How land title affects the income of brazilian labor force?

Como o título de propriedade afeta a renda do trabalhador brasileiro?

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Abstract

Secure property rights are considered a key determinant of economic development. However, the evaluation of the causal effects of land titling is a difficult task. The Brazilian government through a program called "Papel Passado" has issued titles, since 2004, to over 85,000 families and has the goal to reach 750,000. This paper examines the direct impact of securing a property title on the supply of work hours and income. In order to isolate the causal role of ownership security, this study uses a comparison between two close and very similar communities in the City of Osasco. The key point of this case is that some units get the program and others do not. One of them, Jardim Canaã, was fortunate to receive the titles in 2007, the other, Jardim DR, given fiscal constraints, only will be part of the program schedule in 2011, and for that reason became the control group. The estimates, generated using Difference-in-Difference econometric technique, suggest that titling results in a increase of adult labor supply and income for the families that received the title compared to the others. Such remarks can provide a relevant subsidize regarding future public tools to approach informality and affect economic growth.

Key words: Property rights; land titling; income.

Resumo

A obtenção dos direitos de propriedade é considerada um determinante para o desenvolvimento econômico. Entretanto, a avaliação dos efeitos do título de propriedade é uma tarefa difícil. O Governo Brasileiro, por meio do programa intitulado "Papel Passado", vem concedendo escrituras desde 2004 para mais de 85.000 famílias e ainda objetiva alcançar a marca de 750.000 famílias beneficiadas. Este artigo examina o impacto direto da obtenção do título de propriedade sobre o aumento de horas de trabalho e renda. A fim de isolar o papel causal do título concedido, o estudo utiliza uma comparação entre duas comunidades vizinhas na cidade de Osasco. O ponto chave, entretanto, é que uma das comunidades, Jardim Canaã, foi beneficiada pelo programa em 2007 e a outra, Jardim DR, devido a restrição orçamentária do governo, só fará parte do programa em 2011, e por este motivo tornou-se o grupo de controle. As estimações, geradas a partir da técnica econométrica Difference-in-Difference, sugerem o aumento das horas de trabalho e renda para as famílias que obtiveram os títulos, comparativamente aos indivíduos do grupo de controle. Tais observações podem prestar um relevante subsídio em relação a futuras políticas públicas com abordagem sobre informalidade, afetando assim o crescimento econômico.

Palavras-chave: Direitos de propriedade; título de propriedade; renda.

Introduction

The role played by private rights in the economic development of the Western world has been powerfully documented by economic historians such as North e Thomas (1973). The fragility of property rights is considered a crucial obstacle for the economic development (NORTH, 1990). The main argument is that individuals underinvested if others can seize the fruits of their investment (DEMSETZ, 1967). Torstensson (1994) and Goldsmith (1995) found a significantly positive association between secure property rights and economic growth.

In such context, strengthening economic institutions is widely argued to foster investment in physical and human capital, bolster growth performance, reduce macroeconomic volatility and encourage an equitable and efficient distribution of economic opportunity (ACEMOGLU et al., 2002). In the current developing world scenario, a pervasive sign of feeble poverty rights are the 930 million people living in urban dwellings without possessing formal titles of the plots of land they occupy (United Nations, Habitat Report, 2005). The lack of formal property rights constitutes a severe limitation for the poor. The absence of formal titles creates constraints to use land as collateral to access the credit markets (BESLEY, 1995).

De Soto (2000) emphasizes that the lack of property rights limits the transformation of the wealth owned by the poor into capital. Proper titling could allow the poor to collateralize the land. Field e Torero (2002) mentioned that this credit could be invested as capital in productive projects, promptly increasing labor productivity and income. Among policy-makers as well, property titling is increasingly considered one of the most effective forms for targeting the poor and encouraging economic growth (BAHAROGLU, 2002; BINSWANGER et al., 1995) as translated in the Figure 1 below.

The most famous example is Peru in Latin America. The Peruvian government issued property titles to 1.2 million urban households during the 1990's. In Asia, millions of titles are being issued in Vietnam and Cambodia as shown in the Thel Economist magazine in March 15th 2007 edition. The same edition brings in the front page: "Property Rights: China's Next Revolution". The survey shows that China intends to put into place the most ambitious land-titling program in the World's History and includes such initiative as one of the main points of the Chinese economic development model.

In Brazil, President Luiz Inácio Lula da Silva announced during his first week in the office, back in 2003, a massive plan to title 750,000 families all over the country. The Brazilian Federal Government created a program called "Papel Passado". Since launched, the program has spent US$ 15 million per year from the Federal Budget, providing titles to over 85,000 and reaching 49 cities in 17 different Brazilian states. The official goal of the program is "to develop land title in Brazil and promote an increase in quality of life for the Brazilian population". However, the country still faces a very difficult scenario regarding land property rights: the Brazilian government estimates that 12 million people live under illegal urban conditions (IBGE, 2007).

This paper investigates the impact of property rights on labor markets in an emerging economy such as Brazil by analyzing household response regarding income and supply of labor force to an exogenous changes in formal ownership status. In particular, the paper assesses the value to a squatter household of increases in tenure security associated with obtaining a property title in terms of hours of labor supply and level of income.

Effects of land titling have been documented by several studies. A partial listing includes Jimenez (1985), Alston et al. (1996) and Lanjouw e Levy (2002) on real estate values. Besley (1995), Jacoby et al. (2002), Brasselle et al. (2002) and Do e Iyer (2003) on agricultural investment. Place e Migot-Adholla (1998), Carter e Olinto (2003) and Field e Torero (2002) on credit access, housing investment and income.

Figure 1. Land registration
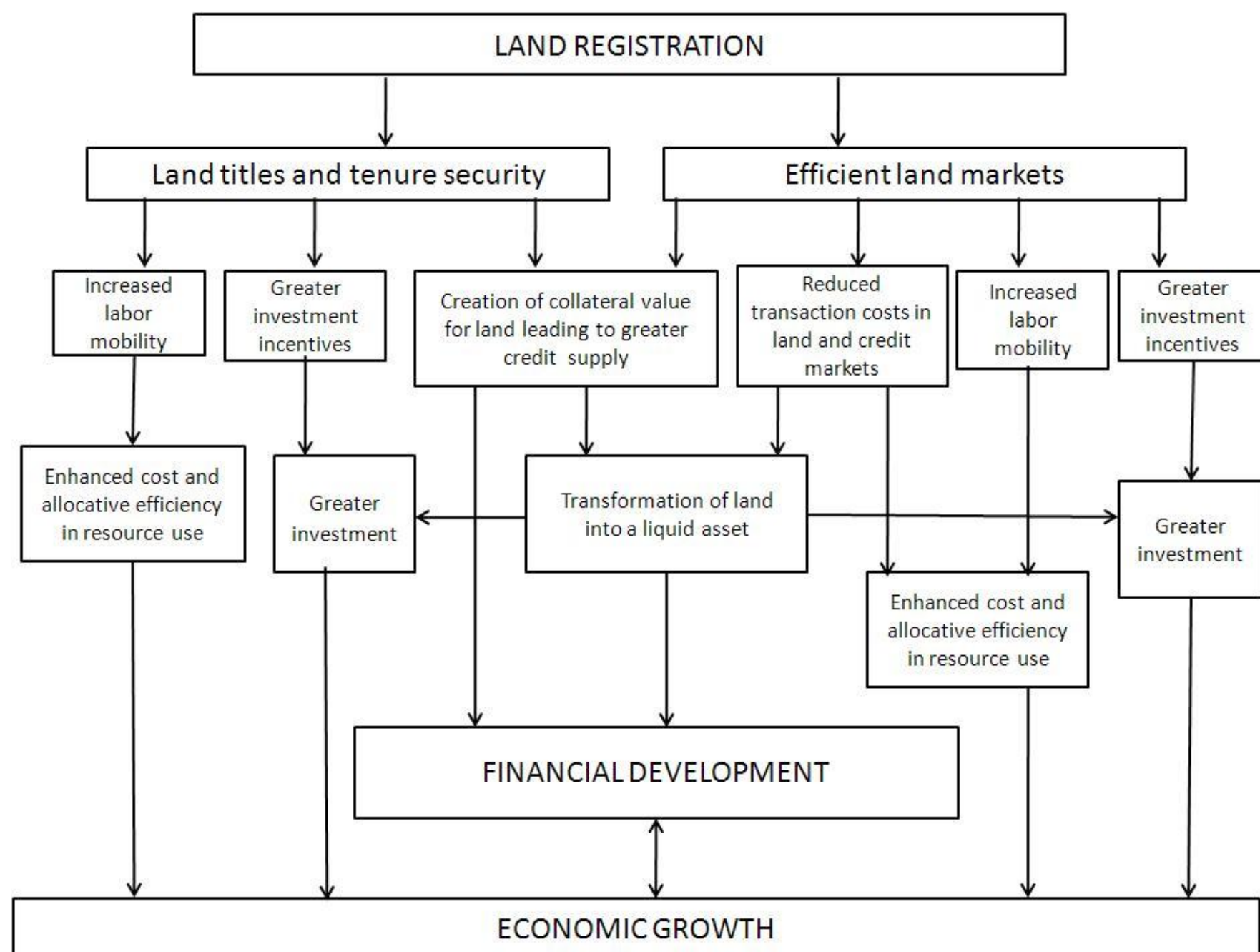
Source: World Bank, 2008.

In urban settings, the value of property titles has been measured far less often and empirical work has focused on real estates prices. A major contribution is from the of paper by Jimenez (1984), involving an equilibrium model of urban squatting in which it is shown that the difference in unit housing prices between non-squatting (formal) sector of a city and its squatting (informal) sector reflects the premium associated with security. The accompanying empirical analysis of real estate markets in Philippines finds equilibrium prices differentials between formal and informal sector unit dwelling prices in the range of 58.0% and greater for lower income groups and larger households.

For Besley (1995), the findings were ambiguous, land rights appear to have a positive effect on agricultural investment in the Ghanaian region of Angola but less noticeable impact on the region of Wassa. Using a similar approach, Jacoby et al. (2002) find positive effects in China, where as Brasselle et al. (2002) find no effects for Burkina Faso. Field e Torero (2002), in Peru, exploits timing variability in the regional implementation of the Peruvian titling program using cross-sectional data on past and future title recipients midway through the project, and also finds positive effects, particularly in the credit access and housing investments. In Brazil, Andrade (2006) using cross-section data from a sample of 200 families of the Comunidade do Caju, an urban poor community in Rio de Janeiro, has demonstrated an increase effect on the income of those that had received the land title.

A common obstacle, faced by all studies mentioned above, is how to measure the influence

of tenure security considering the potential endogeneity of ownership rights as pointed by Demsetz (1967) and Alchian e Demsetz (1973). Direct evidence of this is provided by Miceli et al. (2001), who analyze the extent of endogeneity of formal agricultural property rights in Kenya.

In order to isolate the causal role of ownership security, this study uses a natural experiment, basically a comparison between two neighbors and very similar communities in the City of Osasco (a town with 650,000 people located in the São Paulo - Brazil metropolitan area). Osasco is part of the Papel Passado's map has 6,000 families living under urban property informality. One of them, Jardim Canaã, was fortunate to receive the titles in 2007, the other, Jardim DR, only will be part of the program schedule in 2011, and for that reason became the control group. Such approach enables a comparison of households in a neighborhood reached by the program with households in a neighborhood not yet reached.

Furthermore, the present research, different from the previous studies, is based on a panel data, based on a random sample from Jardim Canaã and Jardim DR, and produced from a two-stage survey with focus on the property right issue. The first part of the survey was collected in March 2007, before titles had been issued to Jardim Canaã, and the second collected in August 2008, almost one year and half after the titles. As Ravallion et al. (2005) argues that the best ex-post evaluations are designed and implemented ex-ante - often side-by-side with the program itself.

And, based on the first survey, 95.0% of the survey participants (from Canaã and DR) were not aware about receiving land titles and the meaning of it (which avoids any behavior deviation generated by the expectation of having a land title). From the second stage of the survey, most of households that received the land title felt that such event was relevant for its life - see Figure 2 below even not previously expecting the land title.

Hence, an important contribution of this paper is the specific focus on non-agricultural households and the value to urban residents and their families of increased ownership security. As shown, in developing economies, large proportions of urban and rural residents alike lack tenure security. As Field e Torero (2002) demonstrated, presumably because of historic interests in agricultural investment and related politics of land reform, the majority of both academic and policy attention to property rights has centered on rural households tenure security. Nevertheless, in most of the developing world, the population - and a particularly the impoverished population - is increasingly urban.

Figure 2. How land title affected household's life?
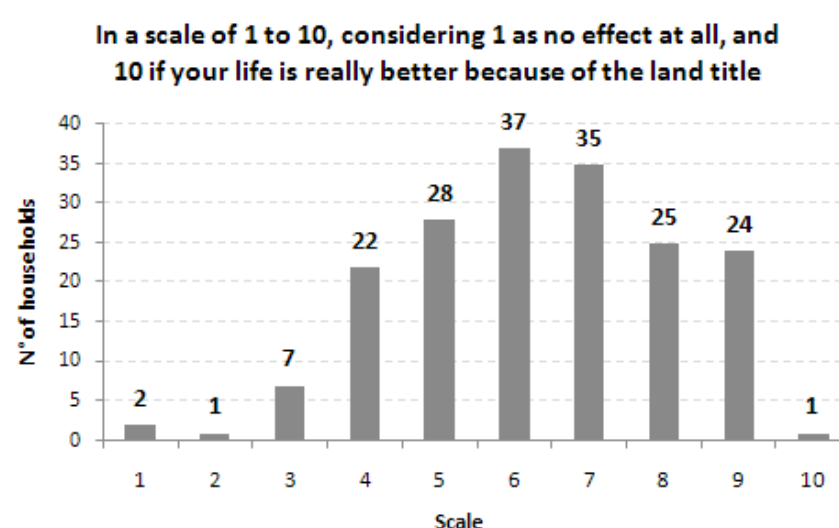
Source: Research from the Osasco Land Title Survey – 2008.

Secondly, this research provides an unique panel data through a natural experiment that helps to minimize the endogeneity aspect related to most of the studies on such subject (property rights).

The data

The empirical analysis of household labor supply and income responses to changes in formal property rights relies on a data survey developed, especially and exclusive for this paper, in the City of Osasco, an important town in the São Paulo metropolitan area with a population of 654,000 people.

The Federal Government has chosen Osasco, as one of the participants of the "Papel Passado"- a program that intends, as mentioned earlier in the paper, to provide land titles to families living under illegal conditions - given its relevant economic and social role.

The city of Osasco has 30,000 people (about 6,000 families) living under informal conditions, which represents almost 4.5% of its total population. The program timetable for Osasco establishes that all the communities under illegal situation will be part of the "Papel Passado" during the period between 2007 and 2014 (the main reason because all communities are not receiving the land title at the same time relies on the fact that fiscal resources are limited in time). Officially, as released by the Osasco City Hall, the priority follows random criteria. Unofficial sources from local communities in Osasco express the feelings that a "political" agenda is present in the decision.

Anyway, the first community to receive the land title was Jardim Canaã, in 2007, a place with 500 families. The closest neighbor of Jardim Canaã is a community called DR, with 450 families. The DR's households will be part of the "Papel Passado" program schedule in 2011. Hence, the data of this particular paper consist in 326 households distributed across Jardim Canaã and DR (185 from Jardim Canaã and 141 from DR).

Minimizing endogeneity bias concerns

Given the particular nature of the research conducted in the city of Osasco, some steps were taken to minimize the bias related with the data collected.

First of all, a technique from Bolfarine e Bussab (2005) was used to choose randomly 326 sample households. The approach was basically to choose the first 150 households (from the Canaã and DR) that have the closest birth dates (day and month) in comparison with the three field researchers that conducted the survey interviews (important to mention that the field researchers are not from Osasco). Each researcher got 50 names initially as first base. Additionally, after reaching each of those households, they could go and pick the third and the fifth neighbor on the right hand side.

Secondly, Heckman e Hotz (1989) states that constructing counterfactuals is the central problem in the literature evaluating social programs given the impossibility of observing the same person in both states at the same time. The goal of any program evaluation is to compare only comparable people. An important step to minimize such issue in this study was to use a comparison between those two neighbors (Jardim Canaã and DR) with very similar characteristics. Canaã and DR are not only official neighbors but there is no physical "borderline" among them, both are geographically united (if someone walks there, it is hard to identify the boundaries -- even for the local households).

One of them, Jardim Canaã, fortunate to receive the titles in 2007, is qualified, for the paper proposal, as the main sample. The other, DR, only part of the program schedule in 2011, became the control group. Such approach enables a comparison of households in a neighborhood reached by the program with households in a neighborhood not yet reached and gives the possibility to produce a panel data.

Another aspect to be mentioned about the data collected is that produced an unique match within same geographic area which helped to assure that comparison units come from the same economic environment. Rubin e Thomas (2000) indicate that impact estimates based on full (unmatched) samples are generally more biased, and less robust to miss-specification of the regression function, than those based on matched samples.

Given such conditions, it was produced from a two-stage survey focused on the property right issue. However, to minimize bias, the way that survey was prepared and conducted by the researchers does not provide any direct information for the households what exactly the research is about. Officially for the people interviewed, the study was about City of Osasco general living conditions.

The survey was based on a 39 questions questionnaire applied to the 326 families randomly sample described above. The survey instrument, in many questions and methodologies, closely mirrors the IBGE Living Standards Measurement Survey (PNAD - Pesquisa Nacional de Amostra de Domicílios do Instituto Brasileiro de Geografia e Estatística) in content, and therefore contains a variety of information on household and individual characteristics. In addition, there are six questions designed to provide information on the range of economic, social and personal benefits associated with property formalization.

The first stage of the survey was conducted in March 2007, before titles had been issued to Jardim Canaã, and the second collected in August 2008, almost one year and half after the first title issued (with exactly same households and with 98.0% of recall -- or 2.0% missing, which means, that almost all households interviewed in the first survey had been found and interviewed during the second stage). The reason regarding such time gap was to give the opportunity to all households interviewed during the first survey stage to have, at least, 1 year with the land title. The exactly dates that each household interviewed received the title were provided by the 2nd Cartório de Osasco (2nd Osasco's Office of Registration) along with the formal authorization from the Osasco's City Hall to conduct the research.

Heckman e Hotz (1989) add that is not necessary to sample the same persons in different periods -- just persons from the same population. This particular survey instrument design has clearly the advantage that the same households were tracked over time to form a panel data set Ravallion et al. (1995) argues that making a panel data with such characteristics should be able to satisfactorily address the problem of miss-matching errors from incomplete data, a very common issue regarding public policy evaluation.

Furthermore, it is also important to emphasize again another aspect that helps minimize the selection bias. Based on the first survey, 95.0% of the survey participants (from Canaã and DR) did not expect to receive any land title, i.e., they were not aware about "Papel Passado" and the meaning of it. Such lack of information about the subject provides the study a non-bias aspect regarding the importance of property rights because avoids a potential behavior deviation from households included in the program.

Finally, the study also tracks the households that moved outside both communities to check if the land title effect stands. From the original sample only 8.0% of the households that received the land title have moved away from Canaã (one of the main concerns from local authorities in Osasco was that most citizens would receive the land title, sell the property right away and return to an informal living conditions and that not has been materialized). From the control group, only 1 household (out of 140) has moved during the same period.

Basic findings: hours worked and income

This study has used basically four questions to address the issues of labor supply and income: a) How many hours do you work each day?; b) How many days per week?; and only for the stage II (2008) c) These hours are greater, equal or lower to one year ago? From the sample, 52.0% answered that are working greater hours compared to the previous year, a percentage above if related with the 16.0% from the control group. If the households that moved after receiving the title are not included, the trend remains the same (53.0% from the sample declared to be working more hours). Also note that working-age members who are not in the labor force and those who are but report not having worked during the previous month were assigned hours value 0.

Additionally, the diagram below summarizes the household's answers (2007 and 2008) about weekly hours of work. The main issue that arises is related to the fact that for the sample is visible that working are working greater hours and for the control group the scenario remains almost constant overtime. Again, even excluding the ones that moved from Canaã, the overall picture does not change.

Figure 3. Adult labor force hours worked weekly x number of households (sample - all households)
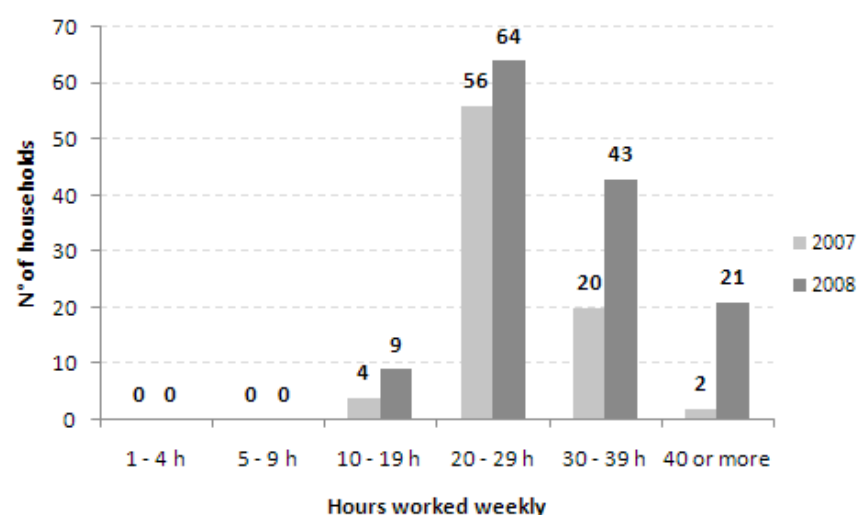
Source: Research from the Osasco Land Title Survey – 2008.

Figure 4. Adult labor force hours worked weekly x number of households (control group - all households)
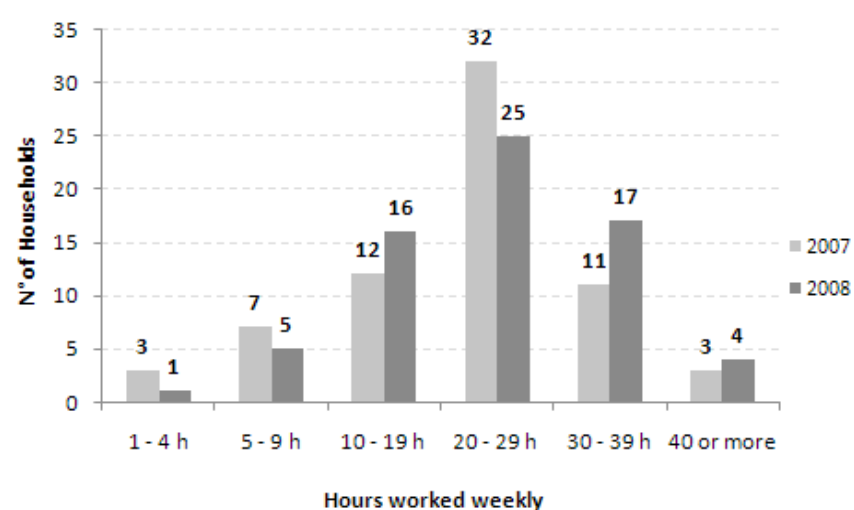
Source: Research from the Osasco Land Title Survey – 2008.

The last question is related to income and was applied as follow using the table below: "Now, I will read some income groups and I would like you tell me what group is your monthly familiar income included. I mean, the sum of all people living in your home, including you. Your monthly familiar income (last month) was?".

Table 1. "Income card" (SM = minimum wage)

1	Until R$ 380,00	Until 1 SM
2	R$ 381,00 to R$ 760,00	More than 1 to 2 SM
3	R$ 761,00 to R$ 1140,00	More than 2 to 3 SM
4	R$ 1141,00 to R$ 1.520,00	More than 3 to 4 SM
5	R$ 1.521,00 to R$ 2.660,00	More than 4 to 7 SM
6	R$ 2.660,00 to R$ 4.560,00	More than 7 to 12 SM
7	R$ 4.560,00 to R$ 8.740,00	More than 12 to 23SM
8	More than R$ 8.741,00	More than 23 SM

(exchange rate US$/R$-BRL was 1.77 in 12/31/2007 and 2.33 in 12/31/2008. Source: Central Bank of Brazil).

The results have shown, please refer to the diagram below, that the sample group has advanced in terms of the distribution of minimum wage compared to the control group.

Figure 5. Level of Income (# Minimum Wage) x Number of Households (Sample)
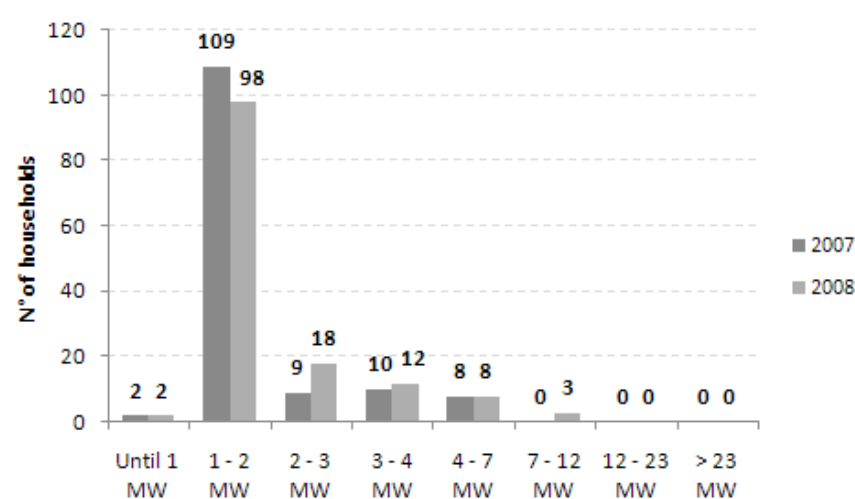
Source: Research from the Osasco Land Title Survey – 2008.

Figure 6. Level of income (# minimum wage) x number of households (Control Group)
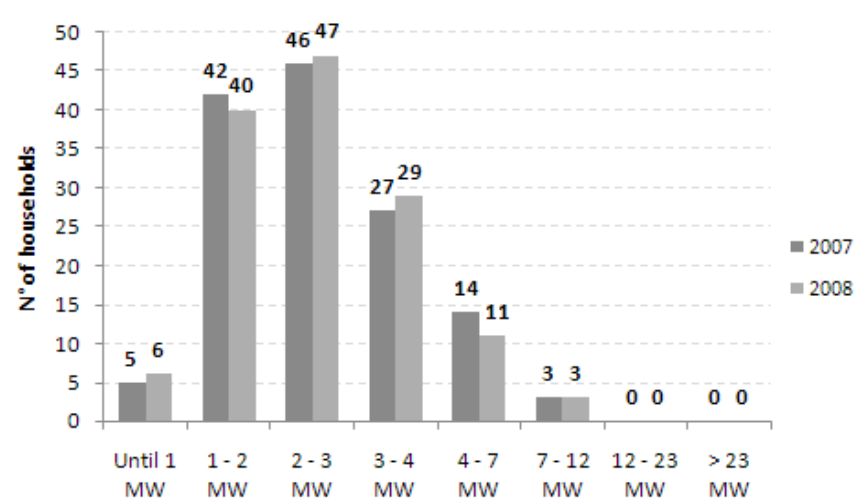
Source: Research from the Osasco Land Title Survey – 2008.

The basic program effect interpretation of such picture is that titling program leads households (from sample that received the title) to shift outward their distribution of work and that generates a similar effect in terms of distribution of income level.

Econometric model: difference-in-difference estimates

Difference-in-difference estimates: estimator – general framework

The econometric method used was Difference-in-Difference Estimate, known as DIFF-in-DIFF (DD),

given the data characteristics described above. As Bertrand et al. (2004) defines, Differences-in-Differences consists of identifying a specific intervention or treatment (often a passage of a law). One then compares the difference in outcome after and before the intervention for groups affected by intervention to the same for unaffected groups.

Such approach involves basically two regimes: "0" and "1" given an observed outcome Y, which means $Y_1 = dY_1 + (1-d)Y_0$. Given $d=1$, we observe Y_1 and with $d=0$, Y_0 is observed.

As Heckman e Hotz (1989) stated that the parameter most commonly invoked in the program evaluation literature, although not the one actually estimated in social experiments is the effect of randomly picking a person with characteristics X and moving from "0" to "1":

$$E(Y_1 - Y_0/X) = E(\Delta/X)$$

In practice, most non-experimental and experimental studies do not estimate $E(\Delta/X)$. Instead, studies usually estimate the effect of treatment on the treated.

$$E(\Delta/X), d=1$$

Given the data characteristics, this particular study aims, as previously mentioned, to provide a comparison between "treated" and "untreated" to estimate impact of treatment on the treated with a counterfactual.

Again as Heckman e Hotz (1989) pointed, it is impossible to form change in outcomes between "treated" and "untreated" states for anyone. However, it is possible to form one or the other terms for everyone with the counterfactual mechanism.

Under such scenario, the current study also has the "before-after" estimator which incorporates time t on the model.

Let's assume that the program/treatment occurs only at the time period k and $t > k > t'$.

Furthermore, y_{i_t} is the "treated" group at period t, if $i=1$ and "untreated" if $i=0$. Additionally, consider $d=1$ is the "treated" group and $d=0$ the "untreated" group.

Hence, the main focus is to estimate the follow:

$$E(y_1 t - y_0 t | d = 1) = E(y_1 t - y_0 t)_1$$

and given that, it is possible to decouple the equation above between "treated" and "untreated" given two different periods, or $t > t'$. The Difference-in-Difference estimator is:

$$E(yit - y_0 t)_1 = E(y_i t - y_0 t')_1 - E(y_0 t - y_0 t')_1 + E(y_0 t - y_0 t')_0 - E(y_0 t - y_0 t')_0$$

And, the assumption is:

$$E(y_0 t - y_0 t')_1 = E(y_0 t - y_0 t')_0$$

Which basically means the between periods t and t', the variation of the "treated" and "untreated" averages are the same. Hence:

$$E(y_1 t - y_0 t)_1 = E(y_1 t - y_0 t')1 - E(y_0 t - y_0 t')_0$$

Given the fact that there is no treatment at t', the "treated" differentiates from the "untreated" as $(y_0 t' | d=1) = y^1 t'$ and $(y_0 t | d=0) = y^0 t'$. Following the equation above:

$$E(y_1 t - y_0 t)_1 = E[(y^1 t - y^1 t') - (y^0 t - y^0 t')] = E(\Delta y_1 - y_0)$$

Finally, the estimator can expressed as follow:

$$\Delta y = d\Delta y_1 + (1-d)\Delta y_0 = \Delta y_0 + d(\Delta y_1 - y_0)$$

Given the case the $\Delta y_i = \Delta X\beta_i + u_i$, the regression is:

$$\Delta y = \Delta X\beta_0 + d(\Delta X\beta_1 - \Delta X\beta_0) + u_0 + d(u_1 - u_0)$$

Assuming that $\beta_1 - \beta_0 = 0$, except for the constant, follows:

$$\Delta y = \Delta X\beta_0 + d\alpha + u_0 + d(u_1 - u_0)$$

and α is the focused parameter.

Difference-in-difference estimates: the regression model

Difference-in-Difference estimates and their standard error, according to Greene (2002), most often derive from using Ordinary Least Squares (OLS) in repeated cross sections (or a panel) data

on individuals in treatment and control groups (no treatment) for a period before and after a specific intervention. As Meyer (1995) argues that the great appeal of DD estimation comes from its simplicity as well its potential to circumvent many of the endogeneity problems that typically arise when making comparisons between individuals.

The standard DD estimates the following regression:

$$Yist=As+Bt+cXist+\beta Ist+\varepsilon ist$$

Where As and Bt are fixed effects for states and years respectively, $Xist$ are relevant individual controls and εist is a error term. The estimated impact of the intervention is the OLS estimate β. Standard errors used to form confidence interval for β are usually OLS standard errors sometimes corrected to account correlation of shocks within each year. Considering the data characteristics mentioned earlier, this study will assume that the estimated coefficient of intervention is variable (given $Xist$) but does not help to determine program participation (land title were given randomly and households were mostly unaware about receiving the title).

Hence, this specification is a common generalization of the most basic DD, and it will be the foundation for this particular study econometric technique. The basic assumption is that changes in outcome variable over time would have been exactly the same in both treatment and control group in the absence of intervention.

Difference-in-difference estimates: land title specification

In this paper, formally, the dependent variable is level of income (measured in number of minimum wages), $Yist$ (the outcome of interest for household i in group s by time t). The dependent variable would be posted as the difference among level of income in 2008 and 2007.

Also, δ indicates whether the household lives in a neighborhood that has been reached by the program - being the dummy for whether the land

title has affected the group s at the time t; with fixed effects and Xi is a vector of characteristic controls.

Hence, the coefficient δ is the estimated of program effect, which provides a measure of conditional average difference households level of income in program area versus the non-program area.

In addition, Xi includes the following controls: sex (dummy), marital status (dummy, example: single) and ethnicity (dummy, example: African Brazilian).

Another set of variables included, to extend to include fixed effects are: worked weekly hours. The number of household members and years of education of family's head are also in. For weekly hours, years of education and number of household members, the difference between the survey collection results in 2008 and 2007 is applied (example: the independent variable of weekly hours worked is = Weekly hours worked 2008 - Weekly hours worked 2007 and so on with the other variable mentioned).

As a robustness check, this study also estimates a regression including the households that moved from Canaã (households that got the title, sold the property and moved right away). The goal is to check if the land title still has positive effect even considering those that are not living in the original community.

Given all the conditions mentioned above, the basic econometric structure is the following:

$$Yi = \alpha + \delta(\text{Land title}) + \beta(\text{Hours worked weekly}) + \beta(\text{Households number}) + \beta(\text{Years of education}) + \alpha'Xi + ei$$

Furthermore, the main hypothesis to be tested is the following:

$$H_0 = \delta > 0$$
$$H_1 = \delta \leq 0$$

Results

The summary of basic statistics results are presented in Table 2 (Sample Means). Consistent with the study basic findings, one main aspects demands special attention. The average weekly

hours has increased from the program households and remained the same for the non-program. Additionally, for land title owners, income level is higher.

Table 2. Sample means - with all households

	Pre-Program (N = 326)			Post-Program (N = 310)		
	Ia (pro-gram)	Ib (non--pro-gram)	IC |tΔ|	IIa (pro-gram)	IIb (non--pro-gram)	IIC|tΔ|
Mean age	39.0	42.4	-3.4	40.0	43.4	-3.4
Time in residency (months)	143.4	154.4	-11.0	155.8	170.2	-14.4
Household number (# members)	3.8	4.0	-0.2	3.9	4.0	-0.1
Number of rooms	3.3	3.6	-0.3	3.3	3.6	-0.4
Income (number of Minimum Wage)	1.8	3.1	-1.3	2.2	3.1	-0.9
Highest Grade Education	3.4	1.6	1.8	3.5	1.8	1.7
Hours Worked Weekly	10.6	10.1	0.5	20.4	11.2	9.3

Source: Author's Estimates.

Table 3. Income regression

Independent Variables	Dependent Variable Income	
		Robustness check
Constant	20 (0.90)	0.82 (0.13)
Sex	-0.20 (0.07)	0.31 (0.12)
Single	-0.51 (0.06)	-0.13 (0.07)
African Brazilian	0.10 (0.14)	0.06 (0.13)
Years of Education	-0.09 (0.006)	0.006 (0.01)
Households number (# numbers)	-0.003 (0.01)	-0.03 (0.03)
Land Title	0.25 (0.07)	0.23 (0.08)
R^2	0.15	0.14
RootMSE	0.49	0.89
N	310	326

Source: Author's Estimates.

Econometric results appear in Table 3. This study default estimates include the entire set of regressors consistent with the current theory regarding level of income and land title and the data collected during the survey. In such specification, the estimate of land title δ coefficient is 0.25, with a standard error of 0.07.

Such outcome is highly consistent with our hypothesis, that property rights (Land Title) increases level of income by fewer 0.25.

The Robustness part of the table provides our robustness check, adding (as mentioned previously) to the regression analysis, households that moved. The robustness outcome remains significant (0.23). Such result should help subsidize the conclusion that land title has a positive effect on the individuals not only on the property itself. Households that moved had the same trend towards level of income.

Hence, the effect land title, given the conditions and variables applied, is clearly positive, and helps to increase the level of income.

Conclusion

This paper has presented new evidence on the value of formal property rights in urban squatter community in a developing country. By studying the relationship between the exogenous acquisition of a land title and adult labor supply and income, the research has provided additional empirical support for the evidence that property title appear to increase household income.

Although existing studies indicate significant effect on access to credit, home investment, fertility and even income, especially by Field (2007) and Andrade (2006), this particular study aims helping to fill an important gap in the literature on property rights concerning the issue of isolating the causal role of ownership security.

Furthermore, the results indicate that unlike employment responses to most welfare programs, which tend to involve an income effect that potentially removes adult households from the labor force, government property titling programs appear to have the opposite effect.

Regarding further research, it will certainly be interesting to apply the same survey in different locations and compare outcome results. Ravallion et al. (2005) argues that the same program works well in one village but fails in another. An example is the Bangladesh's Food for Education Program. The program worked well in reaching the poor villages but not in others, even in relatively close proximity.

However, it is clear that understanding the multiple channels through which land titles influence economic outcome is a particular important given governments across the world are considering titling programs to address urban informality. In addition, the results have potential implications for understanding labor market frictions in developing countries (Goldsmith, 1995). In places characterized by high levels of residential informality such as most of developing and poor countries, informal property protection may constitute an important obstacle to labor market adjustment and economic growth.

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