tax rate, and the consumption tax rate. The other variables are the minimum wage over the mean wage, the replacement rate for those countries where there are unemployment benefits, the unionization rate, average dismissal costs. τ_t and ψ_j are time and country effects. Other specifications could include the GDP growth instead of the time effects and country-specific trends as specification checks. Also, other specifications can include lags of total taxes and the other measures of labor market institutions. The specifications could also include capital/corporate taxes as a check and this is particularly important for the regressions of capital-to-labor ratios and investment.

In addition, if data exists the analysis could rely on additional within country variation across sectors by constructing a panel of sectors across countries over time, where one would rely on how binding the payroll taxes are for different sectors. In particular, the analysis would rely on the fact that while payroll taxes may be uniform, they may 'bite' and have disemployment effects in those sectors in which there are binding minimum wages and it is difficult to pass the taxes on to workers as lower wages. In this case, the above regression would be modifies as follows:

$$Y_{jkt} = \beta_0\text{Total Tax Rate}_{jt-1} \times \beta_1\text{Total Tax Rate}_{jt-1} \times \text{Minimum Wage}_{jkt-1}$$

$$+ \, \alpha \text{Minimum Wage}_{jkt\text{-}1} + \delta \text{Replacement Rate}_{jt\text{-}1} + \rho \text{Unionization Rate}_{jkt\text{-}1}$$

$$+ \, \theta \text{Dismissal Costs}_{jkt\text{-}1} + \, \tau_t + \, \psi_j + \lambda_k + \varepsilon_j,$$

where k denotes the sector and the coefficient of interest is now β_1 and where λ_k are sector effects.

Finally, the analysis could do a simulation of how much other taxes would have to be increased, including consumption taxes and corporate taxes, if payroll taxes and income taxes were to be eliminated (as Daveri and Tabellini (2000) do in this analysis). In addition, it is important to ask how payroll taxes and income taxes can be structured as to minimize undesirable disincentive effects on firms and workers. For example, the earned income tax credit has been found to work well in the U.S. and the U.K., but has hardly been part of policy discussions in Latin America. In addition, it makes sense to ask what the trade-off is between consumption taxes, which may introduce fewer distortions but are more regressive, and labor taxes.

7. Conclusion

This paper summarizes the international literature on the impact of labor taxes on firms and workers, with a particular emphasis on Latin America.

The survey of the literature shows that the effects of payroll taxes have been examined much more extensively than income taxes. There is evidence that payroll taxes reduce employment and labor force participation, and increase unemployment. They also reduce accessions and firm entry. Moreover, payroll taxes seem to contribute to the expansion of the informal sector. At the same time, increased enforcement of the payment of payroll taxes reduces labor productivity and reduces inequality.

The evidence on the impact of income taxes is much more scant, but it shows negative impacts on labor force participation and employment. Much more work is needed to understand the impact of income taxation in Latin America, as there is no evidence on this topic.

References

Albrecht, James, Lucas Navarro and Susan Vroman. 2008. "The Effects of Labour Market Policies in an Economy with an Informal Sector," *Economic Journal*, 119(539): 1105-1129.

Almeida, Rita and Pedro Carneiro. 2007. "Inequality and Employment in a Dual Economy: Enforcement of Labor Regulation in Brazil," IZA Working Paper No. 3094.

Almeida, Rita and Pedro Carneiro. 2006. "Enforcement of Regulation, Informal Labor and Firm Performance," Mimeo.

Beach, Charles and Frederick Balfour. 1983. "Estimating Payroll Tax Incidence and Aggregate Demand for Labour in the United Kingdom," *Economica*, 50: 35-48.

Betcherman, Gordon, Meltem Daysal and Carmen Pages. 2009. "Do Employment Subsidies Work? Evidence from Regionally Targeted Subsidies in Turkey?" *Labour Economics*, 17: 710-722.

Blanchard, Olivier and Justin Wolfers. 2000. "The Role of Shocks and Institutions in the Rise of European Unemployment: the Aggregate Evidence," *Economic Journal*, 110: C1-C35.

Blau, David. 1987. "A Time-Series Analysis of Self-Employment in the United States," *Journal of Political Economy*, 95(3): 445-467.

Blundell, Richard. 1998. "Estimating Labor Supply Responses Using Tax Reforms," *Econometrica*, 66: 827-861.

Botero, Juan, Simeon Djankov, Rafael La Porta, Florencio López-de-Silanes, and Andrei Shleifer. 2004. "The Regulation of Labor," *Quarterly Journal of Economics*, 119: 1339-1382.

Bruce, Donald and Mohammed Mohsin. 2006. "Tax Policy and Entrepreneurship: New Time Series Evidence," *Small Business Economics*, 26(3): 409-425.

Bruce, Donald. 2002. "Taxes and Entrepreneurial Endurance: Evidence from the Self-Employed," *National Tax Journal*, 55(1): 5-24.

Bruce, Donald. 2000. "Effects of the United States Tax System on Transitions into Self-employment," *Labour Economics*, 7(5)" 545-574.

Bussolo, Maurizio, Maurice Kugler and Denis Medvedev. 2011. "Labor Market Policies and the Informal Sector in Colombia," World Bank, Mimeo.

Cárdenas, Mauricio and Raquel Bernal. 2004. "Determinants of Labor Demand in Colombia: 1976-1996" in James Heckman and Carmen Pages, eds., *Law and Employment: Lessons from Latin America and the Caribbean*. Chicago: Chicago University Press.

Carroll, Robert, Douglas Holtz-Eakin, Mark Rider and Harvey Rosen. 2001. "Personal Income Taxes and the Growth of Small Firms," in James Poterba, ed., *Tax Policy and the Economy 15*. Cambridge: MIT Press.

Cox-Edwards, Alejandra and Sebastian Edwards. 2002. "Social Security Reform and Labor Markets: the Case of Chile," *Economic Development and Cultural Change*, 50: 465-489.

Cowling, Marc and Peter Mitchell. 1997. "The Evolution of U.K. Self-employment: A Study of Government Policy and the Role of the Macroeconomy," *The Manchester School*, 65(4): 427-442.

Cullen, Julie and roger Gordon. 2002. "Taxes and Entrepreneurial Activity: Theory and Evidence for the U.S.," *Journal of Public Economics*, 91(7): 1479-1505.

Daveri, Francesco and Guido Tabellini. 2000. "Unemployment, Growth and Taxation in Industrial Countries," *Economic Policy*, 15(30): 47-104.

Eissa, Nada and Hilary Williamson Hoynes. 2004. "Taxes and the Labor Market Participation of Married Couples: the Earned Income Tax Credit," *Journal of Public Econom*ics, 88: 1931-1958.

Eissa, Nada and Jeffrey Liebman. 1996. "Labor Supply Response to the Earned Income Tax Credit," *Quarterly Journal of Economics*, 111:605-637.

Gentry, William and Glenn Hubbarb. 2000. "Tax Policy and Entrepreneurial Entry," *American Economic Review*, 90(2): 283-287.

Gordon, Robert. Wage-Price Controls and the Shifting Phillips Curve," *Brookings Papers on Economics Activity*, 2: 385-421.

Gruber, Jonathan. 1997. "The Incidence of Payroll Taxation: Evidence from Chile," *Journal of Labor Economics*, 15: S72-S101.

Gruber, Jonathan. 1994. "The Incidence of Mandated Maternity Benefits," *American Economic Review,* 84: 622-641.

Gruber, Jonathan and Alan Krueger. "The Incidence of Mandated Employer-Provided Insurance: Lessons from Workers' Compensation Insurance," in David Bradford, ed., *Tax Policy and the Economy*. Cambridge, Mass.: MIT Press.

Gurley-Calvez, Tami and Donald Bruce. 2007. "Do Tax Cuts Promote Entrepreneurial Longevity?" *National Tax Journal*, 61(2): 225.250.

Hamermesh, Daniel. 2004. "Labor Demand in Latin America and the Caribbean: What Does It Tell Us?" in James Heckman and Carmen Pages, eds., *Law and Employment: Lessons from Latin America and the Caribbean*. Chicago: Chicago University Press.

Hamermesh, Daniel. 1979. "New Estimates of the Incidence of the Payroll Tax," *Southern Economic Journal*, 45: 1208-1219.

Heckman, James and Carmen Pages. 2004. "Introduction" in James Heckman and Carmen Pages, eds., *Law and Employment: Lessons from Latin America and the Caribbean*. Chicago: Chicago University Press.

Holmlund, Bertil. 1983. "Payroll Taxes and Wage Inflation: The Swedish Experience," *Scandinavian Journal of Economics*, 85: 1-16.

Kaiser, Carl. 1987. "Layoffs, Average Hours, and Unemployment Insurance in US Manufacturing Industries," *Quarterly Review of Economics and Business*, 27: 80-99.

Kosters, Marvin. 1967. "Effects of an Income Tax on Labor Supply," in Arnold Harberger and Martin Baily, eds., *The Taxation of Income from Capital,* Washington, DC: Brookings Institution.

Kugler, Adriana. 2010. "Comments on Labor Market Rigidities and Informality in Colombia," *Economia*, 11(1): 96-102.

Kugler, Adriana. 2004. "The Effects of Job Security Provision Regulations on Labor Market Flexibility: Evidence from the Colombian Labor Market Reform," in James Heckman and Carmen Pages, eds., *Law and Employment: Lessons from Latin America and the Caribbean*. Chicago: Chicago University Press.

Kugler, Adriana and Maurice Kugler. 2009. "Labor Market Effects of Payroll Taxes in Developing Countries: Evidence from Colombia," *Economic Development and Cultural Change*, 57: 335-358.

Levy, Santiago. 2008. Good Intentions, Bad Outcomes: Social Policy, Informality and Economic Growth in Mexico. Washington, D.C.: Brookings Institution Press.

Long, James. 1982. "Income Taxation and the Allocation of Market Labor," *Journal of Labor Research*, 3(3): 259-276.

MaCurdy, Thomas, David Green and Harry Paarsch. 1990. "Assessing Empirical Approaches for Analyzing Taxes and Labor Supply," *Journal of Human Resources*, 25: 415-490.

Maloney, William and Jairo Nunez. 2004. "Minimum Wages in Latin America" in James Heckman and Carmen Pages, eds., *Law and Employment: Lessons from Latin America and the Caribbean*. Chicago: Chicago University Press.

McIsaac, Donna and Martin Rama. 1997. "Determinants of Hourly Earnings in Ecuador: The Role of Labor Market Regulations," *Journal of Labor Economics*, 15: S136-S165.

Mondino, Guillermo and Silvia Montoya. 2004. "The Effects of Labor Market Regulations and Employment Decisions by Firms" in James Heckman and Carmen Pages, eds., *Law and Employment: Lessons from Latin America and the Caribbean*. Chicago: Chicago University Press.

Mondragon-Velez, Camilo, Ximena Pena and Daniel Wills. 2010. "Labor Market Rigidities and Informality in Colombia," *Economia*, 11(1): 65-95.

Mroz, Thomas. 1987. "The Sensitivity of an Empirical Model of Married Women's Hours of Work to Economic and Statistical Assumptions," *Econometrica*, 55: 765-799.

Nickell, Stephen. 1997. "Unemployment and Labor Market Rigidities: Europe versus North America," *Journal of Economic Perspectives*, 11: 55-74.

Nickell, Stephen and Brian Bell. 1996. "Would Cutting Payroll Taxes on the Unskilled Have a Significant Impact on Unemployment?" Center for Economic Performance Discussion Paper No. 276.

Nickell, Stephen and Richard Layard. 1999. "Labor Market Institutions and Economics Performance," in Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Volume 3. New York: Elsevier.

Parker, Simon. 1996. "A Time Series Model of Self-Employment under Uncertainty," *Economica*, 63: 459-475.

Pissarides, Cristopher. 1998. "The Impact of Employment Tax Cuts on Unemployment and Wages: The Role of Unemployment Benefits and Tax Structure," *European Economic Review*, 42: 155-183.

Robson, Martin. 1998. "The Rise in Self-employment Amongst UK Males," *Small Business Economics*, 10: 199-212.

Schuetze, Herb. 2000. "Taxes, Economic Conditions and Recent Trends in Male Self-Employment: A Canada-U.S. Comparison," *Labour Economics*, 7(5): 507-544.

Summers, Lawrence. 1989. "Some Simple Economics of Mandated Benefits," *American Economic Association, Papers and Proceedings*, 79(2): 177-189.

Triest, Robert. 1992. "The Effect of Income tax Deductions on Labor Supply when Deduction are Endogenous," *Review of Economics and Statistics*, 74: 91-99.

Vargas, Andres. 2004. "The Effect of Social Security Contributions on Wages: The Colombian Experience," Mimeo.

Vroman, Wayne. 1974a. "Employer Payroll Tax Incidence: Empirical Tests with Cross-Country Data," *Finances Publiques*, 29: 184-200.

Vroman, Wayne. 1974b. "Employer Payroll Taxes and Money Wage Behavior," *Applied Economics*, 6: 189-204.

Weitemberg, Johannes. 1969. "The Incidence of Social Security Taxes," *Finances Publiques*, 24: 193-208.

Figure 1: Impacts of Payroll Taxes on

Employment, Real Wages, Capital and Output
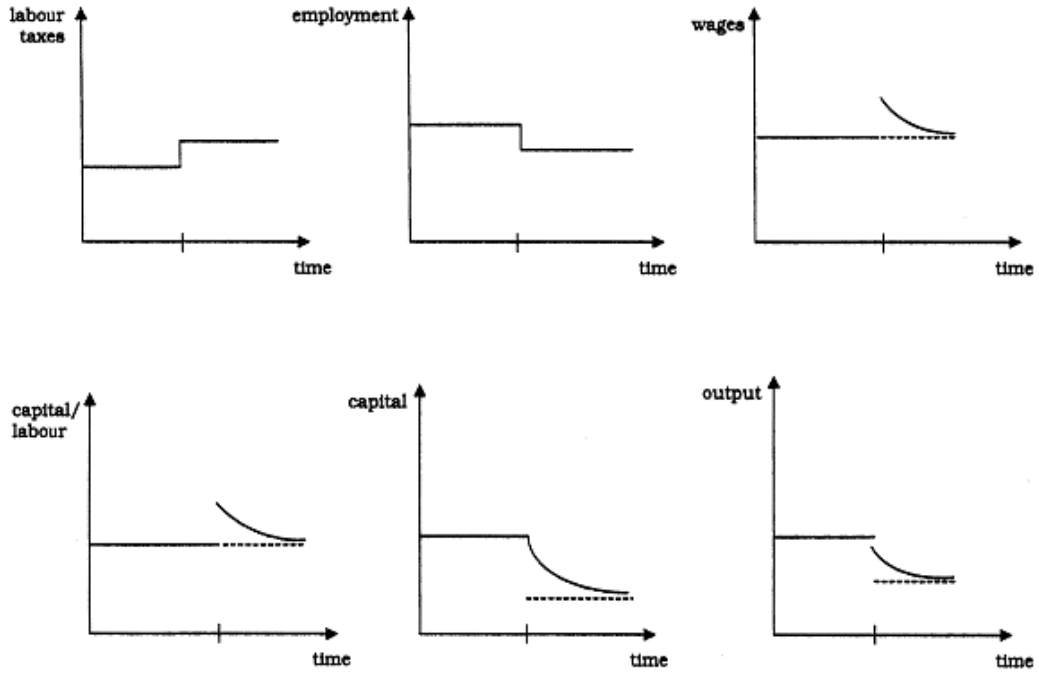
Source: Figure 5 from Daveri and Tabellini (2000).

Figure 2: Impact of Payroll Taxes used to Pay for

Employee Benefits on Employment and Wages
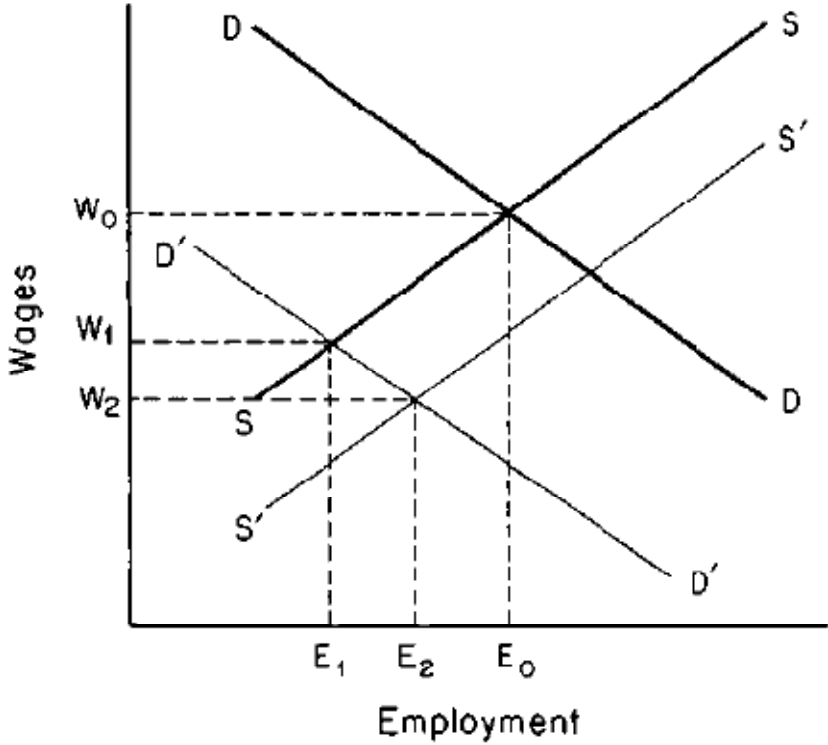
Source: Figure 1 from Gruber and Krueger (1994).

Table 1: Summary of Studies on the Effects of Labor Taxes

on Unemployment, Employment, and Wages

STUDY	DESCRIPTION	RESULTS
Almeida and Carneiro (2007)	City-level labor market indicators from 2000 Brazilian Census and administrative data on inspections from Ministry of Labor. IV estimation.	A 1 percent increase in inspections leads to a 15 percentage point increase in formal employment and a 9 percentage point increase in unemployment. Study does not examine impact on wages.
Betcherman et al. (2010)	Province-level monthly panel from Turkish Social Security Administration from April 2002-December 2005. Difference-in-difference design.	Reforms increase employment between 5%-15%. No effect on wages.
Beach and Balfour (1983)	Quarterly manufacturing data in U.K. for 1958-67. MP condition.	Negative effect on employment and half of labor tax passed on to workers.
Blanchard and Wolfers (2000)	20 OECD countries and eight time periods of five-year averages from 1960 to 1996. Indirect least squares.	Find an estimate of 0.018 on labor taxes. Study does not examine the impact on wages.
Bishop (1981)	US time series data for construction, wholesale and retail trade industries for 1977-1978. Labor demand equations with current and lagged values of output, wages and other inputs.	New Job Tax Credit which gave a 50% tax credit on the first $4,200 of wages per employee increased employment between 0.2 to 0.8 percent.
Bishop and Montgomery (1993)	Use a survey of 3,500 private employers from the early 1980s in the US. Compare firms that do and do not use the Targeted Job Tax Credit (TJTC).	The tax credit of 50% in the first year and 25% in the second year of wages up to $6,000 generates between 0.13 and 0.3 new jobs in the participating firm.
Beach and Balfour (1983)	Quarterly manufacturing data in U.K. for 1958-67. MP condition.	Negative effect on employment and half of labor tax passed on to workers.
Blanchard and Wolfers (2000)	20 OECD countries and eight time periods of five-year averages from 1960 to 1996. Indirect least squares.	Find an estimate of 0.018 on labor taxes. Study does not examine the impact on wages.
Botero et al. (2004)	Cross-section of 85 countries. OLS regressions and IV using legal origins as instruments.	No association between social security benefits and unemployment. Study does not examine the impact on wages.

Brittain (1972)	Manufacturing sector in 64 countries for 1957-59. CES model.	No effect of taxes on employment. Full pass-through to wages.
Bussolo et al. (2011)	Colombian Household Surveys from 1988-2000. Use a general equilibrium model, which allows to endogenously determine whether formality is voluntary or due to segmentation.	A 10% fall in payroll taxes reduces unemployment by 7.4%.
Cruces et al. (2010)	Monthly administrative data from the Integrated Retirement and Pension System in Argentina from March 1995 to December 2001.	No effect on employment, but only 55% shifting on to wages.
Daveri and Tabellini (2000)	14 industrial countries over the period 1965-95 averaging five-year periods. Use OLS, GLS and first-differences.	Find estimates on labor taxes ranging from 0.46-0.54. Higher labor taxes increase real wages in the Nordic and Continental European countries, but the effects become insignificant when including country and year effects.
Gordon (1972)	Quarterly data for US from 1954-70. Reduced form wage equation.	No pass-through. Study does not examine impact on employment.
Gruber (1994)	US Current Population Survey for 1974, 1975, 1977 and 1978. Uses difference-in-difference-in-difference design.	No effect on employment. Full pass-through of taxes.
Gruber (1997)	Uses Data for Chile for the years 1986-1992. Uses difference-in-difference and difference-in-difference-in difference designs.	No effect on employment. Full pass-through of payroll tax as higher wages.
Gruber and Krueger (1991)	US state-level employer-reported data from the Bureau of Labor Statistics (BLS) for the years 1979 and 1988. Difference-in-difference design.	No effect on employment. Full pass-through of taxes.
Heckman and Pages ((2004)	Unbalanced panel of 38 countries. OLS and random effects models.	A 10% increase in social security contributions reduces employment by 10% in OECD and 4.5% in Latin America. Zero pass-through in OECD and 36% pass-through in Latin America.

Holmlund (1983)	Annual US data for 1951-79 in mining and manufacturing. Reduced-form wage equation.	Pass-through of 35%. Study does not examine impact on employment.
Katz (1996)	US March Current Population Surveys for 1987-88 and 1989-90. Difference-in-difference-in-difference design.	The removal of tax credits of 50% in the first year and 25% in the second year for 23-24 year olds reduces employment by 3.4 percentage points.
Kugler et al. (2003)	Quarterly Spanish Labor Force Survey from second quarter 1987 to fourth quarter 2000. Difference-in-difference design.	Reform reduced payroll taxes by 40% for young and increased their permanent employment by 2.6%, and reduced payroll taxes by 60% for older workers and increased their permanent employment by 2.1%.
Kugler and Kugler (2010)	Colombian Annual Manufacturing Survey for years 1992-1996. Difference-in-difference design.	A 10% increase in payroll taxes lowered formal employment between 4% and 5%. A 10% rise in payroll taxes reduces formal wages between 1.4% and 2.3%.
Nickell (1997)	20 OECD countries cross-sections for the periods 1983-88 and 1989-94. Generalized Least Squares.	An increase in the total tax rate by 10% increases short-term unemployment by 25% but not long-term unemployment. Study does not examine the impact on wages.
Nickell and Bell (1996)	U.K. time-series data for 1964-92. Unrestricted dynamic regression with five lags.	No effect of labor taxes on employment. Study does not look at wages.
Perloff and Wachter (1979)	US data from a large employer survey for 1976 and 1977. Compares firms that knew about New Job Tax Credit (NJTC) and those that did not.	Firms which knew about the credit increased employment by more than 3% more than firms that didn't know about the NJTC.
Vroman (1974a)	19 OECD countries for 1958-67. CES model.	No effect on employment. Full-shifting to wages.
Vroman (1974b)	U.S. quarterly manufacturing data for 1956-69.	Shift between 46% and 76% to wages. Study does not examine impact on employment.
Weitenberg (1969)	Annual Dutch data for 1950-66. Reduced form wage equation.	80% of payroll tax shifted to wages.