The Effect of Selective Property Rights Restrictions on Economic Growth

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Abstract: I estimate that per capita GDP in the Bahamas grew by an additional 2%-3% per year, for 12 years, in response to a law that limited the ability of non-natives to buy and sell land in the Bahamas. Using an instrumental variables approach and a variety of robustness checks, I show that this growth occurred in spite of a downturn in net foreign direct investment due to the passage of this law, which weakened the property rights of non-native investors relative to those of native Bahamians. The results of this study highlight the economic importance of distinguishing between the protection of private property for natives and non-natives as separate channels through which institutions cause economic growth. (JEL E02,O11,O43,O54)

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1 Introduction

I study a natural experiment in which the property rights of non-native investors is varied in a plausibly exogenously way. The results of this study provide evidence that changes in laws securing the property rights of non-natives may have a different effect on the economic growth than changes in laws securing the property rights of non-natives. This point, although not explicitly made in the literature, is related to the observation by Acemoglu et al. (2002) that property rights protections that spur economic growth ought to protect a "broad cross section of the society".

The contributions of my work are two-fold. First, I dichotomize property rights into two camps: (i) property rights protecting both native and non-native investors, and (ii) property rights protecting native investors while leaving non-native investors exposed to the risk of expropriation. To my knowledge, this native vs. non-native distinction has not been explored in the property rights literature. Secondly, I measure the responsiveness of non-natives to changes in property rights that differentially affect them.

The native/non-native distinction that I make in this paper is economically meaningful for two reasons. One, natives can use the political process (voting, uprisings and coups) to discipline the government for encroaching on their property rights, whereas non-natives generally do not possess this option. As a result, non-native investors may be more responsive to adverse changes in property rights than native investors because they lack this political mechanism to deter government expropriation. Two, given the personal and familial connection that natives have to the host country, one can imagine that natives and non-natives have different investment horizons, long term and short term respectively. To the extent that both the investors and the government internalize the heterogeneity in investment horizons between native and non-native investors, any strategic interaction between the investors and the government may be affected differentially by changes in the property rights regime. When taken together, these two points suggest that we should care about how changes in property rights affecting non-natives impact the macro economy – non-natives investors be-

ing the group most sensitive to these changes on account of having limited political recourse and a shorter time horizon.

The natural experiment that I study is a change in legislation that limited the ability of non-natives to buy land in the Bahamas. In 1981, the government of the Bahamas enacted the Immovable Property Act (IPA_81), which required non-natives to obtain government approval in order to buy land in the Bahamas. In 1993, this law was repealed and replaced with the International Persons Landholding Act (IPLHA_93), which allowed for non-natives to buy land in the Bahamas without government approval. The IPLHA_93 moreover placed non-natives and natives on equal footing with respect to the assessment of stamp duties on property purchases. Prior to the repeal of the IPA_81, non-natives paid twice the stamp tax rate paid by natives. In the Bahamas stamp taxes range from 2% (on property valued under $20,000) to 10% (on properties valued over $250,000).

For the purposes of this paper, I consider the passage of the IPA_81 to have three primary effects. Firstly, by limiting the ability of non-natives to purchase property in the Bahamas, the IPA_81 effectively restricted the demand for Bahamian land. This demand restriction and the resulting lower prices in the real estate market can be interpreted as an expropriation of the value of the land by the government from actual investors. The second consequence of the IPA_81 is its value as a signal to future investors of the risk of government expropriation in the Bahamas. Third, the IPA_81 increased the cost of acquiring land in the Bahamas in terms of the procedural costs in both time and money associated with obtaining the government approval and paying higher stamp duties. The implementation of the IPLHA_93 in lieu of the IPA_81 has the opposite effect: (i) increasing demand for land in the Bahamas and its market value, (ii) signaling a lower risk of government expropriation to potential investors than before, and (iii) reducing the transaction cost in terms of both time and money of acquiring property in the Bahamas.

Empirical identification depends on my using Barbados as a reference country and constructing a difference-in-difference estimate of the effect of the IPA_81 on the economic

growth rate of the Bahamas. Further, I utilize the within country variation coming from the repeal of the IPA_81 and the enactment of the IPLHA_93 to mitigate against omitted variable bias and to instrument for changes in net Foreign Direct Investment. Regressing the log of per capita GDP in the Bahamas on the dummy variable IPA_81, which represents a weakening of property rights for foreign investors in the Bahamas, I obtain an ordinary least squares estimate (OLS) of 0.15 and an instrumental variables (IV) estimate of 0.22, both of which are significant at the one percent level. Weakening the property rights of non-native investors results in a 15% growth in per capita GDP in the Bahamas. To put this into perspective, annual growth in the Bahamas over the sample period is 5% (1976-2005). This difference-in-difference estimate, is robust to a set of political, economic and natural disaster controls.

2 Literature Review

An important theme in the Economic Development and Growth literatures is the role of institutions in causing development – chief among institutions, the protection of private property. In an influential paper, Acemoglu, Johnson, and Robinson (2001) show that countries with strong property rights protection (historically settlement colonies) are, today, better off economically than those with comparatively weaker property rights protections (historically extractive colonies). Acemoglu, Johnson and Robinson (2001) posit that property rights affect growth because "countries with better institutions, more secure property rights, and less distortionary policies will invest more in physical and human capital, and will use these more efficiently to achieve a greater level of income." Similarly, La Porta et al (2008) note that property rights help to attract foreign capital by signalling a lower risk of government expropriation. In Banerjee and Iyer (2005), an alternate growth channel is proposed. States with bad initial institutions grow at a slower rate because they must first develop the good institutions necessary for growth, before getting on with the business of

economic development itself. The work by Dell (2010) provides additional evidence for this framework of institutional overhang, which describes the persistence of colonial institutions in explaining current economic development. Dell (2010) documents the persistent negative effect of weak property rights on both economic and health outcomes in the case of Peruvian miners. Field (2007) and Hornbeck (2010) provide two additional channels through which property rights may affect economic development. In Field (2007), protection of private property increases labor supply for the Peruvian rural poor as they substitute time spent protecting their domicile for time spent working on jobs. In Hornbeck (2010), a technological innovation in the protection of private property - the introduction of barbed wire - reduced losses to agricultural production by mitigating the risk of one farmer's crops being trampled by another farmer's cattle.

The natural experiment in the literature most closely related to my work in this paper is the two-country comparison in Henry and Miller (2010), where they compare Jamaica and Barbados, both former British colonies with similar colonial history and post-colonial institutions. In this paper, Henry and Miller (2010) show that the divergence in long-run economic growth between Jamaica and Barbados can be explained by differences in the macroeconomic policies adopted by the two countries in response to the oil crisis of the 1970's. In this paper, I use similar selection criteria to those used in Henry and Miller (2010). In Figure 1, I observe that both the Bahamas and Barbados have similar colonial origins and post-colonial legal institutions (British Common Law). Moreover, the countries are similar in their population size, land mass (when comparing the main islands)[1], and economic structure. Both the Bahamas and Barbados are service-based economies with modest levels of agricultural production and manufacturing. In the results section of the paper, I will further motivate the validity of this cross country comparison by showing that

[1]The comparison of the land mass in Barbados to the land mass of the main island in the Bahamas is validated by the fact that close to 70% of the Bahamian population lives on the main island of New Providence. The rest of the islands in the archipelago are sparsely populated. Equally, the total land mass of the Bahamas comparable to total land mass of Jamaica, which was used as a comparison partner to Barbados in Henry and Miller (2010).

investor confidence in Barbados is unchanged during the time period that the Bahamas experiences shocks to its property rights institutions due to IPA_81 and IPLHA_93.

The country comparison in this paper (Bahamas and Barbados) represents an advance over the comparison in the Henry Miller paper (Jamaica and Barbados) in that the Bahamas and Barbados match more tightly on the following criteria: population size, primary economic activity and currency policy. Whereas Jamaica has a population size that is serval times larger than the population size of the Barbados (3 million and 300,000 respectively), the Bahamas and Barbados have a population size that differ by roughly 50,000 persons. In terms of economic structure, Jamaica has an important mining industry due to its rich deposits of aluminum ore. Barbados and the Bahamas both have a less developed mining sector and derive most of their income from the service industries of tourism and offshore banking (90% and 78% respectively). Finally Barbados and the Bahamas have both maintained a currency peg with the US (2-1 and 1-1, respectively), for over 40 years. Jamaica on the other hand has maintained a floating exchange rate for the past two decades.

The goal of outlining the details of the Bahamas and Barbados comparison is to demonstrate that it meets the benchmarks established in the literature for natural experiments of this kind and in some dimensions it builds on these standards. One limitation of the two-country comparison that I propose relative to the Henry and Miller (2010) comparison is the time difference between when the Bahamas and Barbados became independent. Whereas Jamaica and Barbados both gained independence in 1962, the Bahamas earned the right to self-governance in 1967 followed by formal independence in 1973. The time series that I have on net foreign direct investment only begins in 1975. Consequently, I am unable to explicitly model this difference in my data analysis. Any effect of this distinction likely shows up in the dummy variable for the Bahamas in my estimating regressions.

3 Addressing Endogeneity

The source of variation in property rights in this natural experiment is the passage of the IPA_81 in the Bahamas and its subsequent repeal. As with any law, it is difficult to assert that the passage of the law is exogenous relative to the outcome being measured. In the spirit of Dell (2010), I provide some reasons for "plausible exogeneity" or endogeneity that would bias against my finding a negative result of property rights for non-natives on economic growth, which is the central result of my paper.

An important identifying assumption in my paper is that the Bahamas and Barbados are similar countries and as such the passage of a law like the IPA_81 was equally likely in both countries, but simply happened to occur in the Bahamas and not Barbados - a type of historical accident which would make exogeneity of the IPA_81 and its subsequent repeal plausible. Some suggestive historical evidence supporting this proposition is the following. In 2008, the opposition Democratic Labor Party of Barbados articulated a land zoning policy of a similar genre to the IPA_81 in the Bahamas:

> The Democratic Labor Party believes that land ownership is too important to the Barbadian identity to be left totally to market forces. The time has come for Government to intervene to ensure that every Barbadian gets an opportunity to own a piece of the Rock. This can best be achieved through effective zoning. The East Coast should be zoned for private residence and 'inland tourism' controlled by locals; and most central parishes zoned for farming. Many areas should be zoned for sale only to Barbadians. (Democratic Labor Party Manifesto, pg. 8)

The Democratic Labor Party of Barbados won the January 15, 2008 election unseating, the ruling Barbados Labor Party, who had governed for the previous 14 years. The purpose of this example is to illustrate that the same considerations that led the government in the Bahamas to enact the IPA_81 are present in a viable political party in Barbados, the control country in this natural experiment. While it remains to be seen whether the DLP in

Barbados implements a similar legislation to the IPA_81 in the Bahamas, the goal of offering this historical context is to provide suggestive evidence that the natural experiment that I study in this paper is well-suited to address potential endogeneity concerns by showing that the treated and untreated countries are similar with one important difference being the enactment and subsequent repeal of the IPA_81 in the Bahamas.

Another piece of historical evidence supporting the assertion that the IPA_81 can be thought of as a type of historical accident comes from studying the context under which it was implemented in the Bahamas. The governing party which enacted the Immovable Property Act, the Progressive Liberal Party, won the government in 1967 by forming a coalition government with two independent members of the House of Parliament following a 18-18 tie with the United Bahamian Party in the General Election of 1967. Had the two independents instead joined the the United Bahamian Party in forming the government, it is unlikely that the IPA_81 would have been enacted given the differences in political philosophy between the two parties. Moreover, given the closeness of the election, the political balance of power could have plausibly tipped in either direction.

Thirdly, the IPA_81 was enacted to reduce land speculation in the Bahamas by non-natives. Since the reason for enacting the IPA_81 was a prima facie political restriction on a type of investment in Bahamian land, one would expect that any omitted variable bias would serve to overstate the positive effect of property rights on economic development and on investor confidence. Since I find a negative effect of property rights on per capita GDP, the omitted variable bias is not operational in my favor for the central result of this paper.[2]

[2]In "The Economics of Density: Evidence from the Berlin Wall (2001) Ahlfeldt et al. argue that the Berlin Wall provides an exogenous source of variation in the types of businesses on either side of the wall, since the wall boundaries were determined for military rather than economic reasons. One can similarly argue that the political reasons for enacting the IPA_81 would mitigate against possible endogeneity concerns.

4 Data

My data set includes per capita GDP, net foreign direct investment figures, and the consumer price indices (CPI) for both countries. The per capita GDP time series extends to 1960. The net foreign direct investment data begins in 1976. The consumer price index data begins from 1960. I also have data on aggregate property purchases in the Bahamas covering 33 years during the period 1972-2009. This data is broken down into land purchases by natives and land purchases by non-natives for each year.

In addition to these financial data, I have a time series on population data, election outcomes, and the dates of major hurricanes for both countries. I use the population data to compute net foreign direct investment per capita for each country-year observation. This normalized measure of net foreign direct investment helps me to control for changes in population growth while providing a natural comparison variable between the measured outcome (per capita GDP) and the proposed channel (foreign direct investment). I use the election data to construct control dummies for changes in government and one year forward lags for changes in government. These government controls in my study mitigate against omitted variable bias due to changes in investor decisions driven by differences in preferences between the political parties with in a country, investor aversion to the uncertainty accompanying electoral change, and the implementation of addition policies that may work in concert with IPA_81 or IPLA_93 in driving investor confidence or economic growth. I use the hurricane data to construct control a variable for unforeseen natural disasters. With this natural disaster variable, I control for omitted variable bias due to country-specific shocks.

5 Identification

My identification strategy depends on two methodologies, (i) an event study methodology, and (ii) a difference-in-differences estimator . In the first stage of my analysis, I use these two methodologies to estimate the effect of property rights (IPA_81) on net Foreign Direct

Investment (NFDI). Here I use the IPA as a proxy for property rights, i.e., when the IPA_81 is in effect property rights for non-natives are limited. The purpose of the first stage is to establish that IPA_81 as a valid proxy for a change in property rights that affects investor confidence. In the second stage of my analysis, I use the two empirical approaches to estimate the direct effect of IPA_81 on per capita GDP and the indirect effect of IPA_81 on per capita GDP through its effect on net foreign direct investment.

5.1 Event Study

It is standard in event studies to observe pre-treatment and post-treatment data. Discontinuous breaks in the data very close to time of the experimental treatment then capture the treatment effect, assuming exogeneity of the treatment. In this study, I track net foreign direct investment and per capita GDP in both the Bahamas (the treated country) and Barbados (the control country), before and after the two treatments. I construct a 5 year event-study window on both sides of the treatment dates (1981 and 1993). This approach has three benefits: (i). I maximally use the data, since the 1976 data are included in the first event study window; (ii). the event study windows for the two treatments are non-overlapping: 1976-1986 and 1988-1998 and; (iii). the event study windows are large enough to capture time-series variation but narrow enough to contain the immediate effect of the two treatments.

5.2 Difference-in-Differences Estimate

The second estimation strategy that I employ is a difference-in-differences estimate, using pooled data for both the Bahamas and Barbados across all years. For the first stage of this analysis, I regress net foreign direct investment per capita (NFDI) on the property rights dummy IPA_81, a country dummy for the BAH, a continuous time variable (TIME) and the political and climate controls (denoted X).

$$NFDI_i = \alpha_0 + \alpha_1 BAH + \theta_1 IPA\_81 + \alpha_2 TIME + \alpha_3 BAH * TIME + \gamma_1 X + u_i \qquad (1)$$

The property rights dummy IPA_81 equals one (1) for country-year data where the country is the Bahamas and the year of observation coincides with the time period when IPA_81 is operative (1982-1993). It is zero (0) otherwise. The country dummy equals (BAH) one (1) for observations of the Bahamas and zero (0) for observations of Barbados.

The second stage results entail running a similar regression to the one in the first stage, with log(per capita GDP) replacing NFDI as the outcome variable and NFDI entering the right hand side as an explanatory variable. To test whether property rights influence growth through its effect on attracting foreign investment, I interact the property rigths dummy with the NFDI explanatory variable.

$$\begin{aligned} log(GDP_i) = &\beta_0 + \beta_1 BAH + \theta_2 IPA\_81 + \lambda_1 NFDI + \lambda_2 IPA\_81 \times NFDI + \\ &\beta_2 TIME + \beta_3 BAH \times TIME + \beta_4 log(CPI) + \gamma_2 X + v_i \end{aligned} \qquad (2)$$

5.3 Contemporaneous Difference Estimate

6 Results

6.1 Treatment # 1: Suspension of Property Rights for Non-Natives in the Bahamas (IPA_81)

The first treatment that I study is the enactment of the Immovable Property Act in 1981 (IPA_81). I consider this treatment to be an adverse shock to the property rights of foreign investors in the Bahamas. As illustrated in Figure 1, pre-treatment[3] net foreign direct

[3]Since the Immovable Property Act was passed by the Bahamian government in November of 1981, one can consider the observed value of net FDI in 1981 to be minimally contaminated by the treatment of the

investment (NFDI) is positive (on average) in both the Bahamas and Barbados. Further, pre-treatment NFDI in the Bahamas is generally greater than pretreatment NFDI in Barbados. After the first treatment, NFDI in Barbados remains positive and stable relative to pre-treatment values. This fact is consistent with Barbados being a suitable control country for the IPA_81 policy variation in Bahamas. NFDI in the Bahamas, on the other hand, falls following the passage of IPA_81. This decrease in NFDI in the Bahamas suggests that investor confidence in the Bahamas may have declined in response to the change in property rights in the Bahamas.

In Figure 2, I report the difference in per capita GDP between the Bahamas and Barbados above the pre-treatment average, i.e. Δ GDP = (per capita GDP Bahamas - average pre-treatment per capita GDP Bahamas) - (per capita GDP Barbados - average pre-treatment per capita GDP Barbados). As time approaches the event date, 1981, the GDP gap between the two countries, (Δ GDP) is steady at around \$600 per capita. After the event date, the GDP gap jumps by \$400, which is equivalent to 6% of the Bahamas' per capita GDP in 1981 or equally 10.5% of Barbados's per capita GDP in 1981. Thereafter, the GDP gap continues an upward trajectory, increasing at a rate of \$1,000 every two years. Based on Figure 2, the average increase in the GDP gap (1981-1986) is \$2,033 or 31% of the Bahamas' GDP in 1981. The Bahamas therefore develops an income advantage over Barbados notwithstanding the reduction in foreign direct investment accompanying the passage of the Immovable Property Act, which weakens the property rights of non-natives in the Bahamas.

In the baseline specification, my OLS results yield a difference-in-differences estimate of 15% for the effect of IPA_81 on per capita GDP in the Bahamas. This estimate is significant at the one percent level and robust to controls for changes in government, lagged changes in government, lagged changes in net foreign-direct investment and hurricanes.

act being passed. For consistency purposes, in the second treatment, I also include the data from 1993 in the pre-treatment data, since the Immovable Property Act is repealed on December 31st of that year.

6.2 Treatment #2: Return of Property Rights for Non-Natives in the Bahamas (IPLHA_93)

The second treatment in this natural policy experiment is the repeal of the IPA_81 and the enactment of the IPLHA_93 in its place. Leading up to the General Elections of 1992 in the Bahamas, the opposition party established as a legislative priority "to repeal the intimidating Immovable Property Act and enact an Investment Act designed to promote and enhance economic growth and employment"(FNM Manifesto). After the opposition party won the government, the Immovable Property Act (IPA_81) was repealed on December 31, 1993 and replaced with the International Persons Landholding Act (IPLHA_93). Under the International Persons Landholding, non-natives could purchase land in the Bahamas without government approval.

This second treatment provides an additional event study where I observe the effect of property rights legislation on economic development through the foreign investment channel. Again using net foreign direct investment in Barbados as control, I get an across country comparison for the effect of strong property rights institutions on investment. Secondly, the legislative repeal enables me to do a within country comparison to the initial treatment.

In Figure 4 we observe that prior to the treatment, total net foreign direct investment in the Bahamas and in Barbados is on average $71 per capita and $34 per capita, respectively. In the five years following the treatment in 1993, net foreign direct investment in Barbados remains stable at an average of $44 per capita.[4] Per capita net foreign direct investment in the Bahamas, on the other hand, increases almost six-fold during the post treatment period, averaging $401 per capita. Any concerns that this increase NFDI increase is due to the change in government in the Bahamas is obviated by the fact that NFDI in the Bahamas is fairly constant from 1992-1994. The government changes in 1992 and the Immovable Property Act (IPA_81) is repealed Dec 31st, 1993 and the IPHLA_93 comes into effect on

[4]This fact that net-FDI in Barbados varies continuously across the discontinuity at 1993 is again reassuring because Barbados is the comparison country which does not receive the treatment.

January 1st, 1994. The time delay between the government change and the repeal of the Immovable Property Act is a nice feature of this natural experiment. I use this feature of the experiment to un-bundle the effect of the change in the government from the effect of the repeal of the IPA_81 (enactment of IPHLA _93) on foreign direct investment in the Bahamas. Looking at Figure 4, the steady increase in net foreign direct investment occurs from 1994 onwards. This observation is consistent with a story in which net foreign direct investment in the Bahamas grows because non-natives face less uncertainty.

In Figure 5, I report the difference in per capita GDP between the Bahamas and Barbados above the pre-treatment average, i.e. Δ GDP = (per capita GDP Bahamas - average pre-treatment per capita GDP Bahamas) - (GDP per capita GDP Barbados – average pre-treatment per capita GDP Barbados). As the time approaches the event date, 1993, the GDP gap between the two countries is steady at around $500 per capita. After the event date, the GDP gap narrows by $250 in 1994 and oscillates about zero over the next four years in my event study window. The average change in the GDP gap between the two countries is $4.20, or 0.03% of the Bahamas' GDP in 1993. Here we find that property rights do in fact positively affect net foreign direct investment. Net foreign direct investment, however, has very low pass through to economic growth, i.e. a net increase in per capita net foreign direct investment of $330 is associated with an average increase of $4.20 in per capita GDP.

The results of this second treatment, motivate the use of the IPLHA_93 as an instrument for net foreign direct investment in the GDP regression. The IPLHA_93 has a significant effect on net foreign direct investment in the Bahamas, the treated country, and no effect on Barbados the control country. Additionally, the IPHLA_93 has an insignificant direct effect on per capita GDP, i.e. it affects per capita GDP through its effect on net foreign direct investment. In the OLS regression of log per capita GDP where I include the effects of IPLHA_93 and a time trend of IPLHA_93, the point estimates on these two control variables are insignificant, t-values of -0.35 and 1.5 respectively. Moreover, due to the timing of the IPLHA_93, and the fact that it replaces another law, it is unbundled to some degree from

the existing political and legislative background of other laws and policies, which may have worked in concert with the IPA_81 in influencing foreign investment in the Bahamas.

In the first stage of my two stage least squares instrumental variables estimate, I regress net foreign direct investment on the instruments IPLHA_93 and a time trend of IPLHA_93 (TIME_IPLHA_93) as well as on the controls that appear in the baseline model for my regression on log(per capita GDP).

$$\begin{aligned} NFDI =& \alpha_0 + \alpha_1 BAH + \theta_1 IPA\_81 + \alpha_2 TIME + \alpha_3 BAH * TIME + \\ & \alpha_4 IPLHA\_93 + \alpha_5 TIME\_IPLHA\_93 + log(CPI) + \epsilon \end{aligned} \tag{3}$$

Using the coefficients from the first stage, I construct an estimated NFDI, which I denote NFDI_2SLS. In the second stage, I use this constructed value NFDI_2SLS in the place of NFDI in the regression of log(per capita GDP). The second stage regression that I then run is:

$$\begin{aligned} log(GDP) =& \beta_0 + \beta_1 BAH + \theta_2 IPA\_81 + \lambda_1 NFDI\_2SLS + \lambda_2 IPA\_81 \times NFDI\_2SLS + \\ & \beta_2 TIME + \beta_3 BAH \times TIME + \beta_4 log(CPI) + \gamma_2 X + v \end{aligned} \tag{4}$$

Using this instrumental variables approach, I obtain an estimate of 22% for the effect of IPA_81 on per capita GDP in the Bahamas. This result is significant at the one percent level and is robust to electoral, hurricane and lagged NFDI controls that are used to check the OLS result.

7 Robustness Checks

7.0.1 Placebo Tests

In this section, I perform three robustness checks on my data. First I check that the results that I obtained are driven by the changes in the law rather than the choice of Barbados

as a control country. I do this by running the OLS regression just using the data from the Bahamas, depending on the enactment of IPA_81 and it subsequent repeal as the source of variation for property rights. Under this specification, I obtain an effect size of 17% for IPA_81. This estimate is significant at the one percent level and lies in the confidence interval for the OLS estimate that I previously found using the pooled difference-in-differences estimator. The coefficient on the other variables in the un-pooled regression likewise lie in the confidence intervals of the point estimates from the pooled regression in which I use data from both the Bahamas and Barbados.

7.0.2 Contemporaneous Difference Estimator

Second, I do a counter-factual analysis that consist of the following two hypotheticals: (i) IPA_81 is not enacted in the Bahamas (ii) IPA_81 is enacted in Barbados. Under the first counter-factual experiment, I obtain a negative insignificant point estimate for net foreign direct investment. This result is opposite to the positive (and also insignificant) coefficient that I obtained from factual analysis. Under the second counter factual experiment, I find an insignificant effect of the fictitious IPA_81 on economic growth in Barbados. The point estimate in the second experiment is 0.9% and the t-value is 0.21. Both counter-factual exercises cohere with the results in the previous section. First, omitting IPA_81 from the growth equation for the Bahamas leads to a spurious negative correlation between net foreign direct investment and GDP growth. Secondly, including fictitious piece of legislation in Barbados parallel IPA_81 in the Bahamas does not help to explain economic growth in Barbados – the comparison country.

In an important paper Bertrand, Duflo and Mullianathan (2004) demonstrate that auto-correlation may lead to standard errors for difference-in-differences estimators, which are downward biased. The third robustness check that I perform uses a contemporaneous difference estimator to correct for bias in the point estimates and standard errors due to auto-correlation in the data. The contemporaneous difference estimator is obtained by differencing

the dependent and independent variables for the Bahamas (BAH) and Barbados (BDOS) for each time observation and then regressing the differenced depend variable on the differenced explanatory variables. This contemporaneous difference estimator mitigates against omitted variable bias driven by time-specific shocks that affect both the Bahamas and Barbados similarly. The estimating equation looks like:

$$\log(GDP_{BAH,t}) - \log(GDP_{BDOS,t}) = \hat{\beta}_1 + \hat{\theta}_2 IPA\_81 + \hat{\gamma}_2 \bar{X}_t + \bar{v}_t \tag{5}$$

where $\bar{X}_t$ and $\bar{v}_t$ are the differenced control variables and error terms at time t. The coefficient $\hat{\theta}_1$ captures the effect of IPA_81 on the difference in growth rates between the Bahamas and Barbados. By comparison, θ_1 from the difference-in-differences estimator is the average effect of IPA_81 on GDP growth rates in the Bahamas. In order to convert from $\hat{\theta}_1$ to θ_1, I compound the growth difference $\hat{\theta}_1$ over the N=12 years that IPA_81 is in effect and compute it's average. Mechanically, after j years of IPA_81, the growth in the Bahamas due to IPA_81 is given by $(1+r)^j$, where $r = \hat{\theta}_1$, the differential growth due to IPA_81. I let $\hat{IPA\_81}$ denote the average effect of IPA_81 computed using $r = \hat{\theta}_1$.

$$\hat{IPA\_81} = \frac{1}{N}[(1+r) + (1+r)^2 + ... + (1+r)^N] - 1 \tag{6}$$

The sum in the average growth equation is a standard geometric series, which simplifies to

$$\hat{IPA\_81} = \frac{1}{N}\left(\frac{1+r}{r}\right)\left[(1+r)^N - 1\right] - 1 \tag{7}$$

7.0.3 Correcting for Auto-correlation

Estimating the contemporaneous difference model using the explanatory variables that are significant across all specifications from the difference-in-differences estimation procedure, I obtain a point estimate of $\hat{\theta}_1 = 0.03$ and a standard error of 0.01. Computing the average

growth from the expression above, I obtain that the average growth is 0.219 or 21.9%, with a standard deviation of 0.086 or 8.6% (calculated using the delta method). For comparison, I found the average effect of IPA_81 to 15% based on the OLS result and 22% based on the IV result. The results of the contemporaneous difference estimator is significant at the one percent level and falls within the confidence interval of both the OLS and IV estimators.

As an additional check for auto-correlation, I regress the residuals from the contemporaneous difference estimator on their lagged values out to five lags. The positive auto-correlation at one lag is sensitive to the addition of other lags (alternating t-values of 0.84 and -0.90 in a model with four and five lagged residuals, respectively). There is a robust negative correlation at three lags (t-values -2.83 and -3.24 in a model with four and five lagged residuals, respectively). As a result of this robust negative auto-correlation, the standard errors that I obtained from the contemporaneous difference estimator may be upward biased (too big) as opposed to being downward biased (too small).

As a final robustness check, I consider the following counter-factual: I take the positive autocorrelation at one lag to be robust and significant and the negative auto-correlation at four lags to be insignificant. This counter-factual provides a worse-case scenario for the auto-correlation in my model, i.e. the situation in which the standard errors are largest after I would have corrected for auto-correlation. To rid the model of auto-correlation under this set of assumptions, I perform a Cochrane-Orcutt transformation of the data and estimate the parameters of the model (Cochrane and Orcutt, 1949). The Cochrane-Orcutt transformation works when the residuals of the fit are serially correlated at one lag, i.e. $v_t = \rho v_{t-1} + \eta_t$, where the η_t is exogenous and v_t and v_{t-1} are the residuals from the fit at time t and t-1. Given an estimating equation $y_t = X_t\beta + u_t$, the Cochrane-Orcutt transformation is $\tilde{y}_t = y_t - \rho y_{t-1} = (X_t - \rho X_{t-1})\beta + \eta_t$. By taking a weighted first difference of the observations, this procedure eliminates the serial correlation ρv_{t-1} from the error term for the observation at time t. The parameter ρ is estimated from regressing the residuals on their first lagged values (estimated to be 0.43 here).

The results from this counter-factual experiment give $\hat{\beta}_1 = 0.028$ and a standard error 0.014. This point estimate has a p-value of 0.054. Using this value of $\hat{\beta}_1$, I find that the average effect of IPA_81 is 20.2% and the standard error is 0.11. Checking, the residuals of the transformed model, I find that the serial correlation at one lag is eliminated, as expected. Extending the model to more lags, I find that the negative auto-correlation at lag four remains significant at the one percent level and there is an additional negative auto-correlation at lag three that is also significant at the one percent level. The results of this counter-factual exercise suggest that main source of auto-correlation is the negative auto-correlation at lag four. As such, the contemporaneous difference estimator provides a more reliable auto-correlation robustness check. My preferred estimate of the average effect of IPA_81 is 22%, the common result from the contemporaneous difference estimator and the instrumental variables estimator. The standard error on this point estimate is 5.9% for the contemporaneous difference estimator and 8.6% for the IV estimator, making it significant at the five percent level in both specifications. Recall that the negative auto-correlation result in larger standard errors, which makes it likely that the true standard errors are closer to the standard errors obtained from the instrumental variables procedure.

8 Conclusion

In this natural experiment, I find that restricting foreign investment through weakened property rights for non-natives resulted in economic growth in the Bahamas. Further, restoring property rights for non-natives did not have a significant effect on GDP growth - its appreciable impact on foreign investment in the Bahamas notwithstanding. One limitation of the work in this paper is that in this paper, I take an in-depth look at two countries as opposed to looking at a cross-section of countries, at a given time. This affects the generalizability of the empirical results to other contexts where the history, politics and geography may be different from those of the Bahamas and Barbados. With this important caveat in

mind, these results suggest that it may be important to distinguish between protection of private property for natives and non-natives when considering the mechanism through which property rights institutions promote economic growth.

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10 Appendix

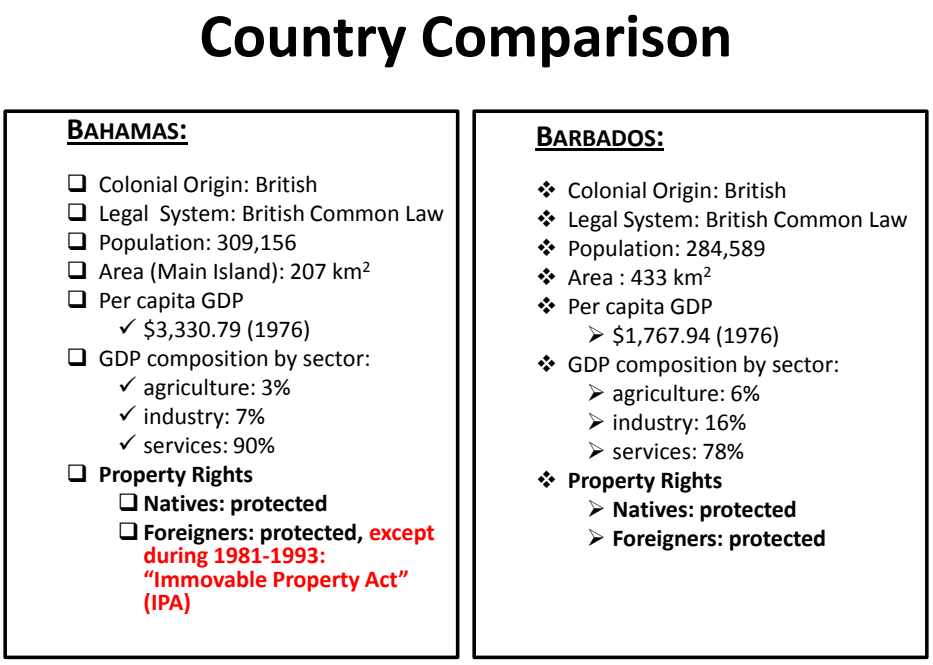

Figure 1: Country Comparison.

Table 1: **Effect of Law Change on GDP Growth**

	(1)	(2)	(3)	(4)
IPA81	0.2790	0.1528	0.1499	0.1531
	(0.0502)	(0.0424)	(0.0423)	(0.0429)
BAH	0.4889	0.5270	0.5121	0.5284
	(0.0395)	(0.0464)	(0.0472)	(0.0481)
BAH x TIME		-0.0013	0.0000	-0.0015
		(0.0033)	(0.0034)	(0.0035)
NFDI		0.0001	0.0000	0.0001
		(0.0001)	(0.0001)	(0.0001)
IPA81 x NFDI		-0.0006	-0.0005	-0.0006
		(0.0003)	(0.0003)	(0.0003)
NFDI LAG				
log(CPI)		1.0360	1.0460	1.0380
		(0.1118)	(0.1115)	(0.1142)
GOV			-0.0392	
			(0.0440)	
GOV LAG			-0.0620	
			(0.0441)	
HURR				0.0044
				(0.0360)
TIME	0.0547	0.0111	0.0105	0.0110
	(0.0020)	(0.0051)	(0.0051)	(0.0052)
Const.	7.8557	4.0840	4.0570	4.0750
	(0.0378)	(0.4082)	(0.4067)	(0.4184)
Adjusted R	0.9468	0.9794	0.9796	0.9790
F-stat	350.80	402.60	316.20	345.60

Table 2: **Using Legal Reform as Instrument for Net FDI**

	Excl. Restriction	First Stage	Second Stage
IPA81	-145.82	0.143	0.223
	(89.92)	(0.076)	(0.058)
BAH	41.27	0.554	0.526
	(60.64)	(0.049)	(0.046)
TIME	7.07	0.008	0.006
	(6.61)	(0.005)	(0.006)
IPLHA93	-38.42	-0.047	
	(140.17)	(0.123)	
TIMExIPLHA93	42.64	0.019	
	(13.02)	(0.013)	
log(CPI)	-99.02	1.109	1.135
	(148.57)	(0.118)	(0.127)
BAHxTIME	9.02	-0.004	-0.007
	(8.56)	(0.008)	(0.006)
NFDI		0.000	
		(0.000)	
IPA81xNFDI		0.000	
		(0.000)	
$NFDI_{2SLS}$			0.000
			(0.000)
IPA81x$NFDI_{2SLS}$			-0.001
			(0.001)
intercept		3.82	3.72
		(0.43)	(0.46)
Adjusted R	0.8306	0.98	0.9809
F-stat	42.32	321.4	432.8

Table 3: **Robustness Checks, Counter-factuals, and Placebo Tests**

	Bahamas Only	Bahamas No IPA	Barbados IPA
IPA81	0.1650		0.0097
	(0.0534)		(0.0460)
NFDI	0.0000	-0.0001	0.0001
	(0.0001)	(0.0001)	(0.0003)
TIME	0.0172	0.0061	0.0107
	(0.0145)	(0.0149)	(0.0084)
log(CPI)	0.8807	1.1835	1.0440
	(0.2929)	(0.2851)	(0.1784)
IPA81xNFDI	-0.0005		
	(0.0004)		
Intercept	5.1680	4.1303	4.0460
	(1.0560)	(1.0365)	(0.6284)
Adjusted R	0.9617	0.9488	0.9780
F-stat	146.7000	180.3000	322.6000

Table 4: **Robustness Checks: Auto-correlation**

	1	2	3
Residual (t-1)	0.43	0.15	-0.17
	(0.18)	(0.18)	(0.19)
Residual (t-2)		0.03	0.15
		(0.15)	(0.16)
Residual (t-3)		-0.42	-0.42
		(0.15)	(0.13)
Residual (t-4)		-0.35	-0.52
		(0.17)	(0.16)
Residual (t-5)			-0.25
			(0.16)
Adjusted R	0.15	0.37	0.51
F-stat	6.07	4.68	6.05

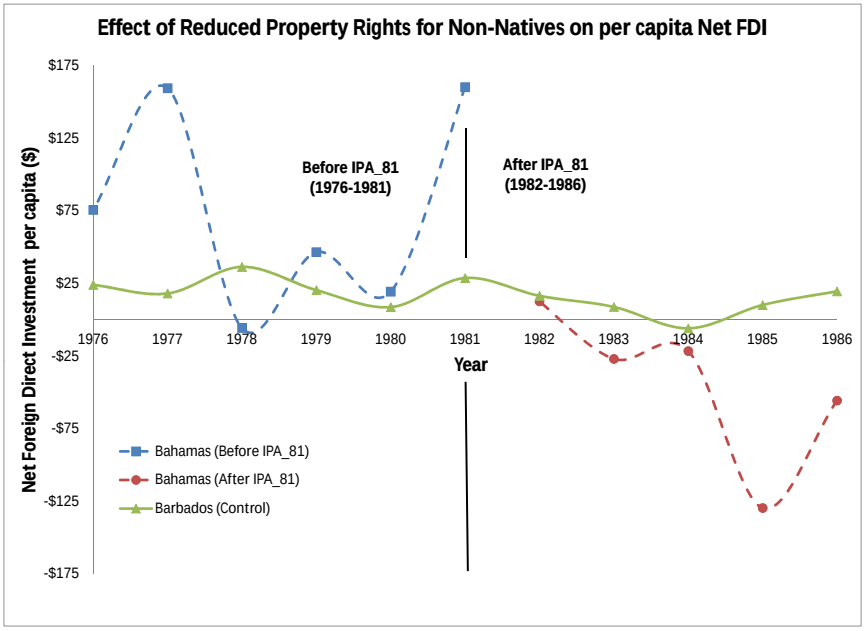

Figure 2: Effect of Reduced Property Rights for Non-Natives on per capita Net FDI.

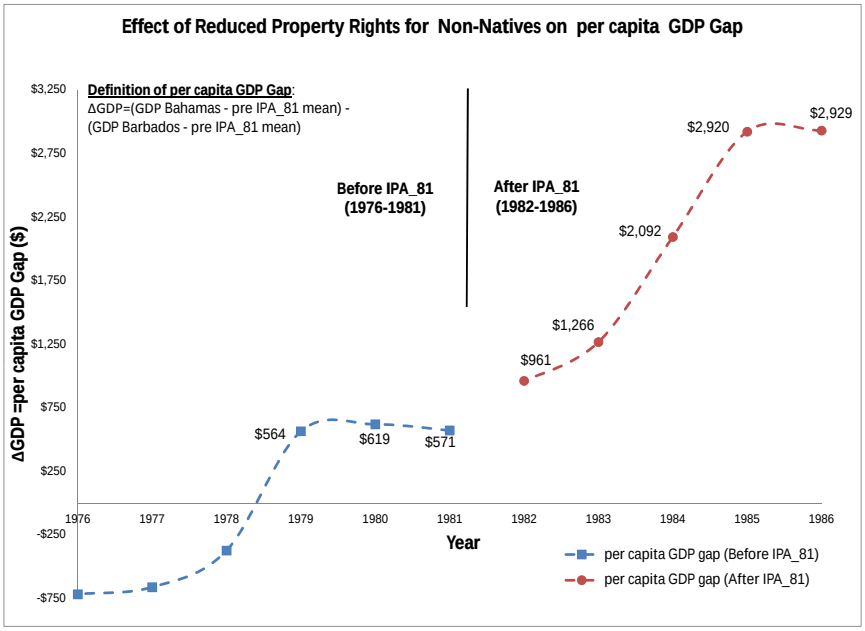

Figure 3: Effect of Reduced Property Rights for Non-Natives on per capita GDP Gap.

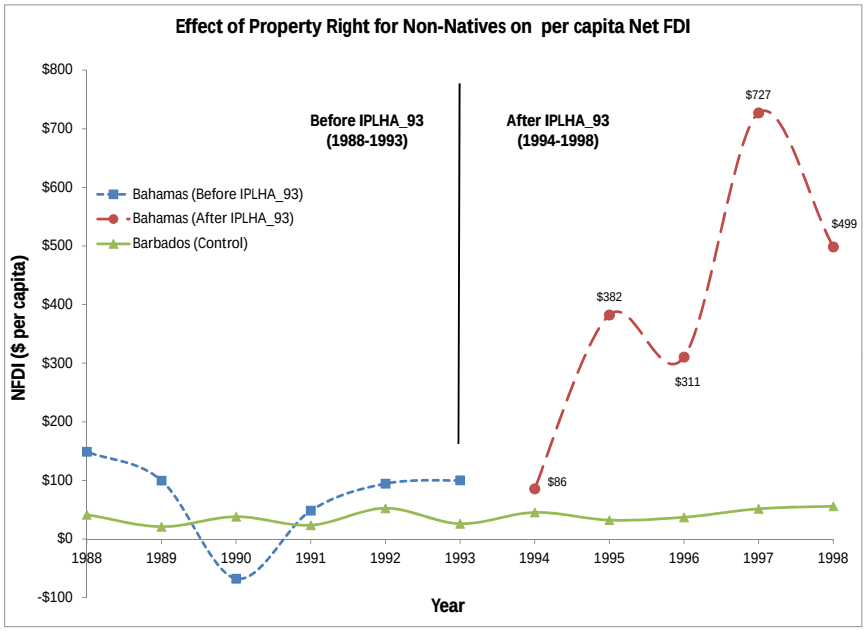

Figure 4: Effect of Property Rights for Non-Natives on per capita Net FDI.

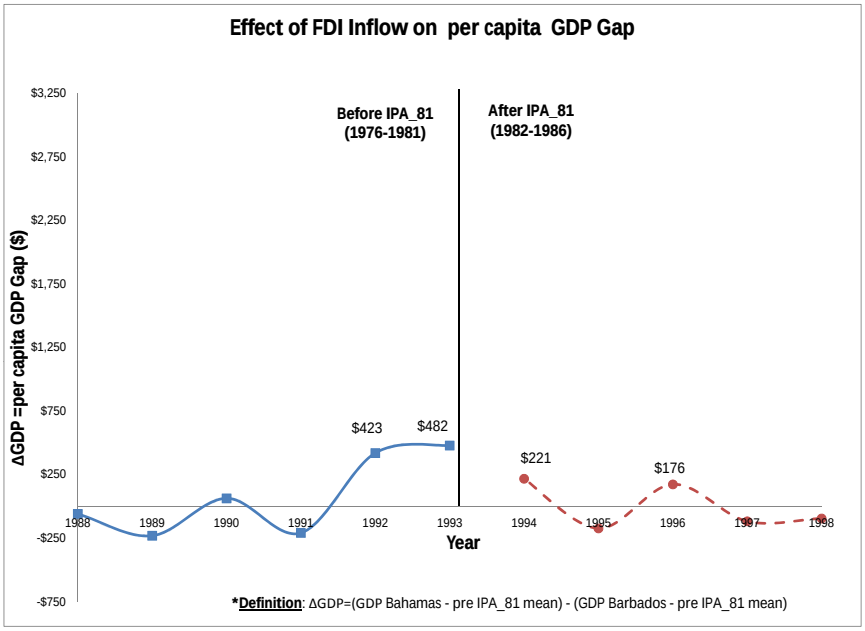

Figure 5: Effect of FDI Inflow on per capita GDP Gap.

Table 5: **Contemporaneous Difference Estimates**

	Contemp. Diff	Cochrane Orcutt
IPA81	0.030	0.023
	(0.011)	(0.014)
TIME	-0.001	-0.001
	(0.001)	(0.001)
log(CPI)	0.085	0.137
	(0.111)	(0.176)
Intercept	0.266	0.153
	(0.014)	(0.011)
Adjusted R	0.443	0.250
F-stat	8.678	4.177