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**Article**

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RESEARCH ARTICLE

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# Property rights and intellectual property protection, GDP growth and individual well-being in Latin America

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## Abstract

A central argument for increased protections of property rights (PR) is the role they play in encouraging economic transactions, investment and economic growth. Likewise, the utilitarian justification of intellectual property laws is that such rights promote creative inventions and innovation, and thus can make a nation better off. A further argument is psychological: it has also been argued (though rarely tested) that enhanced rights contribute to increases in well-being enjoyed by a country's citizens. Many Latin American countries have made efforts to improve property rights (and their enforcement) in the recent past, with varying success. Using three data sources (the Latinobarometer, the World Bank, and the World Economic Forum's Global Competitive Index), this investigation considers the relationship between property rights and intellectual property protection, economic growth, and individual well-being. The results, which are heterogeneous with respect to labour force status, suggest that policy makers in Latin America should pursue improvements in property rights if they wish to improve citizen well-being while also promoting economic growth.

**Keywords:** Property rights, Intellectual property protection, Economic growth, Latin America, Life satisfaction, Latinobarometer

**JEL Classification:** D23, I31, N36, O34

## 1 Introduction

*"[...] Property rights belong legally to individuals, but their real function is social, to benefit vast numbers of people who do not themselves exercise these rights."*

*(Thomas Sowell, "The 'Takings' Issue," Forbes, March 2, 1992, p. 60)*

A continual effort to establish a more secure system of both property rights (PR) and intellectual property protection (IPP) has been under way in many Latin American countries. This has been undertaken through, especially, the adaption of national legislation to the standards set forth in global agreements and treaties like the Paris Convention for the Protection of Industrial Property (PCPIP), the Patent Cooperation Treaty (PCT), and the Trade Related Aspects of Intellectual Property Rights (TRIPS). Considering the modern history of Latin America, it is apparent that the region did not start out in a

positive way regarding property rights. During the colonial period, indigenous groups lost most of their ancestral land as, like in any colonial system, protection of one's property from colonial powers was difficult (Reyes and Sawyer 2016). Also, in the late 20th century, political instability threatened the protection of property rights. As just one well known example, in 1971 the Chilean Congress approved a constitutional amendment, which allowed the Chilean government led by President Salvador Allende to expropriate US copper mining companies. The expropriation caused a conflict with the US companies and government, and withdrawal of credit (Besley and Ghatak 2010). The problem with incidents of expropriation is that they can negatively affect the regions' economic development, because foreign enterprises are less likely to invest in a country with such market conditions. As Biglaiser and Staats (2010) found, recognised and upheld PRs are the second most important FDI determinant.

Chile has now managed to establish a relatively secure system of property rights (incl. IPP) and has the highest property rights scores in Latin America (WEF 2015 and Appendix 1 below). Similarly, Peru has made it a goal to achieve well-defined and strongly protected property rights with, already, profound effects for the lives of Peruvians. One important example for such an effect has been discussed in a study by Field (2007), which examined the outcome of a national land titling program and found that it increased national labour supply by enabling people to spend less time watching and protecting their property. Her study showed to what extent people's lives are affected by property rights. Today, Peru is a signatory of many international conventions on PRs and IPP and has recently joined two Patent Prosecution Highways (PPH): The Prosur PPH and the Pacific Alliance PPH (USTR 2017). Although the pattern is similar across most of the Latin American countries, the region is still facing some challenges. In fact, nine Latin American countries can still be found on the United States' intellectual property watch list (USTR 2017) and the estimates of the lost revenue due to different forms of intellectual property piracy remain high (Horan et al. 2005). A few recent concerns raised by the U.S. Trade Representative (published in April 2017) regarding Latin America include the following: the lack of IPP protection enforcement by the Argentine government; the strong increase in the number of pirated American films in Mexico; and the widespread use of unlicensed software and pirated and counterfeit products, including counterfeit tobacco, alcohol, fuel, and pharmaceutical products in the Dominican Republic (USTR 2017).<sup>1</sup>

Recent efforts to improve the region's PRs and IPRs indicate that there could indeed be some benefits to individuals, as also suggested by Sowell in his quote cited above. Those benefits are commonly understood to be of an economic nature, but they could also potentially be found in greater individual well-being or life satisfaction. The latter possibility has not yet been widely investigated, but there are some potential links that could be derived from what has been found so far. For instance, some authors have associated increased IPP with reduced conflict and easier access to pharmaceuticals to improve the health of citizens, all of which have been positively linked to greater subjective well-being. This is discussed further in Sect. 2.1.

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<sup>1</sup> Relatedly, in early 2018 the European Commission announced that it will establish its first world-wide "Counterfeit and Piracy watch-list", acknowledging the prevalence of such issues around the world. <http://trade.ec.europa.eu/doclib/press/index.cfm?id=1786>.

The research on economic benefits, on the other hand, is far more established. Besley and Ghatak (2010) sum up the four main channels through which property rights influence economic activity as the security channel, the efficiency channel, the reduced protection cost channel, and the transactions facilitation channel. Their results are in line with the results of many other authors who have investigated these economic benefits and are discussed further in Sect. 2.2.

In summary, this investigation inspects whether the benefits that Thomas Sowell referred to in the epigraph could refer to increases in individual well-being as well as the oft-found benefits for economic growth. The remainder of this article is organised as follows. Section 2 discusses property rights and intellectual property protection generally, as well as in the Latin American context, and makes links to both economic growth and life satisfaction. Furthermore, we provide a brief and general discussion on why these associations can be expected to differ dependent upon an individual's labour force status. Section 3 explains the three sources of data used, provides basic descriptive statistics, and offers methodological comments. Section 4 presents the results. Section 5 discusses these results as well as the limitations of the study and suggestions for future research, before offering concluding remarks.

## 2 Property rights and intellectual property protection

One of the most common root causes of both violent international and intranational conflict has been argued to be scarcity (Hume 1751, pp. 14–34). If our indefinite needs were equal to unlimited resources, then there would be no basis for conflicts over possessions. To alleviate the problem of scarcity and thus reduce conflict, it is necessary for a nation to establish a set of rules that will govern the usage of scarce resources. In Latin America, conflicts arising due to ill-defined property rights are quite common. A case study in Nicaragua, for instance, revealed that about 40% of all Nicaraguan households found themselves in conflicts over property rights (Stanfield 1995). Well-defined property rights can fulfil this function of alleviating problems caused by scarcity and encourage individuals to utilize available resources effectively (Meinzen-Dick and Knox 1999). A country's system of property rights plays an important role in determining the level of development in that country and is often defined as a bundle of different rights (see, e.g., Alchian and Demsetz 1973; Eggertsson 1990; Everest-Phillips 2008; Besley and Ghatak 2010). Property rights themselves are often considered to comprise four main components: the right to use and possibly exclude others from using the property; the right to modify the property; the right to transfer it to somebody else; and finally, the right to sell and generate revenue that the individual can claim for herself.

With respect to IPP, patents protect new ideas and give the inventor or patent holder a (temporary) monopolistic position. Other important instruments for IPP include copyright law, trademark law, and trade-secret law; these instruments are often used to prevent and combat counterfeiting (Fisher 2001). According to article 7 of the TRIPS agreement, the main objectives of IPP are described as follows: "The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge in a manner conducive to social and economic welfare, and to a balance of rights and obligations." (TRIPS 1994,

Article 7). In most Latin American countries, the full enforcement of the TRIPS agreement has brought about many changes in intellectual property rights regimes. Reforms have extended protection of intellectual property to new fields (e.g., software piracy) and exclusive rights have been strengthened (Correa 2000; Son and Lee 2018).

### 2.1 Property rights, intellectual property protection, and life satisfaction

To investigate any potential association between PR and IPP and how individuals experience their lives, we make use of the, now well established and validated, economics of life satisfaction research area (Oswald 1997; van Praag and Ferrer-i-Carbonell 2004). This is a popular area of economic enquiry which has been studied in relation to many different phenomena. Diverse examples include unemployment and inflation, as well as economic development, overeducation, self-employment, and culture (respectively: Di Tella et al. 2003; Mikucka et al. 2017; Piper 2015a; Hetschko 2016; Hand 2017). For reviews see Frey et al. (2010), Veenhoven (2015), Weimann et al. (2015) and Clark (2018). A handbook discussing well-being in the context of Latin America has also been recently published (Rojas 2016). The pattern of happiness in Latin America is particularly interesting, because the region reports high levels of well-being which do not coincide with the level of income and development. Beytía (2011) investigated the determinants of happiness in Latin America, Western Europe and the United states, and found that in Latin America, financial satisfaction matters significantly less for happiness than in the other regions.<sup>2</sup>

Despite the growing interest in happiness research, in Latin America this field is not as established as it is in other regions. As pointed out by Díaz (2016, p. 80): “The research field of happiness and positive psychology or the economics field of happiness or well-being, which are the usual fields of study, are relatively new fields in the occidental world and even newer in Latin America. The scientific production by Latin American authors on happiness in indexed journals (WoS and SciELO), yielded 44 articles from the countries in this continental region and in the 12-year period taken into consideration.” Similarly, any association between PRs and IPP and life satisfaction has, until now, received little attention (generally and in Latin America specifically) and just below potential links are presented. These links look to the past, as well as the modern economics of life satisfaction research area.

Regarding the link between property rights and life satisfaction, there are some clear reasons to believe that secure property rights might affect life satisfaction. Historically, a number of political theorists have long stressed that property rights might yield psychological benefits, increasing individuals' satisfaction with life. For example, both Jeremy Bentham and John Stuart Mill justify PRs (and the protection of intellectual property in particular) by referring to the social and economic conditions which they create. A related argument is that these rights create an environment beneficial for creative intellectual activities (Munzer 2007; Mandel 2011). Intellectual property protection ensures that the inventor of an idea is compensated for their research and development effort and prevents risk of imitation. As a result, the inventor has an incentive to further develop their product or to work on new ideas. While a considerable amount of research

<sup>2</sup> Another important finding involves the role of trust in social ties. While in Western Europe greater happiness is associated with greater trust in weak ties, this association is insignificant in the Latin American context (Beytía 2011).

has been carried out on the relationship between innovation and economic growth, there have been only few empirical investigations into the relationship between innovation and subjective well-being. Many of these investigations have only established an indirect link between them through theories of economic growth (see, e.g., Grossman and Helpman 1991; Howitt and Aghion 1998). In contrast, Dolan and Metcalfe (2012) have used British data to investigate a direct link and concluded that there appears to be a positive association of innovations with subjective well-being. This suggests that, in Britain at least, strong IPP may contribute to subjective well-being, by protecting inventors from imitation thereby enhancing innovation. However, from a consumer's perspective the opposite might be the case: it is conceivable that better enforced IPP can raise the cost of common purchases, like those for entertainment purposes, and thus lower life satisfaction. This might be a potentially larger issue in Latin America because, as recent news reports demonstrate, while many people there consume pay television, few people pay for it.<sup>3</sup>

Another relevant idea comes from John Locke. In his natural rights theory, Locke emphasizes that it is conceivable that strong property rights play a key role in protecting personal freedom, which, in turn, has been positively associated with greater well-being in more contemporary literature (for example, Veenhoven 1996; Helliwell and Huang 2008; Bavetta et al. 2016). Similarly, Helliwell et al. (2015) have found that the degree of freedom to make life choices has a large positive impact on the individual's well-being. Taken together, one possible implication of these observations is that a system of secure and well-defined property rights may lead to greater happiness by allowing individuals to act independently and thereby preserve individual freedom.<sup>4</sup>

A potential link between enhanced property rights and individual well-being involves the protection of financial assets and financial stability.<sup>5</sup> As Bordo (2007) suggests, strong property rights constitute a key factor in financial stability, because they foster an environment favourable for both investing in and holding financial assets. Furthermore, financial stability itself has been identified as an important predictor of life satisfaction (Oishi et al. 2009; Green and Leves 2013). This relationship between financial stability and life satisfaction can be related to the idea of loss aversion, which describes how the pain of loss is stronger than the joy of gain. It follows that, by lowering the risk of financial expropriation, protecting individuals' financial assets, and thus enhancing financial stability, stronger property rights might positively affect life satisfaction.

Another potential path through which property rights may affect well-being involves health. Labelled as the "intellectual property rights dilemma for pharmaceuticals", it is a topic that has been discussed by many scholars as it presents a serious challenge. The argument is that, from a public health perspective, IPP instruments such as patents can

<sup>3</sup> <https://www.digitaltveurope.com/2017/07/20/piracy-is-number-three-tv-player-in-latin-america/>, <https://www.rapidtvnews.com/2018040551563/latam-pay-tv-loses-8bn-a-year-to-piracy.html>.

<sup>4</sup> This has also been acknowledged in the Latin American context for indigenous people: "The lack of granting of title, delimitation, demarcation and possession of ancestral territory, hampering or preventing access to land and natural resources by indigenous and tribal peoples, is directly and causally linked to situations of poverty and extreme poverty among families, communities and peoples. In turn, the typical circumstances of poverty trigger cross-cutting violations of human rights, *including violations of their rights to life, to personal integrity, to a dignified existence, to food, to water, to health, to education and the rights of children*" (IACHR 2005, emphasis added).

<sup>5</sup> More widely, issues of financial assets, including wealth and well-being are increasingly being investigated within the economics of life satisfaction research area: see Jantsch and Veenhoven (2018) for a recent synthesis.

decelerate the diffusion of new pharmaceuticals and medical technologies (Cohen and Illingworth 2004). As a result, the cost of health care increases, making it less accessible to people in developing countries (Sathwara and Bhandari 2016). Many scholars in the area of life satisfaction have maintained that physical health affects subjective well-being (e.g., Andrews and Withey 1976; Diener 1984; Ferrer-i-Carbonell and van Praag 2002). If stronger enforcement of patents on pharmaceuticals and medical technologies makes access to health care costlier, it could be argued that IPP might have a negative influence on well-being.

However, in Latin America, the emergence of pirated pharmaceuticals, which often do not conform to industry standards, represent a serious threat to public health (Ramírez 2012). While they are likely to be more accessible to the poor, the so called “counterfeit pharmaceuticals” sometimes contain harmful ingredients (Horan et al. 2005).<sup>6</sup> Stronger and more effective enforcement of anti-counterfeiting and anti-piracy laws in this sector could thus protect public health from this threat. Therefore, it is conceivable that this may have a positive impact on life satisfaction in the Latin American region.

Another possible linkage involves the issue of inequality, which is of particular importance in Latin America, the region with the highest inequality in the world (Torche 2014). While inequality has been associated with happiness in many different regions (Berg and Veenhoven 2010; Alesina et al. 2004), Graham and Felton (2006) found that this association between inequality and happiness is particularly strong in Latin America. Their examination provides conclusive evidence for strong effects of relative income differences on well-being. The authors posit that for the people in Latin America, inequality is perceived as a signal of persistent unfairness (Graham and Felton 2006). In a recent Latin American study, Torpey-Saboe et al. (2015) discovered that property rights could contribute to the alleviation of inequality in developing countries.

In summary, positive and negative associations between property rights, intellectual property protection and life satisfaction are conceivable.

## 2.2 Property rights, intellectual property protection and economic growth

A large and growing body of literature has investigated the relationship between property rights and economic growth (see, e.g., Acemoglu et al. 2001; Everest-Phillips 2008; Besley and Ghatak 2010; Bose et al. 2012; Haydaroglu 2015) and there is a relatively large consensus among scholars that secure property rights are an important prerequisite for stable economic growth and development. There is rather more mixed evidence for the role of intellectual property protection in promoting economic growth. Both are discussed below.

The link between better property rights and economic growth has also been found for Latin America. In their cross-national study Staats and Biglaiser (2012) established a link between property rights enforcement and growth enhancing sources of foreign capital. The authors investigated this relationship in 17 Latin American countries and found that

<sup>6</sup> With the trade standing an estimated value of \$650 million US dollars a year, Mexico has been considered one of the major global sources of counterfeit medicines (Latin America Battles Counterfeit Drug Threat, Daily International Pharmacy Alert: Washington Business Information, 2(292), 2006).

stable property rights can promote inflows of foreign direct investment and increase portfolio investment.

Regarding individual Latin American countries, Field (2005) investigated the relationship between tenure security and investment incentives in urban slums in Peru, using data from a nationwide land titling program.<sup>7</sup> Her examination revealed that strong property rights achieved through government land titling have a positive effect on residential investment, leading to a significant increase in the rate of housing renovation, with obvious benefits for economic growth. In a related study, referring to the same government land titling program, Field (2007) found that secure property rights reduce time spent on protecting property and allow household members to spend it on other activities. This freed up time can be supplied in the labour market and thus increases labour market participation leading to economic growth.

In a cross-country study, Park and Ginarte (1997) constructed an index for intellectual property rights (Ginarte-Park Index), which attempts to give a quantitative score to a country's level of intellectual property protection. Using this index, they provided an examination of the relationship between patent protection and long-run economic growth for 60 countries for the period over 1960–1990 [now extended to 2005 (Park 2008)]. The results of their study show that strong intellectual property rights do not contribute to economic growth by “being codified into laws”, but rather by increasing investment possibilities; such investments then being associated with the stimulation of long-term growth (Park and Ginarte 1997, p. 60). Similarly, Gould and Gruben (1997) also identify an indirect effect of intellectual property rights on GDP: strong patent protection leads to improvements in factor accumulation (of factor inputs like R&D capital and physical capital) which in turn has an influence on economic growth. Their findings further suggest that it is important to distinguish between developed and developing countries (see also Thompson and Rushing 1996).

However, some authors consider the relationship between IPP and economic growth to be a bit more complex and not necessarily positive. For instance, Falvey et al. (2006) argue that providing strong IPP gives foreign firms patent advantage, which turns them for at least an initial period of time into a monopoly and thus reduces competition. This might result in an output below the socially desirable level of output and lead to consumer welfare loss. Adams (2011) and Horii and Iwaisako (2007) concluded that the ultimate effect of strong IPP protection on economic growth and development depends on the country's level of economic development and other country-specific characteristics and give a similar explanation as Favley et al. (2006). According to Sattar and Mahmood (2011), the strength of the relationship depends on the country's level of income. They found that the impact of IPP on GDP is more significant in high-income countries as compared to middle- and low-income countries. Furthermore, the effect is stronger in case of upper-middle-income countries in comparison to lower-middle income and low-income countries).

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<sup>7</sup> The COFOPRI (Comisión de Formalización de la Propiedad Informal) assumed responsibility for formalizing informal urban property in 1996. COFORPI used a registry known as Registro Predial Urbano (Urban Real Estate Registry), or RPU. For 2001, COFOPRI's main objective was to establish legal land titles for over one million informal urban properties in eight main urban centers (Cantuarías and Delgado 2004).



While the discussion above is general, it is conceivable that these associations may differ dependent upon the individual's labour market status and the proportions of such groups in a country or region. In Latin America, larger informal sectors are generally associated with more self-employment (Tokman 2011): self-employment accounts for more than half (56%) of the total informal work (Biles 2009), where regulations and bureaucracy are sometimes seen as barriers to business. But self-employment is very diverse in the Latin American region, which makes it important to consider the other categories of self-employment too.

According to Tokman (2011), inadequate regulations and bureaucracy lead many micro-enterprises to flee to informal sectors. Furthermore, it is similarly argued that individuals who "voluntarily" work in informal sectors reject formality, which could potentially explain why the informally self-employed might not benefit from stronger intellectual property protection. Since strong regulations and bureaucracy lead them to informality in the first place, they might be against any increase in government intervention. Moreover, individuals who are active in the informal sector may be directly affected in their jobs and therefore not benefit, but instead suffer from stronger intellectual property protection.

There also might be different preferences within other groups of the self-employed. A business owner or entrepreneur, for instance, may benefit from stronger intellectual property protection as this could protect her from piracy and imitation, better facilitating the invention of new products as well as improvements of existing products and production processes. However, it could also be that self-employed business owners do not benefit from stronger intellectual property protection, because it is likely that purchasing intangible assets such as patents becomes more expensive (Jacobs 1998).

Our investigation is particularly interested in the relationship between these rights and protections, GDP growth and life satisfaction. The next section discusses the data and chosen method we use to empirically assess these associations.

### 3 Data and methodology

To investigate the issue of property rights, intellectual property protection, economic growth and well-being we employ secondary data from three different sources: the World Economic Forum's Global Competitive Index, the Latinobarometer, and the World Bank. We make use of data for the Latin American region from 2006, when the property rights data we use was first available, until 2015, the (at the time of writing) last year of Latinobarometer data. Here we discuss each in turn.

The data regarding property rights and IPP come from the World Economic Forum's Global Competitive Index which has, since 2006, collected data annually on many different aspects of many countries. The data on property rights and IPP in this index, and hence in this investigation too, come from an executive survey. 100 executives were asked the following question in each year: In your country, to what extent are property rights, including financial assets, protected?<sup>8</sup> The answers are given on a Likert scale

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<sup>8</sup> These executives are engaged in local and national businesses, sometimes with international experience. They come from various sectors of the economy (agriculture, manufacturing industry, non-manufacturing industry, and services), and represent micro, small and medium, and large enterprises. A good geographical coverage is claimed by the survey (Schwab and Sala-i-Martin 2017).

from 1, indicating not at all, to 7, meaning to a great extent. The Latin American countries with the highest averages for property rights over the years considered are Panama (4.89) and Uruguay (4.86); those with the lowest are Venezuela (1.97) and Bolivia (2.81), with Argentina (2.85) not faring much better. The question for intellectual property protection is similar—in your country, how strong is the protection of intellectual property, including anti-counterfeiting measures?—with the same scale. For this intellectual property protection measure the highest averages are again found for Panama (4.14) and Chile (3.81); those with the lowest averages are Venezuela (1.91) and Bolivia (2.30), with Paraguay having a negligibly higher score (2.34). In general, the ratings for property protection are higher than those for intellectual property protection. All of the averages for each year and each country are shown in Appendices 1 and 2.

The data for life satisfaction and the important socioeconomic control variables come from the Latinobarometer. The Latinobarometer is an annual data set (though with occasional missing years) containing socioeconomic data from between 1000 and 1200 individuals in each of 18 Latin American countries in each year. A repeated cross-section data set, which has implications for the analysis we can undertake.<sup>9</sup> The Latinobarometer's life satisfaction question is as follows: generally speaking, would you say you are satisfied with your life? Would you say you are...? There are four options as possible answers: very satisfied (1); quite satisfied (2); not very satisfied (3); and not at all satisfied (4). These are positively coded for the analysis here so that higher numbers indicate higher satisfaction. Table 1 presents the number of observations, and the mean and standard deviation of life satisfaction for each country.<sup>10</sup>

Latinobarometer data 2006–2015, these averages do not consider 2008, and there was no survey in 2012 and 2014. The scale is 1–4, with life satisfaction being positively coded.

Where possible we employ standard socioeconomic controls, common to many investigations within the 'economics of life satisfaction' area. Thus, we consider income, socioeconomic level, labour force status, marital status, age, and education. What is particularly missing is health, which is not asked about enough in the Latinobarometer. Importantly, income, again reflecting the data collected in the Latinobarometer, is a subjective measure. Rather than asking individuals about their actual income, they are instead asked whether their salary is sufficient or not.<sup>11</sup> The socioeconomic level data reflect the interviewer's opinion and is based on the appearance of the respondent, their house and furniture. The other socioeconomic controls are straightforward and require no elaboration, though we discuss labour force status below. Descriptive statistics for all 18 countries combined are available in Table 3 in Appendix.

The GDP data come from the World Bank, our third source of data. We use GDP growth per capita as our measure of economic growth. This data enters the last stage

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<sup>9</sup> Further limitations are discussed in Sect. 5.

<sup>10</sup> Importantly, we do not consider data from 2008. In every other year, the life satisfaction question is asked at the start of the survey; in 2008 it was asked after questions about politics. Other Latin American studies make this decision too (for example Macchia and Plagnol 2017) and it is known that question order can substantially influence life satisfaction data (Deaton 2012; Nikolova and Sanfey 2016).

<sup>11</sup> The actual question is as follows: "Does the salary you receive and your total family income allow you to cover your needs in a satisfactory manner? Which of the following statements describes your situation?" The possible answers are: It's sufficient and we can save; It's just sufficient and we don't have major problems; It's not sufficient and we have problems; It's not sufficient and we have major problems.

**Table 1 Observations, mean and standard deviation of life satisfaction in individual countries**

Country	Life satisfaction		
	Observations	Mean	Standard dev.
Argentina	11,897	2.95	0.75
Bolivia	11,899	2.65	0.81
Brazil	12,037	2.81	0.60
Chile	11,947	2.83	0.75
Colombia	11,973	3.22	0.80
Costa Rica	9948	3.30	0.74
Dominican Republic	9977	3.10	0.91
Ecuador	11,969	2.76	0.83
El Salvador	9971	2.90	0.89
Guatemala	9885	3.11	0.82
Honduras	9951	3.04	0.96
Mexico	11,956	3.08	0.84
Nicaragua	9932	3.00	0.90
Panama	9965	3.27	0.78
Paraguay	11,351	2.94	0.80
Peru	11,909	2.63	0.84
Uruguay	11,931	2.92	0.75
Venezuela	11,953	3.25	0.83

of our analysis and enables us to see if there is a positive association between property rights and life satisfaction, and intellectual property protection and life satisfaction, which is not caused by economic growth. This last stage enables us to learn if there is an additional life satisfaction benefit when economic growth is controlled for. Before that we investigate the association between both types of rights and protections and life satisfaction, while considering socioeconomic controls known to influence life satisfaction, without considering economic growth.

Our interest focuses on the coefficients for property rights and intellectual property protection. Both variables are in every estimate, thus the coefficient for property rights (intellectual property protection) is obtained while controlling for intellectual property protection (property rights). Any substantial differences with the obtained coefficients between the two stages will thus be explained by a moderating role for economic growth. Given that the dependent variable, life satisfaction, is ordinal and only has four different options we treat it as ordinal and present marginal effects obtained after ordered probit analysis. This is undertaken for all countries combined (controlling for the specific countries), and full results are presented in the next section.

One advantage of the Latinobarometer is with respect to self-employment. In the survey, self-employed individuals indicate whether they are self-employed as professionals, business owners, farmers or within the informal sector. It is plausible that the relationship between property rights, intellectual property protection, GDP and life satisfaction might be somewhat different when these vastly different groups of the self-employed are considered. Furthermore, our analysis also considers other labour force statuses (e.g., unemployed and retired).

#### 4 Results

In this section the key results are presented and discussed. Given the difficulty of interpreting the estimated coefficients of ordered probit regressions, in Table 2 we show the marginal effects derived after the estimation of the ordered probit regressions. The marginal effects reveal statistically significant results that also have an appealing economic interpretation, in comparison to the ordered probit regression coefficients. The columns are distinguished by the addition of a control for GDP growth in the second column.

The key results for our investigation are in the first two panels. Other factors held constant, a one-point increase on the property-rights index (on a seven-point scale) gives rise to a two percent increase in respondents self-assessing as very satisfied and a corresponding fall in the percentage of those responding not very satisfied by more than one per cent. There is also a corresponding fall in the percentage of both quite satisfied and not at all satisfied respondents, although these falls are very small. The estimated effects of one-point changes in the property rights index are almost unaffected by controlling for GDP growth. Hence, these effects are not confounded by the correlation between property rights protection and GDP growth. However, in contrast, changes in the index of intellectual property protection, although yielding very similar effects to changes in the property rights index *in the absence of controlling for GDP growth*, yield effects that on grounds both of size and (lack of) statistical significance may be regarded as zero *once GDP growth is controlled for*.

The economic interpretation of these contrasting results is that property rights in general have effects throughout society that impact directly on peoples' life satisfaction (for example, via experience or knowledge of abuses arising from lack of property rights or property rights enforcement) in addition to the effects of economic prosperity as measured by GDP. In contrast, the effects of intellectual property protection are directly experienced by relatively few, while most people will experience such effects only indirectly, via the medium- to long-range effect on GDP.

The marginal effects of the other variables, the control variables, are in line with expectations based on previous literature. A *ceteris paribus* summary follows: improvements in how sufficient one considers their income (including family income) are associated with an more individuals being very satisfied with life (cf. Clark 2018); improvements in education increase the number of individuals reporting being very satisfied with life [a similar positive association for Latin Americans was also found by Graham and Felton (2006)]. Furthermore being married or having a partner is associated with an increase in the amount of individuals being very satisfied with life (cf. Stutzer and Frey 2006); in contrast becoming divorced, separated or widowed, increases the likelihood of being not very satisfied with life or being not at all satisfied with life; age (not shown) follows the often-found U-shape, with life satisfaction falling in early adulthood, reaching a bottom at approximately 52 years, before increasing again (Piper 2015b; Cheng et al. 2017; Velásquez 2016 for Colombians).

The results for labour force status may seem more unusual (i.e., different from most of the academic literature which investigates highly developed countries), however they are supported by previous research from Latin America. Table 2 shows that being self-employed, unemployed and not being in the labour market (compared to being employed) are all associated with an increased probability for individuals to report being

**Table 2 Life satisfaction, property rights, intellectual property protection and GDP growth, marginal effects following ordered probit estimates**

	No GDP control	GDP control
Property rights		
Life satisfaction: not at all satisfied	−0.004***	−0.003***
Life satisfaction: not very satisfied	−0.014***	−0.013***
Life satisfaction: quite satisfied	−0.000***	−0.001***
Life satisfaction: very satisfied	0.0189***	0.017***
Intellectual property protection		
Life satisfaction: not at all satisfied	−0.004***	−0.001
Life satisfaction: not very satisfied	−0.013**	−0.004
Life satisfaction: quite satisfied	−0.000***	−0.000
Life satisfaction: very satisfied	0.016***	−0.005
Sufficient income		
Life satisfaction: not at all satisfied	−0.016***	−0.014***
Life satisfaction: not very satisfied	−0.061***	−0.059***
Life satisfaction: quite satisfied	−0.002***	−0.007***
Life satisfaction: very satisfied	0.079***	0.008***
Insufficient income		
Life satisfaction: not at all satisfied	0.009***	0.008***
Life satisfaction: not very satisfied	0.035***	0.034***
Life satisfaction: quite satisfied	0.001***	0.004***
Life satisfaction: very satisfied	−0.046***	−0.005***
Very insufficient income		
Life satisfaction: not at all satisfied	0.015***	0.013***
Life satisfaction: not very satisfied	0.056***	0.056***
Life satisfaction: quite satisfied	0.002***	0.006***
Life satisfaction: very satisfied	−0.073***	−0.076***
Self-employed		
Life satisfaction: not at all satisfied	0.004***	0.003***
Life satisfaction: not very satisfied	0.014***	0.013***
Life satisfaction: quite satisfied	0.000***	−0.001***
Life satisfaction: very satisfied	−0.018***	−0.002***
Unemployed		
Life satisfaction: not at all satisfied	0.013***	0.011***
Life satisfaction: not very satisfied	0.050***	0.049***
Life satisfaction: quite satisfied	0.002***	−0.005***
Life satisfaction: very satisfied	−0.065***	−0.066***
Retired		
Life satisfaction: not at all satisfied	−0.001	0.001
Life satisfaction: not very satisfied	0.004	−0.004
Life satisfaction: quite satisfied	0.000	−0.000
Life satisfaction: very satisfied	−0.006	−0.006
Not in labour market		
Life satisfaction: not at all satisfied	0.004***	0.003***
Life satisfaction: not very satisfied	0.015***	0.014***
Life satisfaction: quite satisfied	−0.001***	−0.002***
Life satisfaction: very satisfied	−0.019***	−0.019***
Student		
Life satisfaction: not at all satisfied	−0.001	−0.001
Life satisfaction: not very satisfied	−0.005	−0.004
Life satisfaction: quite satisfied	−0.001	−0.000

**Table 2 (continued)**

	No GDP control	GDP control
Life satisfaction: very satisfied	0.006	0.005
Education: completed secondary school		
Life satisfaction: not at all satisfied	−0.003***	−0.006***
Life satisfaction: not very satisfied	−0.024***	−0.013***
Life satisfaction: quite satisfied	−0.001***	−0.003***
Life satisfaction: very satisfied	0.031***	0.033***
Education: completed university		
Life satisfaction: not at all satisfied	−0.013***	−0.012***
Life satisfaction: not very satisfied	−0.030***	−0.049***
Life satisfaction: quite satisfied	−0.002***	−0.006***
Life satisfaction: very satisfied	0.062***	0.067***
Married or partnered		
Life satisfaction: not at all satisfied	−0.004***	−0.003***
Life satisfaction: not very satisfied	−0.014***	−0.014***
Life satisfaction: quite satisfied	−0.000***	−0.002***
Life satisfaction: very satisfied	0.019***	0.019***
Divorced, separated or widowed		
Life satisfaction: not at all satisfied	0.005***	0.004***
Life satisfaction: not very satisfied	0.017***	0.018***
Life satisfaction: quite satisfied	0.001***	0.002***
Life satisfaction: very satisfied	−0.023***	−0.025***

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Also included in the ordered probit estimation from which these marginal effects were calculated are age, dummies for the interviewer rated socioeconomic level, additional education categories, and country and wave dummies. Base categories: just sufficient income; single; illiterate; employed. Latinobarometer data 2006–2015

either not at all satisfied with life or not satisfied with life. Here the somewhat unusual result is self-employment, though one general reason why self-employment is associated with less life satisfaction is that self-employed individuals might focus on their work and neglect other important domains of life such as leisure, family, etc. (Binder and Coad 2012). However, in the Latin American context, other research has found that this on average finding covers considerable heterogeneity (Aguilar et al. 2013). This was a motivating factor for our more detailed consideration of labour force status, and particularly different groups of the self-employed.

Regarding these different groups, the most striking differences can be found within the self-employed category.<sup>12</sup> While the results indicate that self-employed business owners, for instance, seem to benefit from stronger intellectual property protection, even after controlling for GDP growth, the same association is negative and statistically significant for individuals who are self-employed in the informal sector. Also discussed in Sect. 2, individuals self-employed in the informal sector can be expected to be negatively affected by stronger intellectual property protection, as it may directly affect their jobs.

Additional interesting findings are for students and the retired. For students, regardless of whether GDP growth per capita is controlled for or not, there is a negative association between IPP and life satisfaction. This relationship remains significant and

<sup>12</sup> Results not shown but available upon request.

negative, even after controlling for GDP growth. One potential explanation could be that their age makes them an important target group for illegal access to entertainment such as movies, videogames and music; as Sect. 2.1 highlighted this is a significant issue in Latin America. Further research could investigate this issue. With respect to property rights, however, the relationship for students is significant and positive. For retired individuals, the association between property rights and life satisfaction is statistically significant (at a 10% level) and positive when GDP growth is not controlled for and becomes slightly more significant (while remaining positive) when GDP growth is controlled for. The link between IPP and life satisfaction on the other hand, is not significant for retired individuals. More research could uncover potential reasons for these associations.

## **5 Concluding discussion, including limitations and suggestions for future research**

This discussion section focuses on the key result from the analysis and offers potential explanations in line with the literature review above. Following this, the limitations of the study are discussed along with suggestions for future research.

The key result from this investigation is that, in Latin America, property rights are positively associated with the well-being of individuals even after their impact on economic growth is considered. The marginal effects presented in Table 2 demonstrate this. In contrast, for the whole population, the benefits of enhanced intellectual property protection for life satisfaction can be explained by their association with economic growth (thus offering no additional well-being benefits). Why might the overall population's well-being association be different with respect to these two types of rights? Further research might identify as a possible reason the notion that strong and secure intellectual property protection, for instance in the form of anti-counterfeiting laws, can make entertainment more expensive. In Latin America, many entertainment goods and services (cinema, pay television, etc.) are consumed illicitly. Strengthening intellectual property protection would thus make it more difficult to access entertainment goods illicitly (i.e., without cost or with cost but lower than the market price).

The results above present a general picture, one that would benefit from further research. Our results are indicative of a correlation—we make no claims about causation—and stem from marginal effects following ordered probit regressions taking into account individual countries via dummy variables, a strategy reflecting the relative lack of macro data variation. Given this, more support for this broad result is needed.<sup>13</sup> We hope our first look at these issues will inspire research using more specific data sets, better able to account for macro variation or simply focusing on individual countries and particular changes in property rights law and enforcement. Work centering on individual countries in Latin America may be able to highlight some nuance regarding this uncovered general finding. Such work may be better able to examine specific country and regional contexts which may be influential in developing collective understanding about property rights, intellectual property protection and individual well-being.

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<sup>13</sup> It is also conceivable that there are potential third factors impacting on both life satisfaction and property rights and intellectual property protection. Future research may also include an investigation of different culturally-based factors in Latin America, which may play a role in this relationship.

Some of this investigation's limitations stem from the main data set used, the Latinobarometer. While valuable, the Latinobarometer is a repeated cross-section data set, with different individuals surveyed in each wave. This limits the methods available for analysis and does not enable (for example) individual unobservable characteristics to be controlled for.<sup>14</sup> Additionally, there are some important variables either not included in the data set or asked subjectively when a more objective measure would be preferable. The biggest omission is with respect to health, which was not considered often enough to enable inclusion in our analysis. Health has been consistently shown to be positively associated with life satisfaction, with one recent study showing that even past health status has a direct effect on current well-being even when current health is controlled for (Piper 2018). As Sect. 3 explains, the income variable is subjective and an objective measure would be preferable; individuals are free to answer regarding how sufficient they find their income and may misrepresent their situation. The inclusion or exclusion of the subjective interviewer rating of the individual's socioeconomic level does not affect the found relationship between property rights, IPP, economic growth and life satisfaction; in other words, this investigation is robust to the inclusion or exclusion of this interviewer rating.

Property rights and IPP are very diverse, both in how the law is written and in how they are enforced. Future research could look at specific changes and assess these. Are there particular reforms that are more (or less) conducive to individual well-being? And what about intellectual property protection? Is the speculation about the increased cost of entertainment (due to enhanced IPP) relevant for life satisfaction? Specific changes in law could be investigated to tease out nuance that is missed in the analysis above. This would likely require a qualitative focus as well as a quantitative one, particularly given that it might be hard to quantify; the executive survey data we use in our analysis is unlikely to be good enough to find this nuance. Case studies and field interviews are likely to contribute to increased understanding; it might also be useful to track the impact of announcements regarding law changes and then the actual subsequent change. Our general analysis can be extended in many different ways. Future research could also link these issues to the quality of institutions in local and national regions. An advantage of our executive survey data is that, presumably, this is built into the responses about property rights; the executives are likely to be making an overall judgement incorporating factors such as corruption and quality of policing regarding their influence on property rights and IPP. Despite this possibility there is much that can be done to extend the general analysis we present above. Indeed, the development of knowledge may well be facilitated by more indicators that provide information on institutional pillars like the rule of law, and judicial-system quality as well as intellectual property protection and property rights.

From the findings of this investigation, some policy implications can be derived. Economic growth is important, and can be promoted by improved property rights, which

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<sup>14</sup> With panel data, and via use of system GMM estimation, direct causal associations of past values of PR and IPP on life satisfaction could be uncovered. This was undertaken more crudely with the cross-section data of the Latinobarometer and no association was found between past PR and life satisfaction, and a negative association between past IPR and life satisfaction. While noting that life satisfaction seems to be a heavily contemporaneous variable (Piper 2018), future research, with more appropriate data may be able to establish credible linkages between past PR and IPP and life satisfaction.



themselves appear to have an additional life satisfaction benefit in Latin America. In this region at least, Thomas Sowell seems to be right about people benefiting from property rights generally. Future investigations can assess this on a case by case basis and extend this initial understanding. Overall, our general investigation suggests that policy makers in Latin America should consider improving property rights, not only for the hoped for benefits in terms of economic growth, but also for additional benefits in terms of citizen well-being.

**Abbreviations**

IPP: Intellectual property protection; PCPIP: Paris Convention for the Protection of Industrial Property; PCT: The Patent Cooperation Treaty; PPH: Patent Prosecution Highways; PR: Property rights; TRIPS: The Trade Related Aspects of Intellectual Property Rights.

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**Authors' contributions**

Both authors contributed approximately equally throughout all parts of the paper. Both authors read and approved the final manuscript.

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**Availability of data and materials**

The data come from three separate sources and all are publicly available (the Latinobarometer, The World Economic Forum's Global Competitive index, and the World Bank

**Competing interests**

The authors declare that they have no competing interests.

## Appendices

### Appendix 1: Property right scores by country and survey year



The graphs represent data of the Executive Opinion Survey by the World Economic Forum. Numbers represent averages of business leaders' assessment of protection of property rights in their country on a 1-7 scale.

**Appendix 2: Intellectual property protection scores by country and survey year**



The graphs represent data of the Executive Opinion Survey by the World Economic Forum. Numbers represent averages of business leaders' assessment of protection of intellectual property in their country on a 1-7 scale.

See Table 3.

**Table 3 Data description: socioeconomic variables**

	Mean	Standard deviation
Income		
Sufficient	0.10	0.30
Just sufficient	0.43	0.49
Insufficient	0.35	0.48
Very insufficient	0.12	0.33
Socioeconomic level		
Very good	0.07	0.26
Good	0.34	0.47
Not bad	0.43	0.49
Bad	0.13	0.34
Very bad	0.02	0.15
Female	0.52	0.50
Marital status		
Partnered or married	0.58	0.49
Single	0.31	0.46
Separated, divorced or widowed	0.12	0.32
Education		
Illiterate	0.09	0.29
Incomplete primary	0.19	0.39
Complete primary	0.17	0.37
Incomplete secondary	0.15	0.36
Complete secondary	0.22	0.41
Incomplete higher	0.08	0.28
Complete higher	0.10	0.30
Labour force status		
Employed	0.26	0.44
Self-employed	0.31	0.46
Unemployed	0.06	0.24
Retired	0.08	0.25
Not in labour market	0.23	0.42
Student	0.06	0.24
Age	40.58	16.66

Latinobarometer data (2006–2015), from 18 countries in Latin America. All variables are dummy variables apart from age

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