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Intellectual Property Rights protection and Export Diversification: the application of Utility Model Laws

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Abstract

We examine in this paper the impact of the tightening of IPRs, notably patents rights, and the adoption of utility model laws on export diversification. To perform our analysis, we used panel data covering 89 developing and developed countries (of which 55 developing countries) over the period 1975 – 2003, and Lewbel (2012)'s instrumental variable technique. Our results lead us to conclude that for developing countries, legal protection for minor and adaptive inventions could be a springboard for further strengthening of IPRs protection in spurring export diversification, which is essential for the structural change needed for their economic development.

Keywords: Intellectual Property Rights; Utility Model Laws; Export Diversification; Lewbel Instrumental Variable Technique.

Jel Classification: F14, O24, O34

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1. Introduction

Over the past decades, the world economy has witnessed a steady rise of integration on several dimensions including, through a greater mobility of factors of Production (capital and labor), Trade, Foreign Direct Investments (FDI), and enforcement of Intellectual Property Rights (IPRs). The latter has been the subject of abundant literature, notably on IPRs and Trade, IPRs and FDI, IPRs and growth and IPR and Innovation. For example, with respect to the literature on IPRs and growth, the importance of the differential effects of IPRs on countries at different stages of their economic development has been explored (see for example, Fink and Maskus, 2005). Furthermore, the issue as to whether the level of intellectual property protection matters for the economic development level has been studied (see Kim et al., 2012). With respect to IPRs and trade, the literature has examined the extent to which the strength of IPRs could spur trade.

However, to our best knowledge, there is currently no study, which has investigated the relationship between intellectual property protection and export diversification.

This paper contributes to the extant empirical literature on the effects of IPRs protection by exploring whether or not the level of intellectual property protection matters for export diversification. More specifically, we draw on many insights from the work of Kim et al., (2012) and consider the impact of not only the strength of IPRs protection, but also of the different types of IPRs (namely, patents and utility model laws) on the countries' degree of export diversification. A special emphasis has been put on the level of economic development of these countries.

We obtain evidence that irrespective of the group considered (developed countries versus developing countries), both strengthening of patents rights protection and adoption of utility model laws are conducive to export diversification. However, while the impact of tightening patents rights protection on export diversification is higher in developed countries than in developing ones, the effect of utility model laws adoption affects similarly the two groups of countries.

The remainder of the paper proceeds as follows. **Section 2** provides an insight into Intellectual Property; **Section 3** briefly reviews the literature on the determinants of export diversification; **Section 4** discusses how different types of IPRs could affect the countries' degree of export diversification, depending on the level of economic development of the country; **Section 5** presents the model specification and describes the data; **Section 6** discusses the estimation strategy; **Section 7** presents the estimations' results; and **Section 8** concludes.

2. Insight into Intellectual Property and its effects

2.1 Intellectual Property Rights: Patents and Utility Models

This sub-section briefly describes patents and utility models laws and explains their differences. It draws among others, on Kim et al. (2012) and Smith (2014).

Intellectual Property (hereinafter, IP) refers to creations of the mind - including inventions, literary artistic works, symbols, names, images and designs used in commerce - which are featured to be non-rivalrous and non-excludable. However, Intellectual Property Rights (hereinafter, IPRs) are laws regarding the protection of intellectual property, which describe the ways in which the creators of IP can control its use. Hence, they are provided to create a private market for what would otherwise be a public good with non-rivalrous and non-excludable characteristics.

There are several forms of IPRs, of which the main are patents, copyrights, trademarks and service-marks, plant breeders' rights, sui genesis[1] rights, and trade secrets. Among all these forms of IPRs, patents are the ones that protect inventions[2]. Utility models constitute an alternative to patents and are adopted in some countries to protect inventions.

While there is a global acceptance of the term "patent", this is not the case for the "utility models". This is because the latter differ fundamentally from one country to another. "Utility model" is a generic term, which refers to subject matter that hinges precariously between protectable under patent law and sui generis design law (Suthersanen, 2001). In the intellectual property legislation, this term does not have a clear legal definition, while in the WTO TRIPS Agreement, there is no specific reference to the utility model, it is recognized under the Paris Convention. This lack of recognition at international level is exemplified by the fact that the WTO TRIPS Agreement does not make a specific reference to utility model – or second tier- protection, which may lead WTO[3] Members to freely formulate or reject second tier protection regimes. Nonetheless, TRIPS' Article 2.1 provides that the relevant provisions of the Paris Convention (including Article 1.2) be extended to all WTO countries.

Whilst Utility models are recognized under the Paris Convention as industrial property, the Convention does not provide any definition nor scope of utility models but simply confirms that the international principles of national treatment and the right of priority be accorded to utility models. The Article 1.2 of the Paris Convention reads as follows: "The protection of industrial property has as its object patents, utility models, industrial designs, trademarks, service marks, trade names, indications of source or appellations of origin, and the repression of unfair competition".

Despite their common function as exclusive rights granted for invention, utility models and patents differ in several important ways: *first*, patents are granted for novel and non-obvious inventions that have industrial applicability, while utility models are second-tier protection for minor inventions, such as devices, tools and implements, particularly in the mechanical and electronic fields (Bently and Shermann, 2001 provide a legal discussion of utility models). Moreover, processes and methods of production are typically excluded in the case of utility models. *Second*, the inventions covered by utility models are technically less complex and less expensive to apply for, than those of patents. *Third*, the requirements for qualifying for a utility model are less stringent than those for a patent. Hence, in practice, utility models are sought for marginal innovations which may not meet the patentability criteria (Beneito, 2006). *Fourth* and last, the length of protection tends to be higher for patents than for utility models: patents are generally granted for 20 years duration from the date of application, while the duration of utility models is 6-10 years.

All in all, we can follow Kim et al. (2012) and conclude that utility models and patents differ in the types of innovation they protect: patents protect innovations of relatively high inventiveness and utility models protect those of relatively low inventiveness.

In the next sub-section, we briefly examine the costs and the benefits of strengthening IP rights.

2.2 Brief discussion on the benefits versus the costs of a strong IPRs protection scheme

Although the design and implementation of IP protection can be traced to the period[4] before the TRIPS era, the Agreement on TRIPS – which entered into force as Annex 1.C of the Marrakech Agreement establishing the WTO on January 1, 1995 - remains to date the most significant multilateral arrangement on IPRs. It establishes minimum standards of intellectual property protection, which many say are similar to those of many industrialized countries, and covers all the prominent forms of protection (Copyright and Related Rights, Trademarks, Geographical Indications, Industrial Designs, Patents, Layout-Designs (Topographies) of Integrated Circuits, Protection of Undisclosed Information, and Control of Anti-Competitive Practices in Contractual Licences) in a single agreement. In addition, it incorporates provisions of previous arrangements, of which the major WIPO[5] conventions.

For its implementation, the TRIPS Agreement allows a phase-in-process of different lengths depending on the economic development level of countries (See Article 65 and 66). In particular, it required industrialized countries to comply with its obligations within a year after its entry into force, that is, January 1, 1996; developing countries and transition economies were required to implement TRIPS within five years after its entry into force, or by January 1, 2000. An extension period of five additional years was provided to those developing countries that did not previously have intellectual property protection in the coverage areas of the Agreement. Least developed countries (henceforth, LDCs), the category of poorest countries in the world designated by the United Nations and considered as such by the WTO, were required to comply with the TRIPs obligations within 11 years of the entry into force of the Agreement, that is, by January 1, 2006. These countries have put forward a number of arguments, - including their special requirements, their economic, financial and administrative constraints, and the need for flexibility so as to create a viable technological base - to secure two extension periods[6] for the compliance of the Agreement's obligations: the first one (obtained on 30 November 2005), was a seven-and-a-half year extension, terminating on July 1, 2013 and the second one (recently obtained, 12 June 2013) was an eight-and-a-half year extension, terminating on 1 July 2021. Moreover, Paragraph 2 of the latter Decision[7] of the Council for TRIPS states that LDCs are supposed to make full use of the flexibilities provided by the TRIPS Agreement to address their needs, including, create a sound and viable technological base and overcome their capacity constraints supported by, among other steps, implementation of Article 66.2 by developed country Members. Article 66.2 reads as follows: Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base.

This leads to a wider question of whether developing countries and specifically LDCs really benefit from strengthening their IPRs protection.

The issue of benefits of Intellectual Property protection is controversial in the international literature, which, some argue, reflects a tension between the interests of the developed countries and those of developing countries. The rationale behind this goes as follows a relatively small number of developed countries are holders of the resources required to innovate and tend to be the sources of intellectual property rights in the international market whilst developing countries tend to be the recipients of intellectual property via international flows.

Smith (2014) summarizes the discussion of the benefits and the costs associated with strong/weak IP systems in developed versus developing countries. This discussion which illustrates the reluctance of developing countries to strengthen their IPRs systems it replicated as follows.On the developed countries side, the net effects of adopting strong IPRs are not clear-cut. Indeed, these effects depend on the relative dominance of the market expansion and monopoly power effects. The monopoly power effects stem from the fact that stronger IPRs provide incentives to source firms to restrict their transfer of IP to markets where IPRs are relatively strong. This allows them to apply for protection in the foreign market and decrease their exports in order to extract monopoly prices. This effect can particularly occur when the recipient markets have few close substitutes, weak imitative abilities, and/or few domestic competing firms. The market expansion effects refers to the situation where the source firms have strong incentives to transfer their IP to markets where IPRs are relatively strong, merely because they can apply for protection in the foreign market and reduce the risk of its creation been copied. This can be the case when domestic firms in the recipient markets have the ability to imitate the intellectual property. The reluctance of developing countries (who are recipients of IP) to strengthen their intellectual property laws despite the strong pressure from developed countries (who are sources of IP) is rooted on their view that the costs of strong IP laws outweighs their benefits: the latter come from the fact that the adoption of relatively strong IP protection by the recipient would facilitate technology transfer and provide domestic incentives for innovation. In contrast, the recipient of IP could opt for relatively weak intellectual property protection to allow for domestic imitation and prevent monopoly behaviour in its market, and avoid transfer of monopoly rents to developed countries firms, loss of competitiveness of developing countries firms, and reduction in technology transfers from industrialized to developing countries.

In this debate, the position of developed countries seems somehow clear: as the sources of IP, they would prefer the recipients' countries to adopt strong IP protection, either to reduce risk of imitation, or allow monopoly behaviour in the recipient countries' market.

The empirical literature has not been silent on this subject-matter. Helpman (1993, pp.1274) while questioning who benefits from tight intellectual property rights in less developed countries, suggests that if anyone benefits, it is not the latter. In the same vein, Barton (2004, 320) argues that "the strengthening of patent systems throughout the world appears likely to strengthen the position of incumbent multinationals and disfavour the independent development of technology by indigenous firms in developing countries". Meanwhile, several arguments have been developed to justify the need for developing countries to increase their protection of IPRs. Diwan and Rodrik (1991) argue that developed and developing countries generally have different technology needs and, without the protection of IPRs by developing countries, developed countries would not develop technologies largely needed by the developing world. According to Taylor (1993, 1994) and Yang and Maskus (2001), developed country firms may react to the lack of IPRs protection by developing countries by making their technologies more difficult to imitate, which can result in less efficient research technology and less innovation. Chen and Puttitanum (2005) note that even if greater protection of IPRs does not directly benefit the developing world, given the fact that strengthening of IPRs is often a condition for a developing country's accession to the WTO, gains from international cooperation that tightens IPRs in developing countries could still increase world welfare. Maskus et al. (2004) argue that the higher the impact of strengthening IPRs protection would be in developing countries, the higher the ability of these countries to absorb technology. He therefore recommends them to focus their resources on improving their absorptive capacities through improved governance, strengthened education programs, targeted technology inducements, and competition policies. In this respect, WTO in collaboration with other multilateral institutions and bilateral donors has been significantly contributing to the attainment of these objectives in these countries and particularly in LDCs, through its technical assistance and capacity building activities.

In this on-going debate, the LDCs have also tried to defend their interests on handicrafts and biodiversity of natural substances. As underlined by Henry (2004), as far as intellectual property is concerned, the most important issue for these countries is related to natural substances and biopiracy. In two important Declarations of LDCs Trade Ministers meetings - the 5th Ministerial meeting held in Maseru, Lesotho, in 2005 and the 6th

Ministerial meeting held in Dar-es-Salam, Tanzania, in 2009 – the Ministers did not make any allusion to strengthening intellectual property rights protection as a goal they should pursue, though several paragraphs in these Declarations were devoted to intellectual property rights. The focus of these declarations was rather on traditional knowledge and benefit sharing from exploitation of genetic resources and traditional knowledge from LDCs, on an effective technology transfer from developed countries to LDCs to help them create a viable technological base and on the need of financial and technical assistance to help LDCs implement their TRIPS obligations (see also Gathii, 2012).

For these countries as well as for many other developing countries, utility model laws are of high importance and can progressively help them acquire the necessary technological capabilities to spur innovation and establish a viable technological base. This argument would therefore be the basis of the remainder of our analysis.

Given the foregoing discussion, we consider in the next section the theoretical effects of strong IPRs protection systems on the ability of countries - depending on their economic level – to diversify their exports. More interestingly, we examine whether or not the utility model laws adopted by certain countries, in particular developing countries also matter for their shifting away from exporting mainly primary products.

3. Brief literature review on the determinants of export diversification

The idea of export diversification dates back to the 1960s where the conduct of trade policy in developing countries was mainly guided by the development theory. In fact, during these periods, there were two concurrent theories: the classical trade theory that argues for trade specialization according to the comparative advantage and the development theory that claimed the need of adopting diversification strategies out of traditional commodities sector towards manufactured goods. This strategy has proven its success in Asian economies in the early 1970s. Nonetheless, the theoretical underpinnings[8] of the export diversification strategy appeared towards the end of 1970s, in particular with the new trade and endogenous growth theories developed by Krugman (1979) and expanded by Grossman and Helpman (1991) and Krugman (1995). The new trade theory, in contrast with the traditional trade theories tries to explain the importance of trade flows such as intra-industry trade by taking into account factors such as externalities and scale economies, the demand and taste of consumers and the product cycle. This theory, firstly developed by Krugman (1979), is based on a monopolistic competition hypothesis where each variety of goods is produced by identical firms within each industry and exported to all markets, given that consumers prefer variety without limit. Hence, in this model, decrease in trade costs will result in adjustments in incumbents' export volume, depending on the sectoral elasticity of substitution. Moreover, Grossman and Helpman (1991) have developed a quality-ladder model whereby innovation driven by factor endowments, improves the quality of exported goods. In fact, their hypothesis of diversification along quality ladder rests on the hypothesis that high-wage leading countries successfully innovate due to their natural resources abundance and continually improve the quality of varieties in order to replace goods imitated by the low-wage followers.

More recently Melitz (2003) had taken into account the high heterogeneity in productivity and size of firms, both within and between industries, to provide a better understanding of heterogeneous firms' trade. These explanations have important implications on trade and development policies: for example, according to Melitz (2003), an increase in export variety - one of the sources of export diversification - can increase productivity given that exporters are more productive than non-exporters. In his model, technology is supposed to be exogenous to trade costs.

Although the empirical literature on the determinants is increasing, it remains far less rich than the literature on the determinants of exports performance. This is probably because of a lack of unified and systematic theoretical framework to perform simple empirical investigations. This empirical literature can be classified into three categories: panel data analysis (for e.g., Parteka and Tambieri, 2008 and 2013; Dennis and Shepherd, 2011; Agosin et al., 2012; Klinger and Lederman, 2011), region-specific analysis (see for e.g., Gutierrez de Pinerez and Ferrantino, 1997; Cabral, 2010), and country-specific analysis (see for e.g., Lim, 2010). Among all these studies, several potential candidates have been identified to explain export diversification, of which, the trade and financial liberalization, the domestic financial reforms, the country size (in economic terms, i.e. the level of economic development, and in geographic and/or population terms), the distance to main trading partners, the exchange rate volatility and overvaluation, the factor endowments (human capital and natural resources) and subsequently the importance of human capital in determining a country's ability to innovate, adapt and implement technologies developed in advanced economies (Mayer, 1996).

More specifically, the importance of technology has been emphasized in many of these empirical studies: Klinger and Lederman (2011, p.69) provide support to Imbs and Wacziard (2003)'s empirical findings of stage of diversification driven by technological development, by noting that "*export discoveries would be the results of technological convergence as developing economies adopt existing technologies to produce and export goods that are new to their economies but old for the advanced economies. As economies approach the global technological frontier, innovation becomes cutting edge*".

Although the importance of technological progress in countries' export diversification process has been highlighted in many of these studies, to our best knowledge, there has been no attempt of assessing how intellectual property could influence export diversification.

4. Discussion on IPRs protection effects on export diversification

Suppose the products exported by a given country are the outcomes of several factors, including the "knowledge capital". The latter varies in sophistication and inventive steps and could take two forms as inputs[9]: industrial knowledge, which is patentable (patentable innovation) and knowledge stemming from minor inventive activity (utility model innovations). In technologically lagging economies or firms, the nature of production is less reliant on Research and Development (R&D) activities (which are undeveloped) but rather on the abilities of countries to duplicate or creatively imitate from product designs of technologically advanced economies (see also Kim, 1997).

Within this framework, it is likely that the level of technological development determines the use of either knowledge capital inputs by a country. In the meantime, the protection by governments of these knowledge capital inputs could spur technological development (as noted in section 2) and subsequently countries' export diversification process. The production – and therefore the exports - of developing countries is therefore likely to depend on utility model innovations whereas that of developed economies would more likely be dependent on patentable innovations. It is worth highlighting that in developed countries, the adoption of utility model laws would not primarily be motivated by the promotion of industrial development, but rather be based on some legal grounds[10] – e.g., provision of recourse against unfair appropriation of effort, even for minor inventive efforts- (see Kim et al., 2012 for more details). In this context, the impact of the intellectual property rights protection – i.e., here, the protection of knowledge inputs - on export diversification would likely be hinging on the level of technological base (including through transfer of technology), though this protection could also contribute to the development of this technological base.

By making a distinction between countries with different levels of economic development, the latter being proxied by the income level, we consider in this study two groups[11] of countries: the High Income Countries (HICs) and the Lower and Middle Income Countries (LMICs). In line with our previous discussion, the production in the latter will be highly hinging on utility model innovations while the production in the former will be rather dependent on patentable innovations. Developing economies (henceforth, LMICs) notably the poorest, which lack technological capacity and are featured by a weak IPR protection regime, will not be able to spur innovation and develop the required technological base that would enable them to diversify their export away from the primary products (manufacturing and services production require high level of technological development). However, by adopting utility model laws to encourage and protect minor inventions, these countries could take advantage of the relatively low level of innovation by progressively developing their technological capacities, further spurring innovation and as result encouraging the diversification of their exports structure. In addition, in low-income countries, there may be some learning effect from past utility model innovations that can enhance the ability to conduct more innovative research and hence the production of R&D invested in developing patentable innovations. This could be an important contributor to export diversification in these countries. Overall, gradual innovation in these countries could allow for a progressively establishment of a viable technological base which will develop as countries accumulate technological learning and enhance technological capabilities so as to better produce patentable inventions at later stages (see also Kim et al, 2012 for this argument).

In the meantime, we could also expect an absence of statistically significant effect of tighter IPRs protection on export diversification in developing countries, if the latter lacks the technological capacities/base, the industrial knowledge, and the skill level or absorptive capacity to really take advantage of the strengthening of IPRs protection in order to diversify their export structure away from primary products. As noted by Naghavi (2005), the effectiveness of the IPRs protection system is dependent on how it impacts on innovation, market structure and technology transfer. It is important to highlight here that this reasoning rests on the hypothesis that technologically lagging economies could in the first years of IPRs laws strengthening, i.e., formative period of strong IPRs laws adopt utility models in order to pave the way for further strengthening IPRs laws. As a result, we should also expect the strengthening of IPRs law in these countries to facilitate export diversification.

Conversely, in more advanced economies, we can expect both the strength of IPRs protection and even the adoption of utility model laws to encourage export diversification through the high level of technological development and innovation.

Granted that the availability of both patents rights and utility model systems mainly affect the efficiency of knowledge production (Kim et al., 2012) and consequently the possible diversification of exports, we can expect that in advanced economies, both the strength of IPRs protection, notably patents rights and utility model systems would encourage the diversification of exports structure through the high level of technological development and innovation. Nonetheless, as we noted earlier (see section 3), the primary motivation for adopting protection for utility models laws in these countries would not be industrial development, but rather non-business and non-economic reasons.

In the next section, we present the empirical model underlying our assessment of how the strengthening of IPRs protection systems and the adoption of utility model laws affect export diversification. For the analysis, we consider the entire sample comprising both HICs and LMICs but also the sub-samples of HICs and LMICs.

5. Model Specification and Data Description

5.1 The Model Specification

The model presented below draws mainly on Agosin et al. (2012) who provide an empirical analysis of the exports diversification determinants for countries around the world. We amended slightly this model by introducing the intellectual property variables (namely patents rights and utility models law adoption) and by taking into account only the variables that could affect simultaneously both export diversification and the level of intellectual property protection.

For assessing whether or not the level of IPRs protection matters for countries' export diversification, we refer to the extant empirical literature on both the determinants of export diversification (see for e.g., Agosin et al., 2012; Parketa and Tamberi, 2013) and the determinants of Intellectual Property protection (see for e.g., Kim et al., 2012; Chen and Puttitanum, 2005) and consider the following model:

$$EDI_{i,t} = \beta_0 + \beta_1 IPR_{i,t} + \beta_2 UML_{i,t} + \beta_3 INOV_{i,t} + \beta_4 TP_{i,t} + \beta_5 EDU_{i,t} + \beta_6 GDPc_{i,t} + \beta_7 GDPcsq_{i,t} + \nu_i + \eta_t + \varepsilon_{i,t} \quad \textbf{(1)}$$

where i denotes the index of the country, t represents the index of the period (here, year); EDI is the Export Diversification Index, measuring the degree of export diversification of a given country in in a given year; IPR represents the level of intellectual property rights; UML is a dummy variable capturing the adoption of a utility model laws by a given country; it takes the value 1 if utility model laws exist in a country and the value 0, otherwise; INOV represents a measure of Innovation; GDPc and GDPcsq denote respectively the GDP per Capita and its square, both expressed in constant 2005 prices; GDPc is a proxy of the level of economic development; TP is a measure of Trade Policy, capturing the degree of trade openness; EDU represents a measure of human capital; ν_i is a set of country-specific effects; η_t is a set of year dummies (to account for the general trends in the index of export diversification, as well as common factors to all countries not explicitly included in the model and that affect this index). $\varepsilon_{i,t}$ is the error-term. The coefficients of the regressors are parameters to be estimated. Our variables of interest are mainly IPR, UML. The other explanatory variables act as control variables in model (1) because they could potentially affect simultaneously the degree of export diversification and our variables of interest. As noted above, the choice of these controls is largely determined by reference to the existing literature.

Note that in the model (1), we further include a dummy variable "LMICs", which takes the value 1 if a country belongs to the category of LMICs and, 0, otherwise (that is if the country belongs to the category of HICs). This dummy variable is interacted with our variables of interest cited above to evaluate the differential impact of these variables in developing countries versus developed countries.

Expected Effects of IPRs protection and the adoption of Utility model laws on export Diversification

From the theoretical discussion made in Section 3, we can summarize the expected effects of IPRs protection tightening and the adoption of utility model laws as follows: strong IPRs and/or adoption of utility model laws could reduce export concentration in both developed and developing countries and the coefficient obtained on the latter could be expected to be strong, and even higher than the one obtained on the former. In our specific case, given the way of interpretation of our dependent variable, we should be expecting a negative sign of the coefficient associated with the variable IPR and a negative sign of the coefficient associated with the variable UML. As emphasized by Kim et al. (2012), the coefficient estimate associated with the variable UML should be interpreted with caution as it only captures the marginal additional effect of adopting a utility model system on the degree of export diversification. A statistical significance of this coefficient should not mean that minor inventions are not produced or have no impact in other non-utility model countries.

Expected Effects of Innovation on export diversification: we can expect, all things being equal that a country with a high level of innovation and technological development would be able to develop its manufacturing and/or services sectors and therefore increase its degree of export diversification. A positive impact of innovation on export diversification is expected here (a negative sign of the coefficient of the variable "INOV"). As the strengthening of IPRs systems and/or utility model laws systems could affect export diversification mainly through innovation (though also possibly through transfer of technology), it is possible that we obtain a statistically insignificant effect of the variable "INOV" if our variables of interest (IPR and UML) appear to be statistically significant.

Expected Effects of the control variables on export diversification

-GDP and GDPsq: Dixit and Norman (1980) and Helpman and Krugman (1985) argue in the context of the new trade theory, that market size directly affects the degree of product differentiation, so that bigger countries can produce wider range of products, making them less specialized. Of course, at lower level of development where capital is scarce and investments projects are almost limited, there are limited diversification opportunities.

More recently, Imbs and Wacziard (2003) have shown evidence that economic development is associated with increased diversification of employment and production across countries. Klinger and Lederman (2004, 2011) and Cadot et al., (2011) have also obtained empirical evidence that export diversification across products appear to increase with the level of development up to a certain point.

Parteka and Tamberi (2013, pp.810) underline that more diversified (i.e. less specialised) structures of economic activity can run in parallel with higher levels of per capita output, which is one reason why development goes hand-in-hand with a better diversification climate. Parteka and Tamberi (2013) study the determinants of export diversification in a sample of developed and developing countries and show evidence that as countries develop (economic development measured by GDP per capita), export specialization decreases (export diversification increases). Moreover, they explore a quadratic formulation of the relationship between the level of economic development and the degree of export diversification (by introducing GDP per capita and its square in their model) and conclude on the significance of the quadratic formulation: the economic development level of a country is associated with less export specialization, i.e., more export diversification; however some reversal of the trend is plausible, because beyond a certain threshold of economic development, countries can become more specialized. We tested this idea in our study by including both GDP per capita and its square in our model. The signs of the coefficients of these two variables are a priori unknown.

- *Trade Openness (TP):* Melitz (2003) shows that in a monopolistic competition mode, each firm produces a different variety of the exported good so that trade liberalization can induce export diversification by raising the number of exporters in those sectors facing improved export opportunities. Conversely, for economies highly dependent in primary commodities for their exports, traditional explanations such as the factor-endowment Heckscher-Ohlin model can be appropriate when examining the potential effect of trade liberalization on export diversification (see also Agosin et al., 2012 for this argument). In those countries, trade reforms can induce export specialization or concentration by increasing the profitability of traditional (commodities) sectors. Krugman and Venables (1990), and Dennis and Shepherd (2011) also argue that trade liberalization can act as market extension, whilst Costas et al., (2008) note that the potential gains generated by trade may cause major product diversification. In this study, we could therefore expect a positive effect of trade policy reform on export diversification (meaning a negative sign of the coefficient associated with the variable "TP").

- *Human Capital (EDU)*: According to Aghion and Howitt (1998), human capital characteristics, among other factors, can affect general conditions for product diversification. Agosin et al., (2012) argue on the basis of Melitz (2003)'s model that human capital accumulation can lead to export diversification if it allows countries to change their specialization patterns from commodities to manufactured goods. As a result, we expect a negative effect of human capital accumulation on export concentration (i.e., a negative sign of the coefficient of the variable "EDU").

In the next sub-section, we describe the data used in the study.

5.2 Data description

The analysis is conducted on a panel dataset of 89 developing and developed countries (see Appendix 1 for the list of countries) over the period 1975-2003. The choice of the latter is dictated by data availability on the variables used in the model (1)[12]. The sub-sample of developing and developed countries, respectively Low-and-Middle-Income Countries (LMICs) comprising 55 countries and High Income Countries (HICs) comprising 34 countries, are listed in Appendices 2 and 3.

To capture medium term effects (a way also to smooth out business cycles effects on the variables) and account for the fact that changes in IPR schemes take time, we used five-year averages of the dependent variable and all the control variables, except for the dummy UML. Hence, for our period of study, we obtained 5 sub-periods of 5-year intervals (1975-1979; 1980-1984; 1985-1989; 1990-1994; 1995-1999) and 1 sub-period of 4-year interval (2000-2003).

Data on the dependent variable, EDI are obtained from the recent IMF Database on Diversification Toolkit[13] (released in June 2014). This Index, representing the overall export diversification is computed by the use of Theil indices following the definitions and methods used in Cadot et al. (2011). It is interpreted as the (reverse) measure of export diversification because higher values indicate lower diversification.

Data on IPR, UML and INOV are drawn from a dataset used by Kim et al., (2012)[14] in their study and provided by them with us.

IPR is an Index of patent rights, measuring the patent protection levels. It was developed by Ginarte and Park (1997) and updated by Park (2008). This index is to some extent relatively "subjective" because as stressed by Hudson and Minea (2013, pp.68), it is a “constructed” not a "measured” variable, and is based on Ginarte and Park's approach to the assessment of the strength of patent regimes. However, we use it in this study on the ground that it is the best measure available and as such is used in the empirical literature dealing with Intellectual Property Rights issues. This index is available every five years over the period 1960-2005 and covers more than 120 countries. Accordingly, in our study, we consider this variable at the beginning of each of our sub-periods. The Ginarte-Park index of patent rights provides a score that reflects a given country's overall level of patent rights and restrictions at a given point in time. The underlying data are based on statutory case laws, which interpret and apply the statutes (Kim et al., 2012). The strength of patent rights is a composite index, based on five categories of patent laws: duration of protection; subject matter that is patentable; membership in international treaties; enforcement mechanisms available; and the degree to which limitations on patent holders are not imposed (such as compulsory licensing) (Kim et al., 2012). Each of these categories (computed per country and per time-period) is scored a value ranging from 0 to 1, and the outweighed sum of these five values constitutes the overall value of the patent right index. As a result, the Ginarte-Park index ranges from 0 (no patent system) to 5 (strongest level of protection): higher numbers therefore indicate stronger protection.

The data on UML are extracted from Greene (2010). This dummy variable is used here because of the lack of a continuous variable capable to measure the strength of protection of minor inventions.

Regarding the Innovation variable (INOV), the literature suggests two ways of measuring: either through R&D expenditures, which aim at capturing the input innovation, or through the number of patents applications and/or patents granted, which represent inventive output. Because of the unavailability of R&D expenditures for many developing countries, we follow the tradition in the empirical literature and use the number of patent applications granted each year by the U.S. patent office to residents of a given country.

Data on the control variables stem from different sources. Data on per capita GDP are sourced from the World Bank's World Development Indicators (WDI) 2014 and are measured in 2005 US Dollars. We use Barro and Lee database to extract data on our measure of human capital, EDU: it is defined here as the average years of total schooling for the total population of a given country. Information on Trade Policy (TP) is measured by the Index of the freedom to trade internationally whose information come from the Fraser Institute (http://www.freetheworld.com). This Index ranges from 0 to 10, with a higher value indicating a higher level of international trade freedom.

Summary of descriptive statistics and correlation coefficients among the different variables over the full sample are reported respectively in Tables 1a and 1b (see below).

[**Tables 1a to 1d, here**]

[**Table 2 here**]

Table 2 (see above) provides some statistics on Utility models, IPRs, and Index of export diversification, both on the full sample and the sub-samples, and over the period 2000-2003. More specifically, in the column of Utility models, we report the number of countries - within each of the group of countries – in which there exists a system of utility model laws in the year 2000 (because as mentioned above, this index is available only every five years); in the column of IPR, the average values for each group of countries in the year 2000 are displayed (this index is also only available every five years); in the last column of the table, figures represent the average values of the variable EDI during the period 2000-2003. The message conveyed by this table can be read as follows:

- During the period 2000 - 2003, and as expected, developed countries (HICs) exhibited stronger IPR protection compared to those of developing economies (LMICs). Furthermore, we note that, the higher the average strength of the patent right index, the lower the average index of the export diversification, meaning that the developed countries with higher IPR protection experience higher export diversification. However, this does not mean at this stage of the analysis that the tightening of IPR protection (in 2000) causes export diversification. Only the empirical analysis will demonstrate it.

- In the year 2000, out of 89 countries, only 29 had adopted a system of utility model laws. It appears clearly and consistently with our prediction (see in particular section 4) that HICs show a low propensity to adopt utility model laws (only 9 out of 34 countries have done so) whereas LMICs show the reverse trend (20 out of 55 countries in our sample have adopted this system).

6. Estimation Strategy

The estimation of our model (1) by the use of fixed effects will provide insignificant results, merely because of little within variation in our main variables of interest, namely IPR and UML as well as in our dependent variable, EDI. Moreover, the estimation of (1) by the use of random effects will not sort out the problem of the little within-variation previously mentioned because the random effects estimator is a matrix-weighted average of the between- and within-effects, so whatever variation it picks up, is likely to be the between-variation in our case (see also Chowdhury et al., 2014) for this argument. We therefore follow the estimation strategy of the Chowdhury et al., (2014) which consists of estimating a pooled panel data analysis where we control for common time effects. We also cluster the standard errors at the country level.

The estimation of the pooled panel model by the use of ordinary least squares (OLS) technique could generate inconsistent and biased coefficient because of potential endogeneity that may arise from reverse causation and eventual measurement errors in our variables. For example, we can expect countries with higher exports diversification to obtain a higher number of US patents. Likewise, a double causality could be expected between each of the variables (GDP, GDPsq, TP and EDU) and the dependent variable, EDI.

To handle this problem of endogeneity, the empirical econometric literature suggests the use of instrumental variables. However, the latter are often unavailable or too weak (Brown et al., 2014) and in our particular case, it is a tough task to find good instruments that fit well with our model. To circumvent this difficulty, we adopt the alternative approach (identification through heteroscedasticity) proposed by Lewbel (2012) that allows traditional weak instrument testing and does not necessary require any external (outside) instrument. Indeed, this approach simply consists in using any heteroscedasticity present in the data to generate sets of instrument variables from within the model, even in the absence of any suitable instrument. Hence, instead of identifying the endogenous variables in the second-stage equation based on traditional exclusion restrictions, Lewbel (2012) approach suggests the identification by the use of higher moments. For the time being, this technique is valid only for cross-sectional data and has been widely employed in the empirical research[15].

To fix the ideas, let us consider a regression equation $Y = X\beta + W\lambda + e$ where X is a vector of endogenous variables and W, a vector of exogenous variables. The approach suggested by Lewbel (2012) is described as follows:

i) The researcher should identify a set of exogenous variable(s), denoted Z, where Z$\in$ W, or even Z=W. External (outside) instruments could be included in Z.

ii) The endogenous variable(s) in X are regressed on the Z vector, followed by the extraction of the residuals $\hat{e}$. The Lewbel (2012)'s technique is strongly hinges on the hypothesis that the residuals $\hat{e}$ must be heteroscedastic. Lewbel (2012) also suggests using the standard Breusch - Pagan type test to detect heteroskedasticity in these residuals.

iii) If the latter condition is met, the residuals are consequently used to construct the variable $(Z_i - \overline{Z}_i) * \hat{e}_i$ for the ith member of Z, where $\overline{Z}$ is the mean of Z_i.

iv) This variable $(Z_i - \overline{Z}_i) * \hat{e}_i$ can be considered as the standard instrumental variable in the second-stage regression. The latter can be estimated either by the standard IV technique or by the use of the two-step feasible GMM (Generalized Methods of Moments).

In this study, the instruments are constructed by considering as endogenous all our explanatory variables, except IPR and UML. In fact, we believe that the probability of bi-directional causality between IPR and EDI and, UML and EDI is very low. Moreover, even if such causality exist, the fact that the variables IPR and UML are taken at the beginning of each sub-period reduces severely the simultaneity bias. In addition, we include in the Z vector an external instrument, which is the "terms of trade". We suppose this variable to be correlated with the variables capturing GDP per capita and Trade Policy, while being exogenous with respect to the variable EDI. The "terms of trade" is the ratio of export unit value indexes to the import unit value indexes, measured relative to the base year 2005. Data on terms of trade variable come from the Penn World Table version 8.0. The model based on the pooled panel data is estimated in the second stage by the GMM technique[16]. For comparison purposes, we also report ordinary least squares (OLS) estimates where standards errors are also clustered at the country level.

7. Estimations Results

Table 3 and Table 4 (see below) present the results of the pooled panel model estimated by employing respectively both OLS and Lewbel (2012)'s instrumental variable GMM techniques. We first discuss the OLS estimations' results and them move to the results based on Lewbel (2012)'s instrumental variable GMM technique. Note that because of the possible collinearity between GDP, trade policy and IPR variables, we run the regressions with/and without the GDP variables, namely per capita GDP and its square. This allows us to check whether the magnitude and significance of our variables of interest are sensitive to the exclusion of GDP variables.

[**Tables 3 and 4, here**]

Let us start the interpretation of our results with the estimations based on OLS technique. Results of the model (1) estimations by OLS and without GDP variables are displayed in columns [1], [2] and [3] of Table 3. We observe evidence of a significant negative effect of IPR and UML variables on the dependent variable, suggesting that the strengthening of IPRs protection and the adoption of utility model laws strongly encourage export diversification. This observed impact applies to both LMICs and HICs, as the coefficients associated with the interactions of these two variables with the variable LMICs are statistically insignificant. In the meantime, an increase in innovation does not appear to affect export diversification. As noted above, this is an expected result and may suggest that the variables IPR and UML are capturing the effects of the variable "INOV" on export diversification. Trade liberalization and accumulation of human capital are positively associated with export diversification because the coefficients of these variables display the expected sign and are significant at 5% level. Interestingly, innovation in LMICs appears to better encourage export diversification than in HICs (the interaction between LMICs and INOV variables is negative and significant at 1% level).

The introduction of GDP variables (see results in column [4] of Table 3) does not affect the other estimates (when compared in particular with column [1] of the same table) but seems to cancel out the effect of IPR on export diversification. This may be suggestive of GDP variables absorbing the effect of IPR protection on the dependent variable. Nonetheless, the effect of GDP variables on export diversification (non-linear relationship) is in line with our predictions. That said, we also note that when we include interaction variables in the model, the coefficient associated with the variable capturing the square of GDP per capita is significant, but not the one associated with GDP per capita. In other words, an increase in the per capita GDP leads to a concentration of exports. This surprising effect may likely hide a possible differential effect depending on the sub-sample considered, but it may also attributed to the possible endogeneity bias of the GDP variables.

As far as the variables IPR, UML, INOV, EDU and the interaction LMICs*INOV are concerned, results in column [6] of Table 3 are roughly similar to those in column [3] of the same table. Additionally, the strengthening of IPRs protection, although spurring export diversification appears to exert a higher effect on HICs, compared to LMICs.

It is worth noticing that the degree of export diversification seems to be the same in LMICs and HICs (see columns [2] and [4] of Table 3).

Let us now turn to the estimates based on the Lewbel (2012)'s GMM technique.
The results based on this econometric technique are reported in Table 4 (both with and without the GDP variables).

[**Table 4 here**]

For the Lewbel GMM technique, the Breusch Pagan tests performed in the first-stages regressions show a p-value = 0, suggesting the presence of heteroscedasticity in the residuals extracted. In each of the columns [2], [4] and [6], the p-values associated with the Kleinbergen Paap rk LM statistic shows that the null hypothesis of model under-identification is rejected at the conventional level of 10% of statistical significance. In addition, in all these columns, the null hypothesis that the identifying instruments are exogenous (Hansen test of over-identification) is not rejected, as the p-values are always higher than 0.10 (for a statistical significance at 10% level).

Let us focus now on our estimations' results reported in Table 4. Before proceeding to the interpretation of these results, it is important to highlight that apart from the results obtained on the variable "IPR", the OLS estimates of Table 3 are roughly similar to those based on Lewbel GMM technique (in Table 4), though the level of statistical significance of coefficients may sometimes differ.

More specifically, when examining columns [1], [2] and [3] of Table 4, we observe evidence that the results are quite similar in terms of magnitude, although the statistical significance of the coefficients are higher with the instrumental variable technique than with OLS technique. Hence, strengthening of patents rights protection, adoption of utility model laws, trade liberalization and improvement in human capital stock are conducive to export diversification (all the coefficients – with the exception of the one associated with the variable "EDU" are statistically significant at 1%). However, and once again in line with our predictions, a rise in the degree of innovation appears to have no significant effect on export diversification, although the expected sign is observed (except in column [1] of Table 4). The results in columns [4], [5] and [6] of Table 4 are quite similar to those reported on the same columns of Table [3], apart from few exceptions: one of our variable of interest, IPR, is negatively and significantly (at 1% level of statistical significance) associated with the variable EDI when we use Lewbel (2012)' GMM technique. Moreover, in contrast with OLS estimates of GDP variables displayed in column [6] of Table 3, we obtain here evidence that after a certain level of economic development, countries tend to increase their export products specialization, thereby reducing the diversification of their exports. With respect to the variable capturing innovation, we find that an additional patent granted by the US patent office to a resident of LMICs will likely increase the degree of export diversification of these countries compared to high income countries. Once again, we obtain a higher effect on export diversification of strengthening of patents rights protection in developed countries compared to developing countries.

Overall, our results lead us to conclude that not only IPR protection strength is important for export diversification in both developed and developing countries, but also the adoption of utility model laws by countries, irrespective of the level of economic development, appears to be a strong determinant of export diversification. Granted, tightening of patents rights protection has a higher effect on developed countries than on developing ones, while adoption of utility model laws affects similarly these two groups of countries. Additionally, countries that open up their economies to trade, and countries that improve their human capital stocks are likely to better diversify their exports.

These results could dampen developing countries' reluctance to strengthen their intellectual property laws but also show their policymakers that the adoption of utility models could be a springboard to diversify their exports, pending the progressive strengthening of the intellectual property systems to establish a viable technological base.

8. Conclusion

This paper presents an assessment of the impact of strong Intellectual Property Rights (IPRs) protection and adoption of Utility Model Laws on export diversification in both developed and developing countries. The study covers 89 developing and developed countries (of which 55 developing countries) over the period 1975 - 2003. Using Lewbel (2012)'s Instrumental Variable approach in a pooled panel setting, we obtained evidence that strong IPRs – notably patents rights - protection and adoption of utility models laws encouraged significantly the diversification of exports in both developed and developing countries. More specifically, the results suggest evidence that the adoption of utility model laws exerts a strong positive effect on developing and developed countries alike. However, the impact of strong IPRs protection in reducing the concentration of their exports baskets appears to be higher in developed countries compared to developing ones.

In examining the economic growth effects of IPRs system, many authors (for e.g., Maskus, 2000; CIPR, 2002; Kumar, 2002; Dolfsma, 2006;) argued that developed and developing countries that have achieved substantial growth rates have all fine-tuned their IPRs system to match their development needs, rather than implement a wholesale IPRs policy. In the same line, Kim et al., (2012) have also shown evidence that it is not only the strength of intellectual property rights protection that matters for innovation and growth, but also the type of protection. In other words, these authors have underlined that the availability of legal protection for minor, adaptive inventions should most be useful to firms with low technological capacities and limited resources. Developing countries, when acceding to the WTO often agree to reform their IPRs systems as part of their accession negotiations. As noticed by Adams (2008), the challenge of reforming IPRs systems requires a strategy of maximizing the gains of tightening IPRs protection, while limiting the potentially adverse effects of improved protection to facilitate the access of local entrepreneurs to the fruit of the IPR systems, as it was the case in India and the Republic of Korea. In this respect, the adoption of utility model laws by these countries, in particular the lower income countries would be very helpful in creating incentives for innovation, technological development and thereby export diversification. Such strategy, by acting as a springboard to export diversification, could allow a progressive strengthening of the intellectual property systems in order to establish a viable technological base. At the international level, lower income countries could have the support of both the World Trade Organization (WTO) - given their flexibilities in the TRIPs Agreement and despite the lack of an explicit reference to utility model laws in this Agreement - and the World Intellectual Property Organization (WIPO) conventions, one of which explicitly recognizes the importance of utility models for them. Moreover, WTO and WIPO provide significant technical assistance to these countries.

Finally, it is worth highlighting that an important limitation in this study is our incapacity to perform the analysis on the category of Least Developed Countries (LDCs) because of data constraints. This could be a future research avenue when data becomes available.

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APPENDICES AND TABLES

Appendix 1: Full Sample considered in the dataset

Algeria	Czech Republic	Iceland	Morocco	Singapore	Uruguay
Argentina	Denmark	India	Netherlands	Slovak Republic	Venezuela
Australia	Ecuador	Indonesia	New	South Africa	Zambia
Austria	Egypt, Arab	Iran, Islamic	Nicaragua	Spain	Zimbabwe
Bangladesh	El Salvador	Ireland	Niger	Sri Lanka	
Belgium	Finland	Israel	Norway	Sweden	
Bolivia	France	Italy	Pakistan	Switzerland	
Brazil	Gabon	Japan	Panama	Syrian Arab	
Bulgaria	Germany	Jordan	Paraguay	Tanzania	
Canada	Ghana	Kenya	Peru	Thailand	
Chile	Greece	Korea, Rep.	Philippines	Trinidad and	
China	Guatemala	Lithuania	Poland	Tunisia	
Colombia	Guyana	Malawi	Portugal	Turkey	
Congo, Dem Rep of	Haiti	Malaysia	Romania	Uganda	
Congo, Rep.	Honduras	Mali	Russian	Ukraine	
Costa Rica	Hong Kong,	Malta	Senegal	United Kingdom	
Cyprus	Hungary	Mexico	Sierra	United States	

Appendix 2: List of countries in the Sub-sample of Low and Middle Income Countries (LMICs)

Algeria	Costa Rica	Hungary	Mexico	Senegal	Uganda
Argentina	Ecuador	India	Morocco	Sierra Leone	Ukraine
Bangladesh	Egypt, Arab Rep.	Indonesia	Nicaragua	South Africa	Venezuela
Bolivia	El Salvador	Iran, Islamic Rep.	Niger	Sri Lanka	Zambia
Brazil	Gabon	Jordan	Pakistan	Syrian Arab	Zimbabwe
Bulgaria	Ghana	Kenya	Panama	Tanzania	
China	Guatemala	Malawi	Paraguay	Thailand	
Colombia	Guyana	Malaysia	Peru	Trinidad and Tobago	
Congo, Dem Rep of the	Haiti	Mali	Philippines	Tunisia	
Congo, Rep.	Honduras	Malta	Romania	Turkey	

Appendix 3: List of countries in the Sub-sample of High Income Countries (HICs)

Australia	Czech Republic	Hong Kong, China	Korea, Rep.	Portugal	Switzerland
Austria	Denmark	Iceland	Lithuania	Russian Federation	United Kingdom
Belgium	Finland	Ireland	Netherlands	Singapore	United States
Canada	France	Israel	New Zealand	Slovak Republic	Uruguay
Chile	Germany	Italy	Norway	Spain	
Cyprus	Greece	Japan	Poland	Sweden	

Table 1a: Summary of descriptive statistics on the full sample as well as the sub-samples

Table 1a: Descriptive statistics on the Full Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
EDI	518	2.99	1.17	1.12	6.04
IPR	506	2.41	1.07	0.59	4.88
INOV	459	2269.55	12961.85	1.00	178873.00
GDPc	511	9876.43	12343.61	121.28	61753.46
TP	498	5.89	2.46	0.00	9.97
EDU	534	6.63	2.83	0.45	12.69

Table 1b: Descriptive statistics on the sub-sample of LMICs

Variable	Obs	Mean	Std. Dev.	Min	Max
EDI	327	3.52	1.07	1.47	6.04
IPR	318	1.90	0.79	0.59	4.42
INOV	264	28.71	80.58	1.00	791.00
GDPc	319	2316.31	2370.35	121.28	14626.29
TP	312	4.71	2.13	0.00	9.11
EDU	330	5.13	2.30	0.45	11.20

Table 1c: Descriptive statistics on the sub-sample of HICs

Variable	Obs	Mean	Std. Dev.	Min	Max
EDI	191	2.07	0.67	1.12	4.33
IPR	188	3.26	0.93	1.33	4.88
INOV	195	5303.30	19507.64	1.00	178873.00
GDPc	192	22437.26	11975.97	2800.87	61753.46
TP	186	7.86	1.53	1.92	9.97
EDU	204	9.05	1.71	3.80	12.69

Table 1d: Bivariate Correlations: Full sample

Variables	EDI	IPR	UML	INOV	GDPc	TP	EDU
EDI	1						
IPR	-0.4867*	1					
UML	-0.1566*	0.2803*	1				
INOV	-0.1770*	0.3027*	0.0054	1			
GDPc	-0.3375*	0.6874*	0.0377	0.2684*	1		
TP	-0.5156*	0.6196*	0.2821*	0.1767*	0.6043*	1	
EDU	-0.5907*	0.6463*	0.1160*	0.2530*	0.5406*	0.6262*	1

Note: * indicates statistical significance at the 10% level.

Table 2: IPR, Utility Model and Export Diversification per group of countries, over the period 2000-2003

Group of Countries	Utility Model Adoption	IPR	EDI
Full Sample	29	3.357	2.905
LMICs	20	2.868	3.336
HICs	9	4.147	2.188

Note: The figures on IPR in this table represent the mean of each of these variables for each group of countries, in the year 2000. By contrast, the figures related to the variable "Utility Adoption Model" indicate the number of countries within each of the Group of countries that have adopted utility model laws in the year 2000. The figures on EDI represent the average values of the variable EDI during the period 2000-2003.

LMICs without a Utility Model Law in 2000s: Bangladesh, Democratic Republic of the Congo, Guyana, India, Iran, Islamic Rep., Jordan, Malawi, Malta, Nicaragua, Pakistan, Paraguay, Sierra Leone, South Africa, Sri Lanka, Tanzania, Trinidad and Tobago, Tunisia, Uganda, Zambia, Zimbabwe.

HICs without a Utility Model Law in 2000s: Cyprus, Iceland, Israel, New Zealand, Norway, Singapore, Sweden, United Kingdom, United States.

LDCs without a Utility Model Law in 2000s: Bangladesh, Democratic Republic of the Congo, Malawi, Sierra Leone, Tanzania, Uganda, Zambia.

Table 3: Estimation's Results: OLS technique

	Dependent Variable: Export Diversification Index, EDI					
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	OLS	**OLS**	**OLS**	**OLS**	**OLS**	**OLS**
IPR	-0.256***	-0.198*	-0.266**	-0.178	-0.173	-0.330*
	(0.0950)	(0.104)	(0.118)	(0.137)	(0.137)	(0.177)
UML	-0.417**	-0.393**	-0.419**	-0.385**	-0.361**	-0.316**
	(0.160)	(0.161)	(0.168)	(0.162)	(0.171)	(0.156)
INOV	-6.02e-07	-1.10e-06	-8.09e-08	-1.58e-06	-1.92e-06	-1.64e-07
	(2.03e-06)	(2.16e-06)	(2.21e-06)	(2.20e-06)	(2.22e-06)	(2.24e-06)
TP	-0.106***	-0.0843**	-0.083**	-0.088**	-0.082*	-0.086**
	(0.0382)	(0.041)	(0.038)	(0.043)	(0.044)	(0.040)
EDU	-0.115***	-0.0916**	-0.090**	-0.089**	-0.082*	-0.091**
	(0.0391)	(0.0439)	(0.0397)	(0.044)	(0.046)	(0.043)
GDPc				-5.19e-05**	-4.08e-05	-2.51e-05
				(2.09e-05)	(2.80e-05)	(2.81e-05)
GDPcsq				1.12e-09***	9.68e-10**	7.89e-10*
				(3.24e-10)	(4.27e-10)	(4.03e-10)
LMICs		0.341	-0.0269		0.224	-0.312
		(0.252)	(0.464)		(0.300)	(0.459)
LMICs*IPR			0.207			0.334*
			(0.130)			(0.178)
LMICs*UML			0.0318			-0.088
			(0.272)			(0.260)
LMICs*INOV			-0.004***			-0.0042***
			(0.0009)			(0.0009)
year1	-1.009***	-0.791***	-0.825***	-0.699***	-0.635***	-0.708***
	(0.163)	(0.234)	(0.207)	(0.218)	(0.227)	(0.196)
year2	-0.442***	-0.346***	-0.356***	-0.293***	-0.268**	-0.293***
	(0.0771)	(0.107)	(0.0922)	(0.099)	(0.103)	(0.0860)
year3	-0.279***	-0.220***	-0.228***	-0.190***	-0.175**	-0.191***
	(0.0496)	(0.0670)	(0.0578)	(0.0671)	(0.0682)	(0.0569)
year4	-0.206***	-0.171***	-0.175***	-0.153***	-0.145***	-0.153***
	(0.0347)	(0.0441)	(0.0380)	(0.0445)	(0.0452)	(0.037)
year5	-0.0793***	-0.0675***	-0.076***	-0.0610***	-0.058***	-0.067***
	(0.0147)	(0.0167)	(0.015)	(0.0175)	(0.017)	(0.016)
Constant	5.662***	4.888***	5.117***	5.237***	4.892***	5.296***
	(0.383)	(0.697)	(0.713)	(0.541)	(0.680)	(0.698)
Number of Countries	89	89	89	89	89	89
Observations	431	431	431	425	425	425
R-squared	0.435	0.444	0.503	0.459	0.461	0.523

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis. The EDI variable as constructed by the IMF is in fact a concentration Index. Hence, an increase in EDI means an increasing concentration of exports and a decrease in EDI signifies export diversification. OLS represents the Ordinary Least Squares technique where standard errors are clustered at the country level.

Table 4: Estimation's Results: Lewbel (2012)' GMM technique

	Dependent Variable: Export Diversification Index, EDI					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Lewbel	Lewbel	Lewbel	Lewbel	Lewbel	Lewbel
IPR	-0.255***	-0.211***	-0.216***	-0.218***	-0.242***	-0.238***
	(0.062)	(0.064)	(0.058)	(0.08)	(0.073)	(0.074)
UML	-0.484***	-0.472***	-0.421***	-0.43**	-0.394***	-0.356***
	(0.096)	(0.090)	(0.111)	(0.08)	(0.088)	(0.091)
INOV	2.23e-06	-7.13e-07	-1.35e-06	-7.43e-07	-1.49e-06	-1.48e-06
	(1.76e-06)	(1.61e-06)	(1.25e-06)	(1.45e-06)	(1.47e-06)	(1.16e-06)
TP	-0.108***	-0.126***	-0.113***	-0.096***	-0.121***	-0.127***
	(0.035)	(0.039)	(0.034)	(0.034)	(0.0315)	(0.024)
EDU	-0.0895***	-0.0583*	-0.062**	-0.064**	-0.035	-0.056**
	(0.0319)	(0.0354)	(0.031)	(0.028)	(0.027)	(0.025)
GDPc				-0.00004***	-0.00002	-0.000033**
				(0.000015)	(0.00002)	(0.000014)
GDPcsq				8.75e-10***	6.53e-10**	8.38e-10***
				(2.19e-10)	(2.32e-10)	(1.98e-10)
LMICs		0.255	0.197		0.285*	-0.084
		(0.163)	(0.273)		(0.163)	(0.213)
LMICs*IPR			0.115			0.186**
			(0.087)			(0.0897)
LMICs*UML			-0.010			-0.022
			(0.168)			(0.145)
LMICs*INOV			-0.0045***			-0.004***
			(0.0007)			(0.0006)
year1	-1.047***	-0.891***	-0.786***	-0.809***	-0.745***	-0.677***
	(0.1459)	(0.175)	(0.145)	(0.156)	(0.140)	(0.119)
year2	-0.4519***	-0.400***	-0.343***	-0.350***	-0.339***	-0.303***
	(0.0680)	(0.084)	(0.067)	(0.073)	(0.066)	(0.056)
year3	-0.2979***	-0.275***	-0.235***	-0.243***	-0.240***	-0.210***
	(0.0426)	(0.051)	(0.042)	(0.049)	(0.044)	(0.038)
year4	-0.2018***	-0.198***	-0.170***	-0.176***	-0.177***	-0.157***
	(0.0297)	(0.033)	(0.027)	(0.034)	(0.031)	(0.026)
year5	-0.075***	-0.072***	-0.069***	-0.064***	-0.064***	-0.062***
	(0.015)	(0.015)	(0.013)	(0.015)	(0.014)	(0.013)
Constant	5.467***	5.045***	4.90***	5.199***	4.90***	5.142***
	(0.248)	(0.499)	(0.46)	(0.309)	(0.337)	(0.315)
Underidentication test	0.0000	0.0003	0.038	0.0001	0.027	0.027
Hansen Over-ID test	0.305	0.051	0.204	0.365	0.338	0.595
Number of Countries	89	89	89	89	89	89
Observations	418	418	418	416	416	416
R-squared	0.423	0.428	0.489	0.449	0.445	0.506

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis. The EDI variable as constructed by the IMF is in fact a concentration Index. Hence, an increase in EDI means an increasing concentration of exports and a decrease in EDI signifies export diversification. Under-identification test refers to Kleinbergen-Paak rk LM statistic and its p-value. Hansen Over-ID test is the Hansen test of over-identification. OLS represents the Ordinary Least Sqaures technique where standard errors are clustered at the country level. Lewbel GMM is the estimation method based on identification-through heteroscedasticity a la Lewbel (2012), performed here by the use of the two-step feasible GMM (Generalized Methods of Moment).