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Do better property rights improve local income?: Evidence from First Nations' treaties[☆]Fernando M. Aragón^{*}

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ABSTRACT

This paper examines the effect of an improvement in property rights on a local economy using the case of First Nations' modern treaties. These treaties are an important institutional reform that clarifies ownership of land and natural resources near Aboriginal communities. Using confidential micro-data, I find evidence of a positive impact of modern treaties on real income. The effect is driven by employment income and spreads across workers in industries not directly affected by the reform. I also find an increase in real wages and housing costs. The effects are similar in neighboring communities outside Indian reserves. These results are consistent with property right reforms creating a positive demand shock that affects the whole local economy. This is a yet understudied mechanism through which better property rights can generate positive local spillovers.

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1. Introduction

Well-defined property rights are considered an important element of economic development (Besley and Ghatak, 2010; North, 1990). Cross-country studies link better property right institutions to higher national income and economic growth (Acemoglu and Johnson, 2005; Acemoglu et al., 2001). Using within-country variation, several empirical papers also find evidence of a positive effect of property rights on investment, and other economic outcomes, such as labor supply, agricultural productivity, and land use (Banerjee and Iyer, 2005; Besley, 1995; Field, 2007; Galiani and Schargrodsky, 2010; Goldstein and Udry, 2008; Hornbeck, 2010; Johnson et al., 2002; Lin, 1992).¹ Not surprisingly, there have been several policy initiatives aimed to reform, and improve, property rights.

In practice, property right reforms usually target some specific local population.² At local level, however, it is not clear whether, or how, improvements in property rights ultimately affect income and living standards. Do the increase in investment or economic activity associated to better property rights translate into higher real income? Are these benefits limited to a specific population, such as land-owners, or do they extend to the rest of the local economy? The answers to these questions are not straightforward due to possible general equilibrium effects associated to property right reforms, such as increase in demand for local labor, migration, and change in local prices.

This paper examines these questions using the case of First Nations' modern treaties.³ These treaties have had a profound effect on defining ownership over land and natural resources near Aboriginal communities. While formally owned by the government, some of this land is subject to collective rights held by Aboriginal communities.⁴ In many cases, however, neither the scope of these rights nor the territory involved is defined. This feature creates lack of clarity about ownership over vast tracts of land rich in natural resources.

Modern treaties clarify property rights over these lands and resources. They do so in several ways. First, they delimit the territory subject to Aboriginal rights. Second, they specify who owns land and

[☆] The estimates presented here are from Statistics Canada data. However, the views and interpretation expressed here are from the author and do not represent the position of Statistics Canada. Financial support from the SFU/SSHRC Small Research Grant Nr. 631927 is gratefully acknowledged. I am grateful to Christopher Alcantara, Terry Anderson, Jane Friesen, Franque Grimard, Stephen Easton, Alex Karaivanov, Anke Kessler, Chris Ksoll, Krishna Pendakur, Juan Pablo Rud, and seminar participants at SFU, CEA, Univ. of Victoria, and NEUDC for useful comments and suggestions.

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¹ Recent work also explores the mechanisms linking property rights and investment, such as access to credit, reduction of expropriation risk, or facilitation of trade (Besley and Ghatak, 2010; Besley et al., 2012).

² For example, in Mexico, the 1992 land certification program targeted only people living in *ejidos* (de Janvry et al., 2013). Similarly, Operation Barga in West Bengal improved security of tenure mostly among rural farmers (Banerjee et al., 2002).

³ The term First Nations refers to the largest Aboriginal group in Canada. The other two are: Métis and Inuit.

⁴ These rights, called Aboriginal rights, arise from the traditional use and ancestral occupation of land.

natural resources, and describe in detail how these rights will be exercised. Finally, they clarify the scope of Aboriginal rights to harvest wildlife and use land for traditional purposes. Note that treaties' main objective is to clarify property rights in dispute, not to reduce inequality in land redistribution. In that sense, they are not similar to standard land reforms.⁵ By clarifying property rights, however, modern treaties have the potential to reduce transaction costs, especially for extractive activities.⁶ In turn, this can facilitate economic transactions and affect local economic conditions.

In order to examine the economic impact of modern treaties, I use confidential Census micro-data of individuals living on reserves held by First Nation bands.⁷ The richness of the data allows me to observe key economic variables (such as employment and income) and to construct indexes of local prices. This is crucial to obtain measures of real income and real wages.

The main empirical challenge is dealing with omitted variables that may affect both economic outcomes and treaty making. I address this identification concern in three ways. First, I use a difference-in-difference (D-i-D) approach with band fixed effects. This approach exploits the timing of treaty implementation and effectively controls for time-invariant differences between bands. Second, I use as a comparison group only reserves located outside metropolitan areas in north-western Canada (i.e., British Columbia, Yukon and Northwest Territories). This is motivated by the observation that all the treaties were implemented by bands in these regions. Focusing on this population reduces the sources of differences between treaty and non-treaty bands. Finally, I complement this strategy with a bias-corrected matching estimator proposed by [Abadie and Imbens \(2002\)](#).

I find evidence that modern treaties increase real income by around 13%. Results are similar using both the D-i-D and matching strategies, and robust to the inclusion of a rich set of controls such as province-year fixed effects. Moreover, the increase in real income happens few years *after* a treaty is implemented. Before a treaty, the evolution of real income between treaty and non-treaty bands is similar. This is a necessary condition for the validity of the D-i-D strategy.

Having established this result, I examine alternative explanations for the increase in real income. There are two main candidates: (1) changes in population composition due, for instance, to selective migration, and (2) confounding institutional changes associated to treaties, such as expansion of the public sector, financial compensation, or implementation of self-government agreements. The evidence suggests, however, that these two explanations are unlikely to fully explain the observed effects. For instance, there is not a sizeable change in observable population characteristics (such as age, migration history, or education) or an increase in income of public workers. There is also a decrease in the importance of non-employment sources of income, such as welfare benefits and government transfers.

An important question is: why would real income increase? To answer this question, I study treaties as a reduction in transaction costs to develop extractive activities. This is a reasonable starting point given the role of treaties on clarifying property rights over land and natural resources, and the need to consult with local communities before starting new projects in Aboriginal lands. In this view, treaties have the potential to facilitate new extractive operations and increase the demand for local labor. In order to study the equilibrium effects of a local

demand shock, I use the analytical framework developed by [Moretti \(2011\)](#). In this framework, a positive shock to the demand for local labor has a first order effect of increasing wages in the affected sector. There are, however, other general equilibrium effects. First, to the extent that workers are mobile between industries, the increase on wages would spread to other workers. Second, the increase in the local budget constraint would also increase the demand, and price, of non-tradable goods, such as housing. Finally, in the presence of imperfect labor mobility, we could expect a positive effect on workers' real income.⁸

With this framework in mind, I explore the effects of treaty implementation on the local economy. First, I find a positive relation between treaty implementation and mining agreements. These are private contracts between mining firms and Aboriginal communities in order to start new mining operations. I interpret this finding as evidence that treaties have indeed reduce transaction costs. Second, I find that real income increases for workers in extractive industries but also for workers in manufacturing, trade, and non-public services. Third, consistent with a local shock on labor demand in presence of inelastic labor and housing supply, I also find an increase in real wages and house prices.⁹ Finally, I present evidence of geographical spillovers. In particular, I document an increase in real income and real wages in neighboring, off-reserve, communities within commuting distance of bands that implemented a treaty.

I interpret these results as evidence that, by clarifying property rights over land and natural resources, modern treaties have reduced transaction costs and facilitated expansion of local extractive industries. This has translated into higher income for the local population. This is an example of property rights improving economic efficiency as suggested by the Coase theorem. These results do not imply, however, that better property rights are a sufficient condition for economic development. Without profitable economic opportunities, like untapped natural resources, strengthening property rights may have a limited impact on local income.

This paper relates to several literatures. First, it relates to a literature examining local labor markets and economic linkages. This literature suggests that local demand shocks can have real effects on local populations due to limited mobility. In the presence of economic linkages, these effects can be transmitted across a local economy.¹⁰ This paper documents a case in which the local shock is created by an institutional reform. Importantly, the richness of the data allows construction of local price indexes. This is important in order to account for the change in cost of living associated to local shocks and to examine general equilibrium effects.

Second, it contributes to a literature studying the economic effects of institutions. Its contribution is to document the effect of better property rights on real income. This outcome has been neglected in previous studies using within-country variation. Moreover, it highlights a potential local spillover associated to better property rights. By fostering investment or facilitating economic transactions, better property rights can create a positive demand shock in a local economy. This can spread the benefits, in terms of real income, to individuals not directly linked to the assets whose property rights have improved.

Finally, this paper relates to a literature studying the causes of economic underperformance of Aboriginal peoples. This literature, mostly using the case of North American aboriginals, emphasizes the importance of institutions, governance and property rights ([Akee, 2009](#); [Akee et al., 2012](#); [Alcantara, 2007b](#); [Anderson and Parker, 2008, 2009](#); [Cornell and Kalt, 1992](#)). There is also evidence of the importance of other factors such as forced political integration ([Dippel, 2014](#)), cultural

⁵ See [Besley and Burgess \(2000\)](#) and [Ghatak and Roy \(2007\)](#) for a review of the effects of redistributive land reforms on poverty and agricultural productivity.

⁶ In this context, the main transaction costs faced by extractive firms, such as mines, is associated to obtaining an operating license. This requires public consultation with local communities, and plans to mitigate or compensate parties whose rights are affected. Lack of clarity of ownership and the extent of these rights makes this process more cumbersome.

⁷ First Nation communities are officially referred to as bands. A band usually has lands set apart for its own use and benefit, called Indian reserves. Reserves are similar to the U.S. Indian reservations.

⁸ If labor were perfectly mobile, as in the Rosen–Roback model, then immigration and the increase in housing prices would offset the increase in wages. This would keep real wages (and workers' real income) similar between locations.

⁹ Similar response of local economies to demand shocks has been documented in previous studies such as [Greenstone et al. \(2010\)](#) and [Aragón and Rud \(2013\)](#).

¹⁰ See for instance recent work by [Moretti \(2010\)](#), [Moretti \(2011\)](#), and [Notowidigdo \(2013\)](#).

assimilation (Kuhn and Sweetman, 2002) or demand shocks from new industries, such as casinos (Evans and Topoleski, 2002). Recent work also explores the long term effect of assimilation policies, such as Indian residential schools, on cultural and economic integration (Feir, 2013). This paper contributes to this literature by examining the economic effects of a large, and on-going, institutional reform in Aboriginal communities.

2. Background

2.1. First Nations, Aboriginal rights, and modern treaties

First Nations are the largest group of Aboriginal people in Canada.¹¹ As of 2006, there were around 1.17 million people identified as Aboriginals, of which around 60% consider themselves as First Nations (Statistics Canada, 2010). First Nation communities, officially referred to as bands, have lands set apart for their collective use or benefit. These lands, called “reserves”, are formally owned by the Crown and are held in trust for bands by the federal government. Around 40% of First Nations peoples live on reserves.¹²

Besides reserve lands, First Nation bands also hold title, and the rights that go with it, over vast tracts of land and resources outside their reserves.¹³ These rights, called *Aboriginal rights*, are enshrined by the 1982 Canadian Constitution and derive from the historic occupation and use of ancestral lands by Aboriginal people. These rights exist whether there is a treaty or not.¹⁴ But, without a treaty there is uncertainty about how and where these rights apply (BC Treaty Commission, 2012). For instance, without treaties, it is not clear what is the territory of Aboriginal lands, or even who is the owner since there are cases of overlapping claims between Federal Government and Aboriginal communities, and also between several Aboriginal communities. Similarly, it is not clear which specific rights of use or wildlife harvesting the community may hold.

Modern treaties, also called Comprehensive Land Claim Settlements, address this issue.¹⁵ They clarify property rights in Aboriginal lands in several ways. First, they delimit the boundaries of the territory subject to Aboriginal rights of a given community. Second, they recognize and specify the property rights to the land and natural resources of the involved parties, and describe in detail how these rights will be exercised. Finally, they define the scope of Aboriginal rights to harvest wildlife and use land for traditional purposes.¹⁶

This clarification of property rights has the potential to reduce transaction costs for development of extractive industries in the vicinity of First Nation communities, such as mining. These transaction costs arise due to the need to consult with Aboriginal communities before

starting any project that may affect their rights. Since 1990, several Supreme Court decisions have clarified the nature of Aboriginal rights and outlined the requirements with regards to consulting Aboriginal populations.¹⁷ In practice, this has led to an increased need to consult with Aboriginal communities before starting new projects on or near their Aboriginal lands, and to arrange mitigation or compensation actions.

This consultation process is likely to be more cumbersome without clarity of who owns the rights over land and resources, and the scope of these rights. While I cannot measure transaction costs directly, latter I show that contracts between mining companies and Aboriginal communities are positively affected by treaties. This is suggestive evidence that treaties may have indeed lowered transaction costs.

In addition to clarifying property rights on Aboriginal lands, treaties may also introduce other institutional changes (see Table C.2 in the online Appendix for a summary of treaty characteristics).¹⁸ Many of them are common to all treaties. For instance, all of them involve financial compensation (i.e., scheduled payments from the federal government or share of resource royalties); increase participation of the local government on land use decisions; management of natural resources, and provision of local public services; and create some local tax capacities. There are, however, two main features that differ between treaties. First, some treaties eliminate Indian reserves, and transfer title of the land in fee simple to the tribal council.¹⁹ This feature, however, is not widely spread and was not implemented during the period of analysis.²⁰ Second, some treaties also include self-government provisions that devolve First Nations jurisdiction over their own affairs.

There is not a comprehensive evaluation of the fulfillment of treaty terms. Some reports (based on few case studies) suggest that they have been successfully implemented, at least in terms of transfer of funds, establishment of public bodies, and recognition of land rights (AANDC, 2009, p. i). However, other reports suggest that implementation is not exempt of difficulties and in some cases the government may have not fulfilled its treaty obligations (Auditor General of Canada, 2007; Standing Senate Committee on Aboriginal Peoples, 2008). Some issues raised in these reports refer to: discrepancies in interpretation of implementation plans, reluctance of federal agencies to refer matters to arbitration, difficult coordination, and lack of funding of the implementation process. Note that limited implementation of treaties may create an attenuation bias and thus make the estimates more conservative. Similarly, lengthy implementation process may create lags between the beginning of treaty implementation and its economic effects. I present evidence of these lags in Section 4.2.

There were previous treaties signed between First Nations and either the British Crown or the Government of Canada. These treaties, called historic treaties, were signed between 1701 and 1923. Treaty making stopped in 1927 when the federal government made it a criminal offense for a First Nation to hire a lawyer to pursue land claims.²¹ Negotiation of modern treaties re-started in 1973, after the Supreme Court recognized the existence of Aboriginal rights. These historic treaties involved mostly Aboriginal communities located in the prairies and Eastern Canada and many of them dealt with similar issues as modern treaties, such as ownership of land and resources and financial compensation. These historic

¹¹ The Aboriginal people in Canada are classified in three groups: First Nations, Métis and Inuits. In Canada, the term First Nations refers to indigenous Indians (AANDC, 2010).

¹² First Nations peoples living on reserves are one of the poorest groups in Canadian society (AANDC, 2004; Royal Commission, 1996). This situation is similar to the economic under-performance of the U.S. Native Americans living on reservations.

¹³ Similar Aboriginal title is recognized in Australia, New Zealand and the U.S.

¹⁴ Section 35 of the 1982 Canadian Constitution states that “(1) The existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed. (3) For greater certainty, in subsection (1) *treaty rights* includes rights that now exist by way of land claims agreements or may be so acquired.”

¹⁵ In addition to these treaties, there are other legal instruments shaping the relation between the Government of Canada and Aboriginal peoples. These include self-government agreements, and specific claims. Specific claims deal with past grievances related to unfulfilled historic treaties obligations or mis-management of Aboriginal assets.

¹⁶ For instance, the Nisga'a treaty defines the boundaries of Nisga'a lands, specifies the types of land title, and delimit parks and ecological reserves. It defines who owns surface and underground minerals, water volumes, and forests; as well as access rights to Nisga'a and Crown lands, rights of ways, and access to water sources. It also specifies rules to allocate salmon fisheries and other designated species, and the scope of rights of Nisga'a citizens to harvest wildlife in their Aboriginal land. Similar provisions, although with different specifics, are found in all the other modern treaties. See AANDC (2009) for a profile of four typical modern treaties. The full text of all treaties is available at <http://www.aadnc-aandc.gc.ca/eng/1100100030583/1100100030584> (last accessed on November 20, 2012).

¹⁷ Some of these decisions are *R. v. Sparrow* (1990), *R. v. Gladstone* (1996) and *Delgamuukw v. British Columbia* (1997).

¹⁸ These institutional changes are important confounding factors that may affect the interpretation of the results. In Section 5 I discuss these issues in more detail.

¹⁹ There are other on-going institutional reforms partially addressing the issue of limited property rights on reserves, such as the “lawful possession” tenure system. Use of this tenure system is limited: only around 2.9% of reserve land is held as a lawful possession (Brinkhurst and Kessler, 2013). Similarly, recent institutional changes, such as bilateral agreements and the First Nations Land Management Act, offer alternative arrangements to First Nation communities to secure property rights over their Aboriginal and reserve land, respectively (Alcantara, 2008).

²⁰ The first transfer of former reserve land to private individuals (in fee simple) happened in the Nisga'a Nation in 2013 (CBC, 2013).

²¹ This restriction on land claims was eventually lifted in 1951.

treaties, however, do not fully address the issue of uncertain property rights in Aboriginal lands in Canada for several reasons. First, the process of treaty-making in the north-west parts of Canada was largely incomplete. For instance, most parts of British Columbia were not covered by any historic treaty.²² Second, some treaties did not fully capture the scope of Aboriginal rights as stated in the 1982 Constitution. This has led to the signing of new modern treaties clarifying claims over lands already included in previous historic treaties, such as Treaty 8 and 11. Finally, there were not historic treaties recognizing the rights of other Aboriginal populations, such as the Inuit and Métis.

Treaty making is still politically relevant, especially in resource-rich provinces. For instance, in British Columbia there are currently 111 First Nations bands, or 70% of its Aboriginal people, participating in the treaty process. Modern treaties are also being negotiated in other provinces, such as Manitoba, Saskatchewan, Nova Scotia, Ontario and Quebec.

Fig. 1 displays the geographical distribution of reserves held by treaty and non-treaty bands.²³ Note that treaty bands are clustered in Quebec, and north-western parts of Canada — such as British Columbia (BC), Yukon (YK), and Northwest Territories (NT) — that were largely ignored by historic treaties. Besides their geographical location, there are also two additional observations (not shown in the map) relevant for the empirical analysis. First, implementation of treaties in Quebec started before 1991. In contrast, implementation of treaties in the other provinces started in the period between 1991 and 2006. Second, all treaty bands are located in non-metropolitan, mostly rural, areas.²⁴ I take these observations into account when designing the empirical strategy and interpreting the results.

2.2. Analytical framework

Based on the previous discussion, the improvement in property rights associated to treaties can be analyzed as a reduction in transaction costs for extractive industries. This is an example of the Coase theorem: well-defined property rights can facilitate market transactions and improve economic efficiency. In this case, clarification of property rights may reduce the costs associated with public consultation, and facilitate the development of new extractive operations, such as mines.

A possible first order effect of the expansion of extractive activities is an increase in the demand for local labor. There might be, however, general equilibrium effects that would transmit the benefits to the rest of the community, even if they were not directly engaged in extractive industries. What are the general equilibrium effects of this shock on demand for local labor? A suitable analytical framework for studying these shocks to local labor markets, and how they propagate to the rest of the economy, is provided by Moretti (2011).

In this framework, there are competitive local economies that use labor to produce a tradable good. Workers are mobile so, in equilibrium, workers must be indifferent between different locations. They have, however, heterogeneous preferences over locations. These preferences define the degree of labor mobility and the supply of labor in a given location.²⁵ There is also a housing market. Demand for housing depends on city size, while its supply is exogenously given by geography and land use regulations.

²² The only historic treaties in British Columbia, Yukon and Northwest Territories are the so-called Douglas treaties (signed with some aboriginal communities around Fort Victoria, Fort Rupert and Nanaimo in Vancouver Island) and the numbered treaties, Treaty 8 and 11, that facilitated the settlement of the Mackenzie River Valley.

²³ I consider only treaties whose implementation started before 2006.

²⁴ In the sample, indicators of being rural or in a non-metropolitan area are perfectly correlated in the baseline year.

²⁵ If workers are indifferent between locations they become perfectly mobile. In contrast, if preferences over location are important, then workers would be less willing to move to arbitrage away real wage differences. In this latter case the supply of labor would be upward sloping.

The direct effect of the labor demand shock is to increase wages in the affected industries, i.e., extractive industries. To the extent that workers are substitutable between industries, this initial shock would also increase the wage of workers in the rest of the local economy. The increase in the local budget would increase the demand, and price, of housing and other non-tradable goods. In turn, these price changes would partially offset the increase in nominal wages.²⁶ Given an inelastic housing supply, the final effect on real wages depends on the degree of labor mobility.

The assumption on labor mobility is crucial. If workers were perfectly mobile (i.e., perfectly elastic supply), then real wages would not change. In contrast, if workers were less mobile (i.e., inelastic supply), the initial shock of demand would translate into an increase in real wages, and worker's real income.²⁷

In the case of First Nation communities studied in this paper, a plausible assumption is that labor mobility to and from Indian reserves is limited, and thus labor supply is not perfectly elastic.²⁸ There are at least three reasons that support this assumption. First, by design, the sample of Indian reserves used in this paper are located in remote areas outside commuting distance of cities. Second, there are several benefits that have on-reserve residency requirements. For instance, income and sale tax exemptions to registered Indians require income to be earned on reserve, and goods to be purchased on, or delivered to, a reserve. Finally, band membership is required to access key services, such as band housing, as well as to purchase private property on reserve.²⁹ This may create barriers for the immigration of non-Aboriginal population.

This simple analytical framework provides some guidance about the direct and indirect effects of strengthening property rights on a local economy. In particular, it suggests that, under plausible assumptions, the improvement in property rights associated to modern treaties would have a positive effect on house prices, wages, and workers' real income. This increase in income would benefit workers in extractive industries, but could also spread to other workers participating in the local labor market. I explore these empirical predictions in Section 6.

3. Methods

3.1. Data

The empirical analysis uses data on modern treaties, collected from the Aboriginal Affairs and Northern Development Canada (AANDC), and confidential micro-data from the Canadian Census.

3.1.1. Modern treaties

I focus only on modern treaties that: (1) were implemented by First Nations bands, (2) involved land claims, and (3) whose implementation started between 1991 and 2006.³⁰ This excludes treaties signed by other Aboriginal groups, such as Métis and Inuit, agreements that only dealt with self-government issues,³¹ treaties signed by bands in Quebec

²⁶ Note that the increase in house prices depend on the assumption of a non-perfectly elastic supply of housing.

²⁷ Existing evidence from the U.S., India and Brazil suggest that the barriers to spatial mobility of workers may be substantial (Kennan and Walker, 2011; Morten, 2013; Morten and Oliveira, 2014). Studies show that low mobility is particularly important among low-skilled workers (Bound and Holzer, 2000; Topel, 1986). Two possible explanations for this phenomenon are that low-skilled workers face greater barriers to mobility, or that they may be disproportionately compensated during labor demand shocks (Notowidigdo, 2013).

²⁸ In Section 6.3, I examine empirically the validity of this assumption.

²⁹ Band members can acquire exclusive rights of use over a property through a Certificate of Possession. These certificates can be transferred only to other band members. Non-band members can, however, rent or lease a property as long as it has a valid Certificate of Possession.

³⁰ This is due to the availability of comparable Census data.

³¹ These are the self-government agreements signed by the Sechelt and Westbank First Nations.

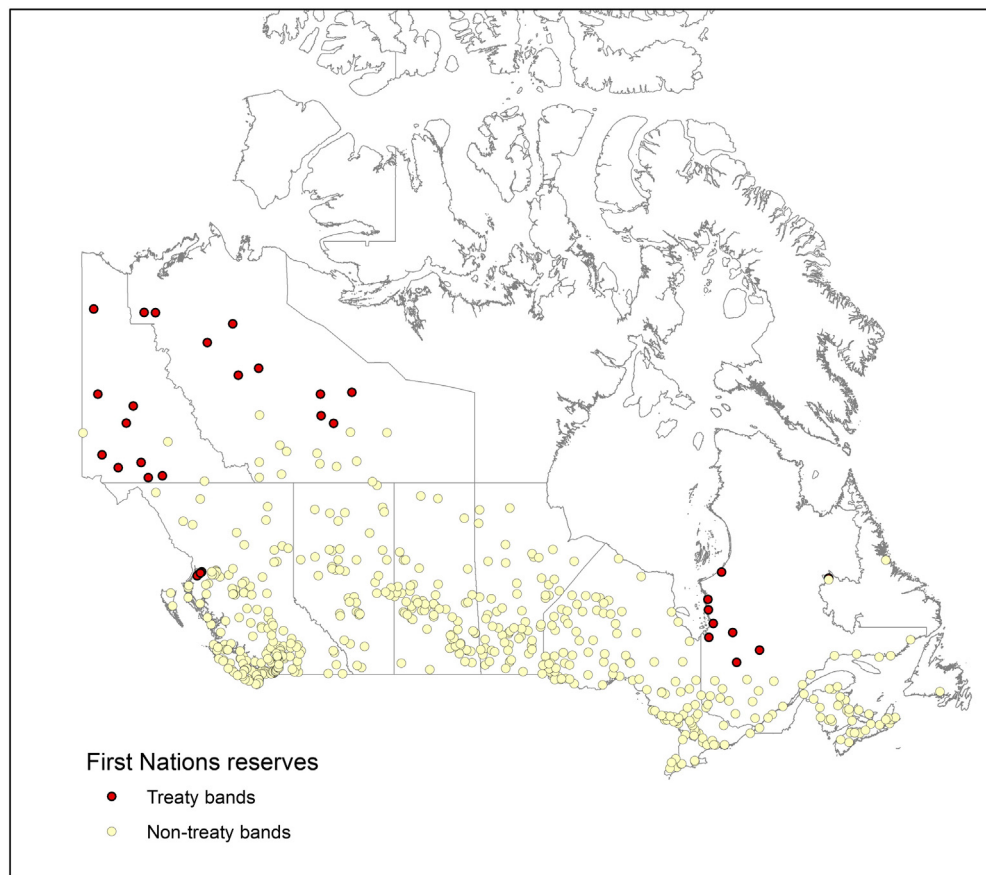


Fig 1. Map of reserves held by treaty and non-treaty bands.

(where implementation started before 1991), and treaties signed recently, such as the ones signed by Tsawwassen and Malnuuth First Nations. For each treaty, I obtain the list of signatory bands and the year when implementation started.³²

Table 1 presents the list of treaties used in this study, number of signatory bands, and two key characteristics, such as whether they include provision for self-government or eliminate Indian reserves.³³ The list includes 15 modern treaties implemented by 27 First Nation Bands. Note that a band can only sign one treaty. This is because a treaty is a final resolution of a band land claims. A treaty, however, can involve several signatory bands.

3.1.2. Census data

The empirical analysis uses micro-data from four rounds of the long-form Canadian Census (years 1991, 1996, 2001 and 2006). I use the confidential version available through the Research Data Centers program.

This version of the long-form Census contains detailed information, at household and individual level, on income and socio-economic characteristics for a representative sample of the population.³⁴ It also includes place of residency at the level of Census Sub-Division (CSD). A CSD is the general term for municipalities or areas equivalent to municipalities for statistical purposes, such as Indian reserves, Indian settlements and unorganized territories (Statistics Canada, 2012b). This geographical variable allows me to identify the population living on First Nation communities.

I focus only on individuals living on Indian reserves in three provinces and territories: British Columbia (BC), Yukon (YK), and Northwest Territories (NT). Note that I use the term Indian reserve broadly to refer to several types of CSDs affiliated to First Nation bands.³⁵ Furthermore, I restrict the sample to non-metropolitan areas.³⁶ This sample choice aims to make treaty and non-treaty bands more comparable. Recall that all bands that implemented treaties between 1991 and 2006 are located in non-metropolitan areas of these provinces and territories.

³² There are five main stages in the process of treaty negotiation. First, parties commit to the treaty negotiations signing a "Memorandum of Understanding". Second, parties agreed on a "Framework Agreement" that defines the issues to be discussed. Third, parties reach an "Agreement-in-Principle" that contains all the major elements of the final agreement, but it is not legally enforceable. Third, parties ratify the "Final Agreement". This is the main outcome of treaty negotiations. Finally, parties need to agree to an "Implementation Plan". This plan is a crucial element of the Final Agreement since it specifies what must be done to put the agreement in effect, assign parties responsible for each implementation activity, and describes when and how these activities will be done. All the information about treaties is available at AANDC (2013).

³³ More detailed information on treaty characteristics and signatory bands is available in Tables C.2 and C.1 in the online Appendix.

³⁴ Normally, the survey sample is 20% of the population. However, in the case of many Indian reserves and rural communities the whole population was surveyed. In contrast, the publicly available dataset (Public Use Micro Files – PUMF) has a smaller sample, just 2.7% of the population, and only includes geographical identifiers for large areas, such as provinces and metropolitan areas.

³⁵ I follow the definition of reserve population used by Statistics Canada. This includes population living on 6 types of CSDs affiliated to First Nation bands such as Indian reserves, Indian settlements, Indian government districts, Terres réservées aux Cris, Terres réservées aux Naskapis, and Nisga'a land (Statistics Canada, 2012b).

³⁶ A metropolitan area (or CMA) is composed by municipalities within commuting distance of a large urban center, i.e., with population of at least 100,000 of which at least 50,000 live in the urban core (Statistics Canada, 2012a).

Table 1
List of implemented modern treaties.

Id.	Treaty name	Prov.	Year implementation	Nr. of signatory bands	Self-gov. provision	Eliminate Indian reserves
1	Gwich'in Comprehensive Land Claim Agreement	NT	1992	4	No	Yes
2	Sahtu Dene and Métis Comprehensive Land Claim Agreement	NT	1994	4	No	Yes
3	First Nation of Nacho Nyak Dun Final Agreement	YK	1995	1	Yes	No
4	Vuntut Gwitchin First Nation Final Agreement	YK	1995	1	Yes	No
5	Teslin Tlingit Council Final Agreement	YK	1995	1	Yes	No
6	Champagne and Aishihik First Nations Final Agreement	YK	1995	1	Yes	No
7	Little Salmon/Carmacks First Nation Final Agreement	YK	1997	1	Yes	No
8	Selkirk First Nation Final Agreement	YK	1997	1	Yes	No
9	Tr'ondëk Hwëch'in Final	YK	1998	1	Yes	No
10	Nisga'a Final Agreement	BC	2000	4	Yes	Yes
11	Ta'an Kwach'an First Nation Final Agreement	YK	2002	1	Yes	No
12	Tlicho Agreement	NT	2003	4	Yes	Yes
13	Kluane First Nation Final Agreement	YK	2003	1	Yes	No
14	Carcross/Tagish First Nation Final Agreement	YK	2005	1	Yes	No
15	Kwanlin Dun First Nation Final Agreement	YK	2005	1	Yes	No

Note: BC: British Columbia, NT: Northwest Territories, YK: Yukon.

Source: AANDC (2013).

A main data challenge is to match individuals to First Nation bands over time.³⁷ To do so, I use geographical concordance and linkage tables from *Statistics Canada* (2012c) and AANDC.³⁸ These tables provide details of the changes of CSDs over time, and a mapping of bands to Indian reserves and CSDs. I use this information to identify which CSDs correspond to Indian reserves held by specific bands in the period 1991 to 2006.³⁹

A second issue is the incomplete enumeration of some Indian reserves that refused to participate in the Census. However, the magnitude of this issue is not significant and seems unlikely to affect the results. For instance, only around 2% of observations correspond to bands that have at least one incompletely enumerated reserve between 1991 and 2006. Moreover, the results remain basically unchanged when excluding these observations.

The final dataset is a repeated cross-section of individuals 15 years and older living on CSDs classified as Indian reserves in years 1991, 1996, 2001 and 2006. The sample represents a population of almost 115,000 individuals living on Indian reserves held by 158 First Nation bands. Note that the sample includes all individuals regardless of Indian status or band membership.

Table 2 presents the mean of the main variables used in the empirical analysis.⁴⁰ Note that due to the confidential nature of the dataset, I cannot report unweighted statistics – such as actual number of observations – and I round ratios and frequencies.

3.2. Empirical strategy

The aim of the empirical analysis is to explore the effect of modern treaties on real income, and other outcomes such as wages and housing costs, of individuals living on Indian reserves.

The main empirical challenge is to find a suitable counterfactual, i.e., what would have happened to individuals leaving in reserves held by treaty bands in the absence of a treaty. A simple cross-section comparison of bands with and without a treaty would be insufficient because there may be systematic differences between both groups that affect both treaty implementation and real income.

Some of these differences are observable. For instance, as discussed in Section 2.1, reserves held by treaty bands are located in non-

³⁷ I also checked the Census codebooks and re-define some variables to guarantee comparability over time.

³⁸ These tables are available upon request from AANDC's Statistical Office.

³⁹ I cannot reliably link CSDs to bands for previous year due to two data limitations. First, geographical concordance tables are only available since 1991. Second, the linkage tables from the AANDC are available only for 2001 and 2006. I do, however, use data from 1986 to evaluate pre-trends and check robustness of the results. For 1986, I simply extrapolate the mapping of First Nation Bands to CSDs of 1991.

⁴⁰ See Section A in the online Appendix for a detailed description of variables.

metropolitan areas in three provinces and territories in north-western parts of Canada. An analysis of determinants of treaty implementation highlights other differences, even between bands within these three regions. Using a cross-section of bands, I find that in 1991 treaty bands had lower income, larger population, and larger public and extractive sectors (see Table C.3 in the online Appendix).⁴¹ Other differences – such as degree of internal cohesion, potential for extractive industries, or quality of local institutions – are, however, unobservable.

I address this issue in several ways. First, I restrict the sample to reserves located in non-metropolitan areas in BC, YK, and NT. Second, I use a difference-in-difference (D-i-D) approach exploiting the timing of treaty implementation. This approach uses treaty implementation as a treatment, and compares the evolution of outcomes in reserves held by treaty bands relative to reserves held by non-treaty bands.

Finally, I check the robustness of the main results to using matching estimators developed by *Abadie and Imbens* (2002). These estimators match bands based on observable characteristics (including geographical coordinates) in 1991, before treaties were implemented.

Fig. 2 illustrates the basic idea behind the D-i-D strategy. It plots the unconditional mean of individual income in reserves held by treaty and non-treaty bands. Note that between 1986 and 1991 real income in both groups followed similar trends. However, since 1996 – after the beginning of treaty implementation – real income in treaty bands has increased at a faster rate. Under the assumption that economic outcomes would have followed the same trend in the absence of treaties, this difference in trends can be informative of the effect of modern treaties.

The observed similarity of trends before 1996 is a necessary condition for the validity of the D-i-D identifying assumption.⁴² Table C.4 in the online Appendix formally examines similarity of trends for real income and other key socio-economic characteristics available since 1986, before treaty implementation. This table displays the mean of key variables in 1986 and 1991 for individuals living on reserves held by treaty and non-treaty bands, and the p-values of the D-i-D estimate for each variable during this pre-treatment period. In all cases, there is not significant difference between treated and comparison group.⁴³

Note that under the identification assumptions, the D-i-D approach would address the problem of selection bias due to systematic differences between treaty and non-treaty bands. However, in the presence of heterogeneous effect of treaties, it does not guarantee estimation of the average treatment effect (ATE) but only of the average treatment

⁴¹ These results are obtained from a logit model using data aggregated at band-year level. The sample includes bands located in non-metropolitan areas in BC, YK and NT.

⁴² Figs. C.1, C.2, and C.3 in the online Appendix plot the evolution of other socio-economic variables, such as employment rates, participation rates, and share of high school graduates. In all these cases, trends before 1996 are similar between treaty and non-treaty bands.

⁴³ I also examine the similarity of pre-trends in Section 4.2.

Table 2
Mean of main variables.

Variables	Whole sample	Non-treaty bands	Treaty bands
<i>A. Band level</i>			
Treaty implemented	0.116	–	0.588
Is treaty band	0.197	–	1.000
Population	654.1	653.2	657.8
Urban	0.048	0.060	0.000
<i>B. Household level</i>			
Household size	3.2	3.2	3.4
Band population	654.1	653.2	657.8
Owns house	0.539	0.546	0.510
Dwelling needs major repair	0.311	0.318	0.286
Nr. rooms	5.6	5.7	5.1
House price	96,736.0	95,079.4	103,931.8
<i>C. Individual level</i>			
Nominal income	18,112.1	17,511.4	20,453.6
Real income	15,468.9	15,106.2	16,882.7
Share non-employment income	44.4	45.6	39.5
Age	40.9	41.0	40.4
Female	0.461	0.461	0.460
High school completed	0.498	0.497	0.501
Primary maintainer	0.471	0.475	0.454
Registered Indian	0.801	0.807	0.778
Band member	0.805	0.811	0.781
Lived in same CSD 5 years ago	0.824	0.824	0.821
Labor force	0.504	0.498	0.525
Employed	0.949	0.946	0.961
Hours worked (per week)	17.2	16.7	18.9
Real wage	12.2	11.9	13.1
<i>D. Industrial composition</i>			
Extractive industries	0.137	0.144	0.111
Trade	0.069	0.069	0.072
Public services	0.430	0.427	0.441
Non-public services	0.191	0.182	0.223
Nr. bands	158	137	21

Notes: Means are calculated using sampling weights and rounded due to confidentiality requirements. CAD = Canadian dollar. Samples include bands in non-metropolitan areas in BC, YK, and NT. Real values are measured in 1991 CAD. Panel D reports the share of workers employed in a given industry. The omitted category is manufacturing, construction, and other industries.

on the treated effect (ATT).⁴⁴ Thus, the D-i-D estimate would reflect the effect of treaties on treaty bands, but not on the average band. This is an important caveat that limits using these estimates to predict the effect of treaties in newer cases.⁴⁵

To formally implement the D-i-D approach, I estimate the following baseline regression:

$$y_{ijt} = \beta \text{treaty implemented}_{jt} + \gamma X_{ijt} + \delta W_{jt} + \rho_t + \eta_j + \epsilon_{ijt}, \quad (1)$$

⁴⁴ To see this, consider a simple Holland–Rubin framework applied to the D-i-D approach. There are two periods: before and after treaty implementation, denoted by $t = \{0, 1\}$. D_{jt} is an indicator of whether treaty implementation started in band j in period t . Assume an initial outcome value equal to γ_j , an additive time change λ , and heterogeneous impact of treaties, β_j . Note that both the initial outcome and the impact of treaties are different across bands.

The expected outcome for an individual i , y_{ijt} , can be written as:

$$E(y_{ijt}|t, D) = \gamma_j + \lambda t + \beta_j D_{jt}.$$

A simple cross section comparison of outcomes between treaty and non-treaty bands is: $E(y_{ijt}|t = 1, D = 1) - E(y_{ijt}|t = 1, D = 0) = E(\beta_j|D = 1) + E(\gamma_j|D = 1) - E(\gamma_j|D = 0)$. This estimate is potentially biased since the initial outcome values of both groups, $E(\gamma_j|D = 1)$ and $E(\gamma_j|D = 0)$, may be different.

In contrast, the D-i-D estimate is $E(\beta_j|D = 1)$. This estimate corresponds to the average treatment on the treated effect (ATT), i.e., the effect of treaties on treaty bands. However, in general, the ATT is not equal to the average effect of treaties, $E(\beta_j)$. This would happen only if treaty implementation is independent of the effect of treaties, i.e., there is no selection into treatment.

⁴⁵ If treaty bands are the ones that have most to gain from this reform, the estimated β may actually reflect an upper bound in the effect of treaties.

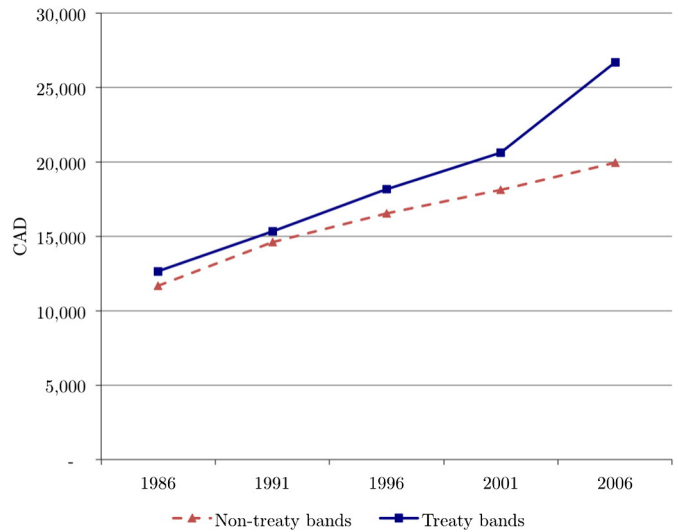


Fig. 2. Average individual income in treaty and non-treaty bands, by Census year.

where the unit of observation is individual i , living on reserves held by band j in year t . y_{ijt} is the outcome variable, such as real income, or house value. Some specifications also use other outcomes, such as real wages, hours worked, or employment status.

To obtain measures of real income and real wages, I deflate nominal values using a band-specific consumer price index (CPI). This local CPI allows for housing costs to vary across reserves held by different bands, and for non-housing prices to vary across provinces. The methodology to construct this index closely follows Moretti (2013).⁴⁶

The main regressor, *treaty implemented* _{jt} , is a dummy equal to one if by year t band j has already started implementing a treaty. The omitted category are non-treaty bands and bands that had not started implementing a treaty yet. In this specification, parameter β captures the effect of treaty implementation. All regressions include year (ρ_t) and band (η_j) fixed effects, as well as controls at individual, X_{ijt} , and band level W_{jt} .

The baseline regression uses sampling weights and clusters standard errors at band-by-year level (i.e., around 600 clusters). This clustering recognizes the level of variation of the regressor of interest (*treaty implemented* _{jt}) and addresses some potential spatial correlation. All the result tables, however, also report standard errors clustered at band, and province-by-year level.⁴⁷

I complement the D-i-D strategy with a matching approach. In particular, I check the robustness of the main results to using simple and bias-corrected matching estimators developed by Abadie and Imbens (2002). Intuitively, this approach estimates the effect of treaties by creating pairs of treaty and non-treaty bands that were similar in 1991, and then estimating the average difference in outcomes, i.e., real income in 2006.⁴⁸ I use the same sample as the main regression, i.e., bands located in non-metropolitan areas in BC, YK, and NT, and micro-data aggregated at band-year level.

Matching is based on a set of socio-demographic characteristics in the pre-treatment period, 1991. These characteristics include: geographical coordinates, real income, population size, industrial composition, participation rate, education, etc. Following Imbens (2014), I calculate normalized differences to assess how different these baseline

⁴⁶ See Section B in the online Appendix for further details on constructing the CPI.

⁴⁷ Note that this last clustering may suffer from small-sample bias since there are only 12 clusters.

⁴⁸ I refer the reader to Abadie and Imbens (2002) for further details. The estimator uses nearest neighbour matching with replacement. The routine is implemented in Stata using the NNMATCH package (Abadie et al., 2004). I use the default package options except when estimating standard errors. In that case, I estimate heteroscedasticity-consistent standard errors using one match.

characteristics are between treated and control groups.⁴⁹ These differences are quite large for some variables, such as latitude, longitude, population, and share of registered Indians. I choose variables with large normalized differences (absolute value above 0.4) as the preferred set of matching variables. I also report results with matching based on all baseline characteristics, and a propensity score.⁵⁰

Table 3 displays the normalized differences of baseline characteristics before and after matching, as well as the estimated propensity score. Matching reduces differences in geographical coordinates, income, population, share of registered Indians, and participation rates. Results in terms of industrial composition are mixed, but there is a sizeable increase in the propensity score of the control group.

4. Main results

4.1. Effect on real income

Table 4 reports the main results. Column 1 in Panel A shows the estimates from the preferred specification. This specification implements the baseline model, Eq. (1), and uses the sample of individuals living on reserves in non-metropolitan areas in BC, YK, and NT. Columns 2 and 3 add province-specific trends and province-by-year fixed effects. These specifications are quite demanding, given the small within-province variation in treaty implementation, but account for possible confounding factors at province level. Panel B restricts the sample to bands in non-metropolitan areas in two provinces – Yukon and Northwest Territories – where most of modern treaties were implemented; while panel C uses data aggregated at band-by-year level.

The relation between treaty implementation and real income is positive and significant.⁵¹ This relation remains significant when clustering standard errors at band and province-by-year level. Under the assumption that the evolution of income would have been similar in treaty and non-treaty bands in the absence of treaties, we can interpret these results as evidence of a positive effect of treaties on real income. The magnitude of the effect is economically significant. A conservative estimate suggests that treaty implementation increases real income by around 13%.

The estimated regressions control for all time-invariant band characteristics – such as location, historical background, or initial differences – as well as for common time variation. A main concern, however, is that there may be time-varying confounding factors correlated to income differences and treaty implementation.

I partially address these concerns in several ways. First, I check the robustness of the results to inclusion of province-specific trends and province-by-year fixed effects (columns 2 and 3). Second, I try to make treaty and non-treaty bands more comparable by restricting the sample to bands in non-metropolitan areas in three provinces (BC, YK, and NT). Regressions with an even narrower sample (in Panel B) produce similar results. This solution may fail, however, to reduce systematic differences between treaty bands and its comparison group. For that reason, I also check the robustness of the results to using matching estimators. As discussed before, these estimators estimate the effect of treaties by comparing treaty bands to non-treaty bands that were similar in the baseline year, 1991.

Table 5 shows the results using simple and bias-adjusted matching estimators. These results use data aggregated at band level. The outcome is ln(real income) in 2006 and the matching variables are measured using data for 1991. Matching is based on a different set of variables (columns 1 and 2) and the propensity score (column 3).

⁴⁹ The normalized difference of variable X is $\frac{\bar{X}_t - \bar{X}_c}{\sqrt{(S_{X,t}^2 + S_{X,c}^2)/2}}$ where t and c stand for treated and control group, while \bar{X}_k and $S_{X,k}^2$ are the sample mean and variance of X for group $k \in t, c$.

⁵⁰ This propensity score is obtained from the logit model used to explore determinants of treaty implementation (see Table C.3 in the online Appendix).

⁵¹ Note that these results are in real terms, i.e., above any increase in local prices that may be associated to treaty implementation.

Table 3
Normalized differences of baseline characteristics.

Variable	Before matching	After matching based on:		
	(1)	Selected variables (2)	All variables (3)	p-score (4)
Longitude	−0.951	−0.376	−0.418	0.134
Latitude	2.365	0.726	0.637	0.352
ln(real income)	−0.431	0.224	0.166	−0.262
ln(band population)	0.582	0.052	0.113	−0.115
% workers in extractive ind.	−0.186	−0.457	−1.112	−1.625
% workers in manuf., and others	−0.227	−0.112	0.307	0.010
% workers in trade	−0.11	−0.125	−0.069	0.984
% workers in public services	0.371	−0.396	−0.385	−0.120
% worker sin non-public services	−0.064	0.698	0.967	0.680
Age	0.055	−0.306	−0.048	−0.045
Household size	0.251	0.468	0.294	0.653
% female	0.148	0.284	0.067	0.105
% high school completed	0.316	0.052	0.308	0.320
% registered Indians	−0.605	0.154	−0.144	−0.292
% lived in same CSD 5 years ago	−0.175	0.395	0.313	0.155
Participation rate	0.582	0.034	0.025	−0.200
<i>Estimated p-score</i>				
Treated group	0.831	0.831	0.831	0.831
Control group	0.029	0.241	0.346	0.833

Similar to the D-i-D estimates, matching estimation suggests that treaty implementation is associated to greater real income. The magnitude of the increment, around 25%, is also comparable to the baseline results.

A related identification issue is whether the timing of treaty implementation is endogenous. A main concern is that completion of treaty negotiations (or beginning of its implementation) are correlated to some factors that also affect the trend of economic development. For instance, influential band leaders may be more able to complete treaty negotiations and also implement policies or reforms that foster economic growth. Similarly, treaties may be more likely to be completed during economic booms. Failing to account for these factors may confound the effect of treaties.

Due to data limitations, I am unable to completely rule this out. A review of factors that affect the outcome of treaty negotiation suggests,

Table 4
Treaties and real income, D-i-D estimates.

	(1)	(2)	(3)	Nr. Obs.
A. Micro-data, sample = BC, NT and YK	0.348 (0.099)*** [0.124]*** [0.128]**	0.185 (0.073)** [0.086]** [0.086]*	0.157 (0.079)** [0.092]* {0.095}	115,905
B. Micro-data, sample = NT and YK	0.134 (0.112) [0.125] {0.122}	0.196 (0.100)* [0.113]* {0.101}*	0.225 (0.101)** [0.113]* {0.091}**	37,350
C. Aggreg. at band-year level, sample = BC, NT and YK	0.393 [0.099]***	0.189 [0.089]**	0.17 [0.092]*	567
Specification	Baseline	Adding prov. specific trends	Adding prov.-year FE	

Notes: Robust standard errors clustered at band-year level in parentheses. Robust standard errors clustered at band level in brackets, and clustered at province-year level in braces. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. Outcome variable is ln(real income). All regressions include band and year fixed effects, and a set of covariates such as: age, age², gender, Indian status, indicators of education level, indicator of being principal maintainer, indicators of employment status, and household size. Column 2 adds province specific trends and column 3 includes province-year fixed effects. Panels A and B use micro-data at individual level and report the weighted, and rounded, number of observations. Panel C uses data aggregated at band-year level and reports the actual number of observations. BC: British Columbia, NT: Northwest Territories, YK: Yukon.

Table 5
Treaties and real income, matching estimates.

	(1)	(2)	(3)	Nr. obs.
A. Simple	0.246 (0.088)***	0.264 (0.078)***	0.284 (0.147)*	142
B. Bias-adjusted	0.370 (0.088)***	0.435 (0.078)***	0.263 (0.147)*	142
Matching based on:	Selected variables	All variables	p-score	

Notes: Heteroscedasticity-consistent standard errors in parentheses. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. Results obtained using nearest-neighbor matching estimators developed by *abadie2002simple*. Number of treated units is 21. See Section 3.2 for list of matching variables and details on matching procedure.

however, that this identification concern might not be very important. Existing qualitative studies suggest that the main factors for failing to complete a treaty include: lack of political will from provincial and federal governments, differences in governmental and Aboriginal world-views and goals, confrontational negotiation tactics, internal divisions in Aboriginal groups, and negative perception of Aboriginal groups (Alcantara, 2007a, 2008, 2013). To the extent that these factors are time-invariant or related to broader (i.e., provincial or national) circumstances, they are already controlled for by the set of band, year, and province-by-year fixed effects.

4.2. Exploring dynamic effects

A relevant question is when the effect of treaty on real income occurs. There could be a lag in the effect if, for instance, the institutional changes require some time to mature or to be implemented. The effect could also occur before implementation if local markets change in anticipation to the institutional reform, or if treaty and non-treaty bands follow different growth paths. This last case is relevant since it would shed doubts on the validity of the identification assumption

To explore these issues, I extend the baseline regression (1) by including lags and forwards of *treaty implemented*. In particular I estimate the model:

$$y_{ijt} = \sum_k \beta_k \text{treaty implemented}_{j,t+k} + \gamma X_{ijt} + \delta W_{jt} + \rho_t + \eta_j + \epsilon_{ijt}, \quad (2)$$

where *k* is a time period relative to the beginning of treaty implementation. Due to data limitations, I define *k* as a range of years before or after treaty implementation.⁵² Using this notation, *treaty implemented*_{*j,t+k*} represents a dummy equal to 1 if we observe a treaty band *k* years from the beginning of treaty implementation, and 0 otherwise. The parameters of interest are β_k which capture the difference between treaty and non-treaty bands in periods before and after treaty implementation, relative to an initial period.⁵³

Fig. 3 presents the estimates of β_k and their 95% confidence interval.⁵⁴ There are two relevant observations. First, there is no significant difference between treaty and non-treaty bands before the beginning of treaty implementation. This similarity of pre-trends increases confidence on the validity of the identification assumption. Moreover, it rules out possible changes in economic conditions in anticipation of treaty implementation. Second the effect of treaties seems to increase over time. In the first year after the beginning of treaty implementation, the effect is insignificant. From year 2 onwards, however, the magnitude of the effect increases. This finding is consistent with the gradual implementation of treaties.

⁵² These periods are: -5 to -1, 0 to 1, 2 to 3, 4 to 6, 7 to 11, and 12 and more. Thus, *k* = (-1 to -5) means a period 1 to 5 years before the beginning of treaty implementation.

⁵³ Given the definition of *k*, this initial period corresponds to 6 and more years before treaty implementation.

⁵⁴ These estimates are also displayed in Table C.5 in the online Appendix.

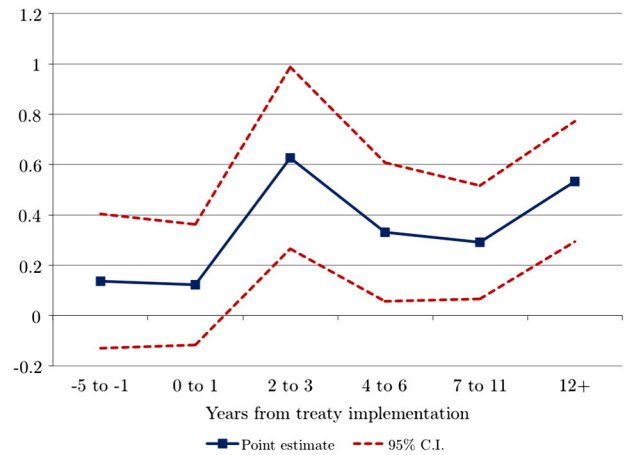


Fig. 3. Effect of treaty on real household income, by period. Note: figure displays estimates of β_k from Eq. (2). The omitted category is a period 6 years and more before treaty implementation.

5. Alternative explanations

The previous results yield support to the hypothesis that treaties have a positive effect on real income. This paper argues that this effect is driven by changes in property rights associated to modern treaties.

There are, however, at least two alternative explanations for the observed results. First, treaties involve other institutional changes in First Nations communities. They are usually accompanied by financial compensation, increased participation of local governments on land management, and even self-government provisions that devolve local responsibilities to tribal councils.⁵⁵ The presence of these confounding institutional changes would not alter the main finding of a positive impact of treaties on income, but would affect the interpretation of the results.

Second, despite the limited labor mobility discussed in Section 2.2, the institutional and economic changes associated to treaties may have attracted (or reduced emigration of) more productive workers. In that case, the results would just reflect compositional effects, not an increase in real income. In this section, I explore the relevance of these two alternative explanations.

5.1. Confounding institutional changes

The confounding institutional changes associated to treaties suggest several alternative channels for treaties to affect income. First, financial compensation associated to treaties may increase governmental transfers to local residents. This would mechanically translate into an increase in real income. Second, the devolution of responsibilities (either through participation in land management or self-government) could expand public spending (and employment) or improve provision of public goods.

5.1.1. Financial compensation

I explore the role of financial compensation in two steps. First, I replicate the baseline results splitting the sample between band and non-band members. This distinction is relevant because band membership is required to receive band money and access other band benefits, such as band housing. Band membership is also required to participate in the election of the tribal council.⁵⁶ Columns 1 and 2 in Table 6 display the results. If the results were mechanically driven by distribution of

⁵⁵ Some treaties also include provisions to eliminate Indian reserves and transform them into private land, but these provisions were not implemented during the period of analysis. The first case of privatization of reserve land occurred in Nisga'a lands in 2013.

⁵⁶ Access to federal programs, such as income support, requires having Indian status. The baseline regressions already control for this variable. Moreover, the results are similar splitting the sample by Indian status. Note that having Indian status does not automatically guarantee band membership.

Table 6
Treaties and real income, examining confounding institutional changes.

	A. Financial compensation			B. Expansion of public sector			C. Self-gov.
	ln(real income)	ln(real income)	Share of non-employ. income	ln(real income)	ln(real income)	Works in public sector	ln(real income)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treaty implemented	0.112 (0.061)* [0.079] {0.056}*	0.433 (0.119)*** [0.151]*** {0.158}**	−1.762 (0.961)* [1.243] {0.805}*	−0.042 (0.046) [0.041] {0.047}	0.534 (0.147)*** [0.183]*** {0.174}**	−0.042 (0.018)** [0.019]** {0.024}	0.740 (0.124)*** [0.148]*** {0.169}*** −0.522 (0.177)*** [0.224]*** {0.189}***
Self-government agreement implemented							
Sample	Non-band members	Band members		Public workers	Non-public workers	All workers	
Weighted nr. of obs.	22,590	93,315	115,755	40,310	75,595	60,005	115,905
R-squared	0.340	0.296	0.437	0.390	0.314	0.219	0.331

Notes: Robust standard errors clustered at band-year level in parentheses. Robust standard errors clustered at band level in brackets, and clustered at province-year level in braces. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. The set of controls and sample definition is similar to the baseline regression (column 1, panel A, in Table 4), except for column 6 which includes only workers. Difference in sample size between column 3 and baseline results is due to exclusion of cases with negative income. Column 1 includes all individuals not enrolled as band members in any band. This includes Indians without band membership as well as people without Indian status.

band resources, we would expect that income increases only among band members. The effect of treaties on real income is, however, positive for both types of individuals.⁵⁷

Second, I examine the effect of treaties on the share of non-employment income. This category of income accounts for around 44.4% of total income and includes government transfers, unemployment benefits, and income from other sources, such as pensions, income supplements, payment from retraining programs, etc.⁵⁸ Note that transfers associate to treaty money or federal programs would be recorded as non-employment income. Column 3 in Table 6 shows the results. Treaty implementation is associated to a slight reduction in the share of non-employment income, i.e., an increase in the relative importance of wages and salaries. Together, these findings weaken the argument that the increase in real income was entirely driven by financial compensation associated to treaties.

5.1.2. Expansion of public sector, and self-governance

To assess the importance of changes in the public sector as an alternative explanation, I first explore the effect of treaties on income of public workers, and public employment. To do so, I replicate the baseline regression splitting the sample between public and non-public workers. Then, I examine the effect of treaties on the likelihood of being a public worker.⁵⁹ The results suggest that treaties only had a positive effect on real income among non-public workers (columns 4 and 5 in Table 6). Moreover, workers' likelihood of working in the public sector decreases. This is the opposite of what we could expect if the baseline results were driven by an expansion of the local public sector.⁶⁰

Second, I examine whether the effect of treaties on income is driven by the inclusion of self-government agreements. This is an important institutional change usually associated to treaties.⁶¹ To examine the role of self-governance, I add to the baseline regression an indicator of

having started implementation of a self-government agreement (*self-government implemented*). This variable is not perfectly correlated to *treaty implemented* because not all treaties include self-government provisions, and there are some cases of self-government agreements without treaties. Column 7 in Table 6 displays the results. Real income seems to decline after implementation of a self-government agreement. However, the relation between treaties and real income remains positive and significant. I interpret this result as evidence that the positive relation between treaties and real income is not driven by self-government agreements.

5.2. Compositional changes

A second relevant concern is the possible change in composition of local population. This may happen, for instance, in the presence of selective migration.

I explore this alternative explanation by examining whether treaties are associated to changes in observable characteristics of the population.⁶² To do so, I estimate the baseline Eq. (1) using population characteristics as outcome variables. I use measures of (1) population demographics, such as gender, age and household size, (2) education (i.e., an indicator of having completed high school), (3) migration (i.e., indicators of whether the individual lived in a different CSD or address 5 years ago), and (4) band membership.

Table 7 presents the results. Note that treaty implementation is associated to an increase in band membership. This change is expected given the (potential) increase in benefits associated to band membership, such as access to band transfers and assets. Treaties are also associated to an increase in the measure of education. The magnitude of the change is, however, too small to fully explain the observed increase in real income.⁶³

6. Exploring the mechanism

The previous results suggest that treaties increase real income, mostly from employment sources. A relevant question is: why would

⁵⁷ Note that some band membership may give other, non-government related, advantages. Some impact-benefit agreements with mining companies, for instance, have provisions to prioritize employment of band members.

⁵⁸ In contrast, employment income includes only wages and salaries.

⁵⁹ I classify an individual as a public worker if she works in any of the following industry divisions: government services, education, or health and social services. The results are similar using a narrower definition of public workers, i.e., workers in government services. Industry divisions are classified according to the Standard Industrial Classification (SIC) 1980.

⁶⁰ A possible explanation for the lack of increase in income of public workers is that their wages are set at national or regional level, not in local markets.

⁶¹ Almost all treaties include self-government provisions. However, self-government agreements can be signed without treaties.

⁶² In addition, I check the robustness of the baseline results on real income using a sample of less mobile population, i.e., individuals who lived in the same CSD or address 5 year ago (see Table C.7 in the online Appendix). The increase of real income in this population is less likely to be driven by selective migration.

⁶³ A back of the envelope calculation suggests that for this to happen the differences of average income between workers with and without complete high school should be more than 4 times the average income. This is not observed in the data.

Table 7
Treaties and population characteristics.

	Female	Age	House-hold size	High school completed	Lived in diff. CSD 5 years ago	Lived in diff. address 5 years ago	Band member
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treaty implemented	−0.006 (0.005) [0.006] {0.005}	−0.165 (0.269) [0.384] {0.324}	−0.025 (0.062) [0.070] {0.093}	0.028 (0.011)** [0.013]** {0.012}**	0.010 (0.013) [0.016] {0.017}	−0.019 (0.016) [0.020] {0.015}	0.039 (0.018)** [0.018]** {0.025}
Weighted nr. of obs.	115,905	115,905	54,545	115,905	115,715	115,715	115,905
R-squared	0.003	0.039	0.094	0.079	0.035	0.049	0.311

Notes: Robust standard errors clustered at band-year level in parentheses. Robust standard errors clustered at band level in brackets, and clustered at province-year level in braces. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. All regressions include band and year fixed effects. The sample is similar to the baseline regression (column 1, panel A, in Table 4), except for column 3 which uses a sample of households.

employment income increase? To examine this question, I use the analytical framework discussed in Section 2.2.

In this framework, I treat treaties as a reduction in transaction costs that facilitate development of extractive activities, such as mining. In turn this can generate a positive shock to the demand of local labor. A direct effect of this shock is to increase wage, and income, of households working in extractive industries. This local demand shock would spread to the rest of the local economy, not directly engaged in extractive activities, via increases in wages and prices of non-tradables, such as housing. To the extent that labor and housing supply are not perfectly elastic, these changes would increase workers' real income.

I evaluate these predictions in four steps. First, I explore whether treaties are indeed associated to an increase in contracts that facilitate development of extractive activities. This can be indicative of reduction of transaction costs. Second, I examine whether the effect of treaties on income spread to workers in other industries. Third, I study the effect of treaties on employment and local prices. Finally, I explore possible geographical spillovers to neighboring communities. In particular, I examine whether treaties have affected economic outcomes in populations living *outside* Indian reserves but within commuting distance.

6.1. Do treaties reduce transaction costs? Treaties and mining agreements

Ideally, we would like to evaluate how treaties affect a measure of transaction costs faced by extractive industries, such as number of days to obtain a license or monetary cost of public consultations. Unfortunately, this information is unavailable. Instead, I examine the effect of treaties on contracts made between Aboriginal populations and mining companies.⁶⁴

These contracts, called mining agreements, are usually signed to facilitate the exploration or development of new mining operations (Natural Resources Canada, 2013). They specify the obligations of each party regarding mitigation actions, as well as the benefits to the local community (such as employment opportunities, training, or revenue-sharing). These agreements are negotiated in almost all new mining projects in Canada and are regarded as a best practice by the mining industry (Sosa et al., 2001). They arise as a response to the duty to consult with Aboriginal people that may be affected by mining projects in or

near their traditional lands. Importantly, they do not replace treaties: mining agreements are signed by bands with and without treaties. The number of mining agreements has steadily increased since mid 1990s, especially among treaty-bands (see Fig. C.4 in the online Appendix). In 2012, there were 280 mining agreements which involved around 24% of First Nations bands.

Mining agreements provide a way to examine whether treaties have facilitated economic transactions over natural resources. In this case, the contract is between a mining company and a First Nation community.⁶⁵ To do so, I construct a panel dataset of First Nations bands with annual observations for the period 1988–2012, and estimate the following regression⁶⁶:

$$mining\ agreement_{jt} = \phi treaty\ implemented_{jt} + \rho_t + \delta_j + \mu_{jt}, \quad (3)$$

where the unit of observation is band j in year t . $mining\ agreement_{jt}$ is the number of mining agreements signed by the band up to year t , and $treaty\ implemented_{jt}$ is an indicator of whether the band has started implementing a treaty. This specification includes band and year fixed effects, and cluster standard errors at band level to account for possible serial correlation. Note that this specification exploits within-band variation, hence it already controls for time-invariant band characteristics, such as location or initial mining potential.

Table 8 presents the results. Similar to the baseline regressions, column 1 restricts the sample to bands in British Columbia, Yukon and Northwest Territories. Column 2 focuses only on treaty bands, i.e., bands that started implementing a treaty between 1988 and 2002, while column 3 extends the sample to all bands in Canada. In all cases, treaty implementation is associated to a significant increase in the number of mining agreements. The most conservative estimate suggests an increase of 0.185, or almost 1.5 times the national average.⁶⁷

Taken together, these results support the hypothesis that treaties may have facilitated contracts related to natural resources, and the development of extractive industries. A main caveat is, however, that they are only informative about the effect on mining, not about other important extractive industries, such as a logging, fishing or trapping.

⁶⁴ I focus on mining, instead of other extractive activities, due to data limitations. Note that in the area of study, oil and gas production are not very important. For instance, the majority of workers in category "mining quarry and oil" works in mining. Most oil and gas production is concentrated in Alberta, with some production in north-eastern parts of British Columbia, and other provinces such as Saskatchewan and Newfoundland. Among the bands studied in this paper, logging, fishing and trapping are the most important extractive activities in terms of employment and income shares (see Table C.6 in the online Appendix). For instance, in 1991 logging employed 7% of the labor force, or roughly half of all workers in extractive industries. Mining has experienced, however, faster growth. Between 1991 and 2006, the employment share of mining increased from 1.5 to 1.7 while income share almost doubled from 1.5% to 2.9% of total income. In contrast, other extractive activities experienced a relative decline.

⁶⁵ This relies on the assumption that mining agreements are more likely to occur when transaction costs are lower.

⁶⁶ Data on mining agreements was obtained from Natural Resources Canada (2013).

⁶⁷ I also estimate Eq. (3) including lags and forward values of $treaty\ implemented_{jt}$. In particular, I estimate:

$$mining\ agreement_{jt} = \sum_{k=-5, -3, 0, 3, 5, 7} \phi_k treaty\ implemented_{jt+k} + \rho_t + \delta_j + \mu_{jt}.$$

This specification allows me to explore when treaty implementation affects mining agreements. The estimates of ϕ_k are displayed graphically in Fig. C.5 in the online Appendix. They suggest that mining agreements increase *after* treaties are implemented.

Table 8
Treaties and mining agreements.

	Nr. active mining agreements		
	(1)	(2)	(3)
Treaty implemented	0.413 (0.134)***	0.185 (0.085)**	0.402 (0.121)***
Sample	All bands in BC, NT, and YK	Treaty bands	All bands in Canada
Mean outcome var.	0.164	0.519	0.123
Nr. Bands	243	29	634
Observations	5832	696	15,216
R-squared	0.123	0.288	0.121

Notes: Robust standard errors in parentheses. Standard errors are clustered at band level. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. All regressions include band and year fixed effects.

6.2. Effect on income by industry

I then examine whether the increase in income is circumscribed to workers in extractive industries, or whether it spreads to workers in other industries. To do so, I split the sample of workers by main industry of occupation. The industry classification is based on industry divisions from the SIC 1980.⁶⁸ I group these industry divisions into fewer groups, but the results are similar using a finer disaggregation.⁶⁹ Then, I replicate the baseline regression (1) using real income as outcome variable.

Table 9 displays the results. Note that real income increases for workers in extractive industries, but also for workers in other industries not directly engaged in extractive activities, such as non-public services, trade, and manufacturing.

Taken together, these results suggest that the initial effect of treaties spreads among the whole local economy. This is consistent with the spillover effects from a positive shock to the local demand for labor in presence of a relatively inelastic labor supply. However, to further explore this interpretation, we also need to examine what happens with local employment and prices.

6.3. Effect on employment and local prices

The analytical framework suggests that, if labor is inelastically supplied, then an increase in local demand of labor would translate into an increase in real wages, and worker's income. In addition, the price of inelastically supplied non-tradable goods, such as housing, would also increase due to the expansion of the local budget constraint.

To explore this prediction, I first examine the relation between treaties and labor outcomes. I use several indicators of labor supply in the extensive and intensive margin, such as population size, participation rates, employment rates, and number of hours worked.⁷⁰ Table 10 displays the results. Column 1 uses data aggregated at band level, while columns 2 to 4 use micro data at individual level. In all cases, however, the relation is not significantly different than zero. This evidence is consistent with low labor mobility and yields support to the assumption that treaties have not significantly affected local labor supply.

Second, I examine the relation between treaties and local prices (see Table 10). Columns 5 and 6 explore the effect of treaties on real wages for both public and non-public workers. This specification controls for

⁶⁸ Note that the 2006 Census used the NAICS classification, while previous Censuses used the SIC 1980. I use data from the 2001 Census (which reported both NAIC and SIC 1980) to construct concordance tables between both classification systems.

⁶⁹ I group industry divisions in five groups: (1) extractive industries (such as mining, logging, agriculture and fishing) (3) manufacturing and others (such as construction, transportation and communication, and utilities), (4) trade (retail and wholesale), (5) public services (i.e., government services, education, health and social services) and (6) non-public services, which include the rest of service industries.

⁷⁰ Note that in Moretti (2011)'s original model, labor supply changes only due to migration. This would imply changes in population size.

Table 9
Treaties and real income, by industry.

	ln(real income)				
	(1)	(2)	(3)	(4)	(5)
Treaty implemented	0.345 (0.116)*** [0.168]** {0.121}**	0.188 (0.081)** [0.097]* {0.079}**	0.165 (0.088)* [0.113] {0.100}	-0.042 (0.046) [0.041] {0.047}	0.208 (0.090)** [0.106]* {0.108}*
Industry	Extractive industries	Manufacturing and others	Trade	Public services	Non-public services
Weighted nr. of obs.	12,870	16,155	6505	40,310	17,875
R-squared	0.245	0.268	0.313	0.390	0.354

Notes: Robust standard errors clustered at band-year level in parentheses. Robust standard errors clustered at band level in brackets, and clustered at province-year level in braces. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. The set of controls and sample is similar to the baseline regression (column 1, panel A, in Table 4). See main text for definition of industry groups.

workers characteristics — such as education, age, gender, and industry of occupation. Columns 7 and 8 estimate hedonic regressions using self-reported house values and monthly gross rents.⁷¹ Note that these measures of prices are in nominal terms.

The evidence suggests that treaties increase housing costs and real wages, except for public workers. This change in local prices is consistent with the general equilibrium effects of a positive shock to a local economy. Moreover, they shed light on the mechanism linking this positive shock to an increase in real income.

6.4. Geographical spillovers

I interpret the previous results as evidence that treaties have created a local positive shock on demand for local labor. So far I have assumed that local labor markets correspond to Indian reserves. Local labor markets, however, may be larger and extend to areas outside Indian reserves. If that is the case, then neighboring *off-reserve* communities may also be affected by treaties. In this sub-section, I explore this possible geographical spillover.

To do so, I identify a sample of people living outside Indian reserves hold by treaty bands but within commuting distance.⁷² In particular, I select all individuals living in Census Sub-Divisions (CSDs) with at least some part within 10 km of the boundary of an Indian reserve held by a treaty band.⁷³ Then, I replicate the baseline results on income and prices using this new dataset. The main difference is that I include CSD fixed effects instead of band fixed effects and cluster the errors at CSD-by-year level instead of band-by-year level.

Table 11 presents the results. These results suggest that treaties also increase real income and real wages in neighboring communities.⁷⁴ Moreover, the increase in real income is driven mostly by workers in extractive industries and non-public services. These results are similar to the ones documented for populations living on Indian reserves. The main difference is that there is no increase on housing costs.⁷⁵

⁷¹ I also examine the relation between treaties and housing conditions (see Table C.8 in the online Appendix). Similar to labor supply, there is not a significant effect of treaties on housing outcomes.

⁷² In 2001, the average commuting distance for individuals living within 50 km of an Indian reserve was 11.2 km. The average commuting distance for all individuals in provinces and territories with at least one treaty band was very similar, 11.8 km.

⁷³ Ideally I should focus on individuals whose residence is within commuting distance of reserves. Data on geographical location, however, is only available at the Census Sub-Division level. Given the large size of CSDs outside Indian reserves, this data limitation may introduce measurement error since I will include individuals that actually are outside the local labor market.

⁷⁴ Table C.9 in the online Appendix reports additional results on population size and migration (i.e., indicators of living in a different CSD 5 years ago). The results are positive (suggesting population growth and immigration) but statistically insignificant.

⁷⁵ This last result may reflect a more elastic supply of housing outside Indian reserves.

Table 10
Treaties, local employment, and local prices.

	A. Local employment				B. Local prices			
	ln(band pop.)	Labor force	Employed	ln(hours work)	ln(real wage)	ln(real wage)	ln(house price)	ln(rent)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treaty implemented	-0.038	0.001	-0.004	-0.026	0.133	-0.087	0.348	0.130
	[0.043]	(0.011)	(0.007)	(0.016)	(0.055)**	(0.053)	(0.084)***	(0.054)**
		{0.009}	{0.008}	{0.013}*	{0.063}**	{0.060}	{0.095}***	{0.061}**
					{0.044}**	{0.047}*	{0.057}***	{0.047}**
Sample	CSDs	Indiv. age 15 +	Labor force	All workers	Non-public workers	Public workers	Home owners	Tenants
Weighted nr. of obs.	567	135,770	63,200	57,925	28,050	19,670	31,095	14,200
R-squared	0.141	0.212	0.033	0.088	0.201	0.219	0.259	0.368

Notes: Robust standard errors clustered at band-year level in parentheses. Robust standard errors clustered at band level in brackets, and clustered at province-year level in braces. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. All regressions include band and year fixed effects, and include only bands in non-metropolitan areas in BC, NT, and YK. Column 1 uses data aggregated at band level, and does not include any additional control variable. The weight for each observation is equal to one. Column 2 to 3 includes as controls: age and its square, gender, Indian status, indicators of education level, indicator of being principal maintainer, and household size. Column 4 also adds an indicator of being employed. Columns 5 and 6 include as controls: age and its square, gender, Indian status, indicators of education level, indicator of being principal maintainer, household size, industry dummies, indicator of being employed, and indicators of labor force activity. Columns 7 and 8 include as controls: number of rooms and its square, indicators of need for repairs, indicator of urban area, log of band population, and home owner's Indian status and educational attainment.

Importantly, they are consistent with the presence of geographical spillovers expected from localized demand shocks.

7. Final remarks

This paper studies the local economic effects of First Nations modern treaties, an important institutional reform that clarified ownership over lands and resources near Aboriginal communities. I find robust evidence that modern treaties have increased real income. This benefit spreads to other workers in the local economy. The results are driven by increase in wages and employment income, not by other changes associated to treaties, such as financial compensation or expansion of the local public sector.

The main contribution of the paper is to document the effect of better property rights on real income and show how general equilibrium effects can transmit the benefits throughout a local economy. This insight enrich existing evidence already linking property rights to improvements on investment, productivity and other economic outcomes.

The policy implications of these findings are important not only in Canada, where treaty making is still an unfinished business, but also in the context of less developed economies. First Nations communities share important similarities to populations in less developed societies: they are mostly rural, relatively immobile and with ill-defined property rights. This paper suggest that in these cases the benefits of property

right reforms may spread beyond the direct beneficiaries, through its indirect effects on local labor markets.

Some words of caution are, however, necessary. A conservative interpretation is that the estimates reflect the effect of treaties on the bands that have already implemented them, not on the bands that will adopt them. The treaty bands studied are likely to be the ones with higher expected benefits from this institutional reform. Thus, the effect on real income is likely to be an upper bound value for the rest of First Nation communities. Second, as suggested by the analytical framework, the results depend on a relatively inelastic labor supply. With more mobile workers, the effect on real income may be smaller. Finally, this evidence does not mean that improvement of property rights is a sufficient condition for economic development. Better property rights may facilitate contracts but they still require the existence of economic opportunities. In this paper, these opportunities are linked to the availability of natural resources in western Canada. These caveats should be taken into account when using the results of this paper to predict the economic impact of future modern treaties and other property right reforms.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jdeveco.2015.03.004>.

Table 11
Treaties, real income, and prices in neighboring off-reserve areas.

	ln(real income)				ln(real wage)		ln(house price)	ln(rent)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Within 10 km of reserves held by bands with treaty implemented	0.084	0.583	0.002	-0.129	-0.068	0.167	0.294	0.006	-0.005
	(0.042)*	(0.078)***	(0.094)	(0.085)	(0.058)	(0.073)**	(0.069)***	(0.126)	(0.051)
	[0.025]***	[0.077]***	[0.054]	[0.113]	[0.072]	[0.112]	[0.120]**	[0.069]	[0.060]
	0.031**	0.064***	0.090	0.060*	0.045	0.062**	0.035***	0.130	0.056
Industry	All	Extractive industries	Manufacturing and others	Trade	Public services	Non-public services			
Weighted nr. of obs.	21,020	3075	3620	1955	5520	4495	8270	7065	4370
R-squared	0.328	0.303	0.289	0.393	0.356	0.324	0.171	0.265	0.247

Notes: Robust standard errors clustered at CSD-year level in parentheses. Robust standard errors clustered at level in brackets, and clustered at province-year level in braces. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. The sample includes individuals living in Census subdivisions within 10 km of Indian reserves held by treaty bands. It excludes individuals living on Indian reserves. All regressions include census subdivision and year fixed effects, and a set of control variables. Columns 1 to 6 use the same set of controls as the baseline regression (column 1, panel A, in Table 4). Industry definitions are the same used in Table 9. Columns 7 uses the same set of controls as column 5 in Table 10. Columns 8 and 9 use the same set of controls as columns 7 and 8 in Table 10.

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