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AN INTERNATIONAL ANALYSIS

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THE IMPACT OF INTELLECTUAL PROPERTY RIGHT REGIMES ON SELF EMPLOYED ENTREPRENEURSHIP: AN INTERNATIONAL ANALYSIS

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Abstract

The importance of IPR regimes for large firm innovation is well documented but less is known about their impact on self-employed entrepreneurship which is typically less innovative. The paper sets out to estimate the net effect of the various elements that comprise an IPR regime including the political system, the laws, and institutions as well as a general familiarity with and respect for IPR related products. Cumulatively, the analysis indicates that a well developed IPR regime has a net positive effect on the self-employment activity. Since the self-employed sector is possibly the only segment of the enterprise base where IPRs may be expected to have a negative effect it provides a useful contribution to our empirical understanding of the welfare effects of IPRs on the entrepreneurial economy and economic development more widely.

Contrary to some of the most vocal objections to the TRIPS Agreement we find that rather than undermine the self-employed enterprise base it actually boosts it. We find that half-hearted IPR conventions, in this case the Phonograms Convention, designed to accommodate countries with a weak desire to support IPRS undermines this positive effect. We do not find any evidence to suggest that the organizations which tend to be associated with the enforcement of IPR laws such as Interpol, ISO, PCA, UNCTAD, UNESCO, WIPO and the WTO had any effect over and above WIPO and the WTO helping to create TRIPS in the first place.

The evidence in the paper indicates that the standard practice of international economic development aid where recipient countries have been encouraged to embrace democracy and IPRs (in particular, the TRIPS Agreement) seems to have been prudent. Most likely these initiatives would act to boost the self-employed enterprise base in developing and transition economies.

Keywords: self-employment, intellectual property rights, law

1. Introduction

Innovation and intellectual property rights are often heralded as key components underlying the entrepreneurial economy. Entrepreneurial organisations are predominantly characterised by the commercialisation of innovation but often are the source of the innovation too. This process in large firms has been extensively analysed (See Martin 2002 for an overview) and its roots date back to the work of Schumpeter (1942). The ability of firms in this environment to recoup fixed costs relies on their ability to thwart imitation. Without some impediment to imitation innovators face unfair competition where imitators can free-ride on the R&D costs and risks undertaken by innovators. Thus, the existence and enforcement of intellectual property right (IPR) laws become important determinants of large firm innovative activity (see Arrow 1962, and Besen and Raskind 1991 for an overview of the economic motivation of IPR laws). More recently, the innovation activity of smaller firms has been highlighted (for a perspective, see Audretsch 1995) as well as the role for venture capital backed organisations (Gompers and Lerner, 1999). However, Bhide (2000) demonstrates that the vast bulk of new ventures are not very innovative. This observation is supported by the data from the Global Entrepreneurship Monitor (Bosma and Harding 2006). Bhide argues that most new ventures are mainly imitative with low growth prospects. Thus, he labels these small firms as 'marginal businesses'. Studies such as Burke, Fitzroy and Nolan (2000) indicate that vast bulk of the self-employed (over 95%) would fit this category. Whether or not the self-employed sector benefits or not from intellectual property right laws and culture has been a largely overlooked area of research. Most likely because is too often assumed that imitation intensive firms are likely to be negatively affected by IPR laws intended to make imitation more difficult/costly. The purpose of this paper is to investigate this neglected area of research. We investigate how mostly less innovative and more imitative self-employed entrepreneurial firms are affected by intellectual property right laws. Although most of the self-employed sector is comprised of marginal firms, at an aggregate level it is very significant - if not the most important (Audretsch and Thurik 2004) – part of the entrepreneurial economy. Furthermore, it as been argued in many quarters (e.g. Schmitz 1989, Schultz 1975, 1980) that on aggregate imitative activity is more important than innovative activity; particularly where it magnifies and speeds up the diffusion of new technologies in the economy. Thus, it is remarkable that at present there has been very little empirical analysis investigating how the creation and enforcement of intellectual property rights (IPR) affects this sector.

Therefore, the purpose of this paper is to shed some light on how the predominantly imitative self-employed sector has reacted to IPR creation, enforcement and culture. The idea is that this study can then be used as means to flesh out in a more comprehensive fashion the wider impact of IPRs on the entrepreneurial economy. Therefore, in this context our contribution is to focus on the neglected impact of IPRs on self-employment

and we use international panel dataset in order to capture cross country and temporal changes in an IPR regime comprising the laws, institutions, economic activity and culture.

The rest of the paper is structured as follows. In the next section we discuss the theoretical framework and the data. This is followed in section 3 by an outline of the econometric methodology and the results. The concluding section of the paper draws out the implications of the findings of the paper.

2. Theoretical framework and data

We draw together the economics literature on self-employment with the law and economics literature relating to R&D and innovation. We use the wage worker *versus* self-employment career choice model developed by Kihlstrom and Laffont (1979) and Evans and Jovanovic (1989). The basic premise assumes that income is a major part of the utility functions of members of the workforce. Therefore, the number of people who choose to become self-employed is a positive function of earnings from self-employment ($\prod$) and a negative function of its opportunity cost, the wage rate (w). Net entrepreneurial income (y) is defined

$$y = \prod - w \qquad\qquad (1)$$

y as an argument in individual's utility function where an increase in y increases the likelihood that an individual will choose to become self-employed rather than take up wage work. We define y as being comprised of the sum of each self-employed venture's profit function *plus* the wages paid by the self-employed individual to herself. Intellectual property rights law, institutions and culture can play an important role in defining the profit function and within that, the impact of entrepreneurial ability. Since intellectual capital can form both an input and an output of the business it can enter both the revenue and the cost functions. Hence its impact on self-employed income is often ambiguous. If one takes the view that IPR laws act to restrict access to technology for imitative firms then one should expect the negative effect to dominate. If alternatively one expects that IPRs will create new profit opportunities for new ventures by creating new opportunities which can be imitated and which are best exploited by new small firms then they may be expected to have a positive effect. What we are saying in fact is that the conditions which define whether or not IPRs are beneficial to economic welfare are the same in terms of those assessing the net impact on self-employments rates.

The law and economics literature distinguishes between the dual effect of IPRs on welfare, namely their impact on an incentive for firms to innovate versus what Landes

(2003) describes as consumer *access to* and Cornish (1999) describes as *dissemination* of creative works to consumers. In the case of self-employment profit functions the key is knowing whether the marginal effect of IPRs on the knowledge stock (through increased innovation) from which the self-employed may imitate is greater than their marginal effect on restricting access to this knowledge stock by increasing the monopoly power of innovators. Thus, in terms of the paper we seek to assess which effect dominates but we also attempt to ascertain whether the effect is uniform across every aspect of the entire IPR regime such as the laws, institutions, culture etc or whether its affect may vary.

We now describe the variables used in the analysis and explain how they might be expected to influence the rate of self-employment. The data is drawn from three sources comprising the World Bank's 'World Economic Indicators' (WEI), the International Labour Organization's 'Key Indicators of the Labour Market' (ILO), and the International Federation of Phonographic Industries (IFPI). A list of the countries used in the analysis is presented in Appendix 1. The list of variables along with their means and standard errors are presented in the Appendix 2.

Research such as Burke, FitzRoy and Nolan (2002) indicates that the specification of the determinants of male and female self-employment levels can be radically different and therefore, we opt for two separate equations for males and females rather than an aggregate equation using a gender dummy variable. Our main purpose is to capture the impact of the existence of the IPR regime/culture on both male and female self-employment rates. We now describe the general specification used in each equation. We initially discuss the IPR related variables which are central to the motivation of the paper. We then move on to discuss control variables drawn from the small business economics literature and which relate to the main economic factors that determine the rate of self-employment. We consider a range of represented by the vector x that have an impact on net self-employed income $y(x)$. From equation 1 arguments which have a positive (negative) effect on y increase (reduce) the utility from self-employment and will hence raise (reduce) the self-employment rate. We discuss legal factors first because they are the core focus of the paper and then move on to discuss the remaining elements of the vector x.

Legal factors

We aim to attempt to test for the effect of a very wide range of means through which the IPR regime may affect self-employment rates. Thus we consider the following:

IPR laws: since all the countries in the sample have IPR laws we test to see the extent to which these conform to particular norms and styles. We do this by assessing the impact of membership of key international IPR conventions. In order to join these international conventions the national laws must conform to the style, objectives and principles

underlying them. In addition it might also indicate a level of some political support for these objectives. We test the impact of 4 IPR related international agreements/conventions. Two of these relate to IPRs in general and the other two are specific to the music industry. In all four cases, we use a discrete (1,0) variable and also a variable testing for the duration of membership, conscious of the fact that it might take time for these conventions to make an impact. Therefore, we include variables which capture the length of time in which a country has been a member of the Berne Convention and TRIPS Agreement respectively in order to test the impact of general conventions - that aim to have implications for the economy as a whole rather than being specific to a particular industry.

The Berne Convention is the oldest and most fundamental general convention on intellectual property rights. It sets out statutes and principles which have become the core underlying standards for most types of IPR law. In contrast the TRIPS agreement is a much more specific convention which attempts to build upon Berne in order to cater for a more complex business and technological environment in an ever increasing global and developing World economy. We constructed these variables from IFPI data and information from the World Trade Organization.

We also have similar variables for membership of the Rome and Geneva conventions for industry specific laws with a view to see if see if moves to create an IPR conducive culture in one industry – in this case, the music industry – have spillover effects on the self-employed economy more generally and/or in fact capture a general political will to legislate more robust/strong forms of IPR laws. The 1960 Rome Convention was a very specific and binding agreement which dealt with IPR issues surrounding the manufacture, distribution and sale of pre-recorded music. The specificity of the Convention discouraged many countries form signing up. As a result, ten years later the music industry produced a much less specific and committal convention to deal with similar areas covered by the Rome Convention. This new convention became known as the Phonograms Convention. The two conventions provide us with an opportunity to not only test if spillover effects from a single industry to an economy exist but also to see whether such spillover effects flow more or less easily when the convention is more general in its legal from. Alternatively, to see whether a high commitment to support IPRs (e.g. the Rome Convention) acts as a positive stimulus to IPR related performance in the rest of the economy and likewise whether a weak IPR convention (such as Phonograms) acts to undermine IPR based economic activity. Tables 1 and 2 contain correlation matrices for these conventions and self-employment rates. It is evident that there is significant variation in the membership durations across the panel of countries and little correlation with male and female self employment rates.

Table 1: Correlation Matrix of Male Self-employment Rates and Duration in IPR Conventions

	Self-Employment	TRIPS	Rome	Geneva	Berne
Self-Employment	1.00				
TRIPS	0.00	1.00			
Rome	-0.31	0.10	1.00		
Geneva	-0.41	0.26	0.52	1.00	
Berne	0.00	0.00	0.52	0.41	1.00

Table 2: Correlation Matrix of Female Self-employment Rates and Duration in IPR Conventions

	Self-Employment	TRIPS	Rome	Geneva	Berne
Self-Employment	1.00				
TRIPS	-0.04	1.00			
Rome	-0.36	0.10	1.00		
Geneva	-0.27	0.26	0.52	1.00	
Berne	0.12	0.00	0.52	0.41	1.00

The legal and political system/culture. Here we want to account for the legal and political cultural context in which IPR laws exist in order to see if these have an impact on the effect of IPR laws on self-employment rates. We include a set of dummy variables which define whether the legal code in each country is based on civil, common, Islamic or transition economy law (WEI data). It is not clear what effect these legal systems may have. On the one hand, common and civil law countries were the originators of IPR laws and hence may be expected to be the most conducive to IPR related economic activity. However, Baumol (1990) has also raised the prospect that legal systems which are conducive to a litigation culture can be detrimental for enterprise in that they can inspire destructive economic activity based around a rent seeking style motivation. Thus, *a priori* the impact of these legal systems on self-employment is ambiguous. We also include a set of dummy variables which define the political system including a republic, monarchy, communist and dictatorship (WEI data).

Legal institutions. We investigate the importance of legal institutions either directly or indirectly relevant for the creation and enforcement of IPR laws. Thus, we include a set of variables which define whether or not a country is a member of the International Criminal Police Organization (Interpol), International Organization for Standardization (ISO), the Permanent Court of Arbitration (PCA), United Nations Conference on Trade and Development (UNCTAD), United Nations Educational, Scientific and Cultural

Organization (UNESCO), the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO). All the data is taken from the World Bank's WEI database. In general, we would expect membership to be associated with a more prevalent culture of respect for intellectual property.

Respect for Intellectual property. In order to capture the extent to which IPR laws are respected we include a variable which measures the proportion of the CD music album market that is accounted for pirate produce. Since the CD music albums are widely popular consumer product we feel that this gives a reasonable estimation of how much intellectual property in a key product is respected. This data is provided by the International Federation of Phonographic Industries (IFPI).

Level of Patent activity. Patents are often used as a gauge of innovative activity. But since not all innovations which can be patented are actually patented they also contain a measure of the extent to which innovation is controlled monopolistically. Thus, patents can act to either boost or retard self-employed entrepreneurship. On one hand the availability of new technology creates new profit opportunities which can be exploited by self-employed entrepreneurs. Alternatively, if key technology becomes monopolistically controlled due to the IPR protection then it may act to make market entry more difficult. A third effect may result from a role model or demonstration effect where high levels of patent registrations demonstrate new possibilities for business venturing and may indeed inspire others to follow by example. In order to avoid endogeneity problems we do not use patents registered by residents as a variable as many of these will have been filed by self-employed entrepreneurs. Instead, in order to get an exogenous measure of the level of patent IPR innovative activity, we use the number of patents registered by foreign nationals (WEI).

IPR related consumer and media products: Here we assess whether a high usage of IPR intensive products act to increase awareness and support for IPR and in turn affect self-employed entrepreneurship. We also consider that many of these media related products are transmitters of information and therefore may increase the knowledge base and promote self-employed entrepreneurship. Thus we include variables which measure the number of personal computers (WEI) , TV (WEI), cable television (WEI), CD music albums (IFPI), mobile phones (WEI), internet (WEI), and daily newspapers sold (WEI) in each country.

Control variables from the economics of self-employment.

Wage rate: we include the wage rate (ILO) to account for the opportunity cost of self-employment and hence expect a negative sign.

Unemployment. We know that higher levels of unemployment can result in a lower probability that an individual can secure wage work and hence can push individuals into self-employment. Thus, we include a measure of the unemployment rate (ILO) in order to account for the likely positive effect between unemployment and self-employment rates.

Cost of capital: we use the interest rate (WEI) to account for the costs of capital which would be expected to have a negative affect on self-employment rates.

Composition of National Income: we use percentage of labour force in manufacturing, services and agriculture to account for some of the diversity in the economic composition of GDP (WEI). In developed countries higher levels of self-employment tend to be associated with a higher proportion of GDP accounted for by the service sector which tends to have lower minimum efficient scale. By contrast, less developed countries with small scale farming may also have higher levels of self-employment. We also include information technology as a percentage of GDP to capture the recent growth in hi-tech self-employment ventures.

Education: Higher levels of education may raise entrepreneurial ability and enhance the rates of self-employment. However, the same increase in human capital is likely to increase labour productivity and hence the wage rate thereby raising the possibility that it may reduce self-employment. Due to data limitations and variations in economic development across the sample of countries, we use pupils in primary education as a percentage of the population as an independent variable. Thus, this education measure only captures the impact of early school education.

Age of population: it is now well documented that the propensity of individuals to choose to become self-employed varies by age group (see Storey, 1994 for an overview). It is also the case that profit opportunities vary by age group due to differences in the age composition of consumer demographics. Data limitations resulting from our panel of countries prevent us from testing the impact of anything other than the size of the work age population (15-64), children (0-14) and the elderly (64+).

Life expectancy at birth: if self employment involves a level of start-up investment for a future stream of income from a particular venture then the longer the life of the individual the greater the value of present discounted value of future free cash flows (FCFs). Thus, since wage work lacks start-up investment it follows that the longer the life expectancy of the individual the more likely she may find that self-employment is the more optimal career choice. In order to capture this effect we use life expectancy at birth across the panel of countries as an independent variable.

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We have surveyed the elements of the vector *x* that have an impact on net self-employed income *y(x)*. In the next section, we test their impact on the rate of self employment *S(y(x))* across the countries in the sample. The self-employment literature (for surveys, see Storey 1994 and Parker 2004) has shown that *S'(y) > 0* so the sign on *y'(x)* can be gleaned from estimation of *S'(x)* which we test in the next section. In other words, since

$$\frac{\partial S}{\partial x} = \frac{\partial S}{\partial y}\frac{\partial y}{\partial x} \qquad\qquad (2)$$

it follows that since *S'(y) is < 0* then *S'(x) > 0* is a necessary and sufficient condition for *y'(x) > 0*. The same correspondence applies to *S'(x) > 0* and *S'(x) = 0* and *y'(x) > 0* and *y'(x) = 0* respectively. Thus, the estimates in the next section allow us to assess the impact of the vector *x* (in our case mainly comprised IPR related variables) on self-employed income in a similar fashion to that used in Evans and Jovanovic (1989) and Blanchflower and Oswald (1998).

3. Econometric Model and Results

The following model is used to estimate the impacts of IPR laws and western culture on international self-employment rates:

$$S_{it} = x'_{it}\beta + u_i + \varepsilon_{it} \qquad\qquad (3)$$

where: *x* is a column vector of IPR and other independent variables outlined in the previous section, u_i represents time invariant, country-specific, unobservables; and ε_{it} is an iid disturbance term. The assumption that u_i is stochastic gives rise to the random effects model; fixed effects arise where u_i is non-random.

The random effects estimator is known to be consistent and efficient under the assumption $cov(x_{it}, u_i) = 0$. In contrast, under the same assumption, the fixed effects estimator is consistent but inefficient. Accordingly, in the following estimation, we prefer the random effects GLS estimator on grounds of efficiency. [1]

However, GLS is inconsistent if $cov(x_{it}, u_i) \neq 0$, whereas the fixed effects estimator retains its consistency in these circumstances. Therefore, we test for systematic

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[1] Also, inferences in the fixed effects model are conditional on the sample, which is *not* the case for the random effects model. Conditional inferences would limit the interpretation of the estimates to the countries present in the sample.

differences between the GLS and fixed effects estimates using a Hausman test. The idea underlying this test is that, if $\text{cov}(x_{it}, u_i) = 0$, both sets of estimates should *not* differ systematically since both are consistent. In contrast, if $\text{cov}(x_{it}, u_i) \neq 0$, then the estimates *will* differ systematically and the inference is that the random effects model is misspecified. In addition, Wald tests for omitted, time-varying, variables are conducted since both GLS and fixed effects estimators are inconsistent if $\text{cov}(x_{it}, \varepsilon_{it}) \neq 0$.

Estimation Results

Separate GLS estimations of the self-employment equations, for both males and females, are reported in the following table. The estimation sample covers the period 1995-2000[2] and the 32 countries listed in Appendix 1. A table of summary statistics, for the variables used in the analysis, is reported in Appendix 2.

Table 3: The Impact of IPR Laws and Culture on Self-Employment Rates. Random Effects GLS Regression

	Males		Females	
	Estimate	*p*-value	Estimate	*p*-value
IPR RELATED VARIABLES:				
Patent Activity				
Non-resident patent registrations (1000s)	-0.01	0.15	-0.01	0.08
IPR Related Goods (per 1000 of population)				
Computers	-0.02	0.00	-0.01	0.01
Cable TV	-0.02	0.00	-0.02	0.00
TV	-0.01	0.09	0.00	0.12
Internet	0.00	0.37	0.00	0.13
(joint significance)		*(0.00)*		*(0.00)*
Membership of Conventions (duration; years)				
TRIPS	0.79	0.00	0.29	0.14
Rome	0.27	0.01	0.13	0.05
Phonograms	-0.35	0.00	-0.32	0.00

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[2] The self-employment data, in fact, cover a longer time span. However, the estimation sample is constrained by the span of patent registrations data (1995-2000). We estimated models, with longer sample periods, by omitting the patents data, but these models failed the misspecification tests.

(joint significance)		*(0.00)*		*(0.00)*
Political system				
Republic	2.98	0.19	7.26	0.81
Constitutional monarchy	-		4.11	0.89
Other democracy	6.83	0.01	11.27	0.71
(joint significance)		*(0.03)*		*(0.00)*
Legal system				
Civil law	-1.83	0.46	-3.36	0.05
Common law	-5.84	0.01	-3.81	0.03
(joint significance)		*(0.04)*		*(0.04)*
CONTROL VARIABLES:				
Log GDP per capita	3.99	0.03	3.45	0.01
Unemployment rate (% of total workforce)	0.26	0.00	0.20	0.01
Log real wage [1]	-0.73	0.01	-0.76	0.00
Pupils in Primary Education (% of population)	0.12	0.02	0.06	0.15
Life expectancy (Years)[2]	-0.01	0.97	-0.17	0.61
Real interest rates	-		-0.02	0.63
IT expenditure (% of GDP)	0.34	0.02	0.29	0.03
English	4.83	0.02	-3.15	0.05
International Trade (% of GDP)	0.01	0.28	0.00	0.83
Population (millions)[3]				
Aged 14 or less	-0.78	0.26	-0.50	0.35
Aged 15-64	0.40	0.18	0.34	0.09
Aged 65 or more	-0.50	0.48	-0.59	0.15
(joint significance)		*(0.35)*		*(0.17)*
Employment (% of total)[4]				
Agriculture	0.41	0.04	0.26	0.21
Industry	-0.38	0.04	-0.38	0.11
Services	-0.08	0.62	-0.11	0.59
(joint significance)		*(0.00)*		*(0.00)*
σ_u^2		3.56		2.16

σ_ε^2	0.58	0.46
R squared $\left(corr(x_{it}'\beta, y_{it})^2\right)$	0.87	0.81
χ^2 (p-value)	0.00	0.00
Hausman Specification Test (p-value)[5]	0.64	0.91
Wald test (omitted variables) (p-value)[6, 7]	0.11	0.07

Notes:
1. This variable is instrumented using its first lag.
2. Gender specific measures used.
3. Gender specific measures used.
4. Gender specific measures used.
5. Hausman test for systematic differences between fixed and random effects coefficients.
6. The omitted variables are: domestic music repertoire as a percentage of music sales; music piracy as a percentage of the legitimate market; patent registrations by residents; lagged patent registrations by non-residents; mobile phones per 1000 of population; and interest rates (males only).
7. Additional tests for omitted quadratic terms, in the treaty duration variables, yielded p-values of 0.69 and 0.11 for the male and female models respectively.

We begin by discussing the IPR related variables. In terms patent activity, we observe that non-resident patent registrations are weakly negatively related to female self-employment rates; an extra 10,000 of these registrations lowers this self-employment by 0.1 percentage points. The corresponding effect for males is of the same magnitude but is, apparently, statistically insignificant.[3] The results appear to indicate that either the *access* versus *creativity* effects of patents cancel each other out for male self-employment whereas the restrictive access factor (a barrier to entry) marginally dominates for female self-employment.

Higher levels of IPR related media goods, principally computers and subscriptions to cable television, appear to retard both male and female self-employment levels. Thus, we don't find any evidence to support the notion that familiarity with IPR related goods (themselves facilitated by a conducive IPR regime) acts to inspire self-employment. If anything, the negative effect seems to indicate that IPR related media dampens or deters the self-employment entrepreneurial spirit.

Memberships of all the IPR conventions apart from the Berne Convention are significant for both males and females. Dummy variable for all the conventions were insignificant while duration variables were significant. This suggests that it is not merely the membership of a convention that is important but having a length of time for a

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[3] However, we retain non-resident patent registrations, in both models, since omitting this variable lead to failure of the Hausman specification tests and Wald tests for omitted variables.

convention to make an impact. Additional years of membership, in the TRIPS Agreement and Rome Convention, increase self-employment rates, whereas the marginal impact of the Geneva Phonograms Convention is negative. There is a substantial difference in the total marginal impacts[4] of IPR conventions across gender. For a country, which is a member of all three treaties, an additional year of membership increases male self-employment by 0.7 percentage points, whereas the impact for females is only 0.1 percentage points.[5] Thus, given that membership of Berne is a prerequisite to be a signature of TRIPS, these results appear to indicate that the Berne Convention has been superseded in importance by the more recent TRIPS Agreement. Moreover, that a commitment to international IPR laws has a positive impact on self-employment rates. This finding is important – especially for emerging and transition economies - considering that IPR laws are often seen as barrier to the development of a self-employment entrepreneurial base.

The significance of the Rome and Phonograms conventions supports the notion that the impact of an IPR regime in one industry can spill over to the self-employed economy more widely. Alternatively, they may reflect the impact of having strong political initiatives to support IPRs. The signs are opposite to one another and again seem to indicate that a stronger commitment to IPR law seems to have a positive impact on self-employment with a positive spill over effect emanating from the strong-IPR Rome Convention and a negative effect resulting from the weaker-IPR Phonograms Convention.

The country's political system affects both male and female self-employment rates; these estimates suggest that democratic forms of government promote self-employment. [6] This suggests that liberal democracies and self-employment present a conducive environment for self-employment. Freedom of expression associated with democracies, facilitates creative thought and its dissemination so this political environment is likely to be conducive to innovation. By contrast, a common law system is, for both males and females, associated with lower self-employment rates relative to other types of legal system.[7] The civil law country coefficient is also negative but insignificant. Given that this result controls for democracies we view this as perhaps an indication that that

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[4] That is, the sum of the marginal impacts of membership over the 3 conventions.

[5] The *average* impact of TRIPS membership on male self-employment is 1.9 percentage points (i.e. the marginal impact, 0.8, multiplied by the average duration in TRIPS, 2.4 years); this impact is 0.7 points for females. Similarly: the average impact of Rome membership is 2.7 percentage points for males and 1.3 percentage points for females; and the average impact of Geneva membership is minus 4.5 percentage points for males and minus 4.1 points for females. This implies a total average impact, on male self-employment, of (plus) 0.1 percentage points (for a country which is a signatory to all 3 conventions). In contrast, this impact is minus 2.1 points for females.

[6] The omitted political systems are: communism; dictatorship; and transitional governments.

[7] The omitted categories are Islamic and transitional legal systems.

common law systems are conducive to rent seeking litigation as discussed by Baumol (1990) which would deter productive enterprise activity in the self-employment sector. The monopoly power in IPRs has a longer of tradition of support in civil and common law counties and hence these negative effects may in fact be emanating from the impact of this on the small firm self-employed sector.

It is interesting to note that the legal institution and consumer culture of respect for IPR variables are all insignificant and did not survive the general to specific estimation. Thus, the extensive actions and resources employed by organizations such as Interpol, ISO, PCA, UNCTAD, UNESCO, WIPO and the WTO appear to have no marginal effect on the self-employment rates. Of course, to the extent that the WTO and WIPO played a major role in developing TRIPS these organizations are somewhat exonerated. Likewise, it appears that a lack of respect for IPRs which is a concomitant part of higher levels of music piracy has no impact on self-employment rates.

Among the control variables, higher levels of GDP, reflecting enhanced business opportunities, are related to higher self-employment rates. There is also a significant push effect from unemployment; a one percentage point increase in unemployment raises self-employment by 0.26 points, among males, and by 0.2 points among females. Wage earnings have, as expected, a negative effect on self-employment rates. However, these effects are quite small, with a 10% increase in wages reducing self-employment by less than 0.1 percentage points, in both the male and female equations.

Regarding human capital, higher levels of primary education raise male self-employment but have no significant effect on female self-employment. We note the impact of the use of the English language has a positive effect for male self-employment but a negative effect on female self-employment. In contrast, the marginal effect of information technology expenditure, as a proportion of GDP, is about one-third of a percentage point across both males and females. Finally, employment shares by sector have significant impacts for males and females; in particular, self-employment rates are higher in rural economies, and lower in industrialized countries.

The results of the Hausman tests indicate that, for both models, we do *not* reject the hypothesis that the random effects are uncorrelated with the regressors. This suggests the random effects models are not misspecified. In addition, the Wald tests, for omitted time-varying variables, provide further evidence that the models are adequately specified. Additional tests of parameter constancy, between high income and lower income countries, were unable to reject the hypothesis that the models are stable over income

groups. [8] This is important because it indicates that the results hold regardless of the stage of economic development.

Table 4: Self-employment rates in IPR and counterfactual regimes

	IPR Regime	Counterfactual Regime	Impact=IPR Regime – Counterfactual Regime (*p*-value)
Males	(1a) 23.17%	(1b) 17.68%	5.49 points (0.00)
	(2a) 18.23%	(2b) 17.68%	0.55 points (0.20)
	(3a) 22.49%	(3b) 14.02%	8.47 points (0.00)
	(4a) 18.35%	(4b) 18.16%	0.19 points (0.38)
Females	(1a) 13.49%	(1b) 11.94%	1.56 points (0.00)
	(2a) 13.03%	(2b) 11.94%	1.11 points (0.01)
	(3a) 14.09%	(3b) 7.74%	6.35 points (0.00)
	(4a) 9.79%	(4b) 12.04%	-2.25 points (0.00)

In table 4 we have computed the impact of some IPR/counterfactual regimes on self-employment rates in order to gauge the magnitude of some of the results discussed so far. We provide estimates for the following comparison groups (all other variables, not mentioned explicitly in the above regimes, are held constant at their sample mean values):

(1a) Civil law legal system; other democratic political system; member of TRIPS, Rome and Phonograms conventions.

(1b) Neither civil nor common law legal system; non-democratic political system; *not* a member of TRIPS, Rome or Phonograms conventions.

(2a) Common law legal system; other democratic political system; member of TRIPS, Rome and Phonograms conventions.

(2b)=(1b)

(3a) Member of TRIPS and Rome.

(3b) Non-member of TRIPS and Rome.

(4a) Member of TRIPS, Rome and Phonograms.

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[8] The models were re-estimated on the sub-samples of high income countries i.e., countries with an income per head of $9,386 or more (following World Bank income groupings). The sample countries with incomes *below* this threshold (lower income countries) are: Romania, Thailand, Czech Republic, Hungary, Poland, Slovak Republic and Turkey. Chow's predictive failure tests were computed by comparing the residual sums of squares, from the pooled models, with those obtained from the high income sub-samples. The *p*-values for the predictive failure tests are 0.57 and 0.82, for the male and female models respectively, indicating that the models are stable over income groups.

(4b) Non-member of TRIPS, Rome and Phonograms.

Counterfactuals 1 and 2 show that countries with IPR regimes with wide convention membership which is underpinned by common or civil legal systems as well as democratic political systems have significantly higher rates of self-employment than other types of countries. Comparison 3 hones in on the unique role of IPR conventions, namely the wide encompassing and modern TRIPS Agreement alongside the specific/rigorous Rome Convention. The impact of these conventions is dramatic raising self-employment rates for males and females by 8.5 and 6.5 percentage points respectively. These are equivalent to a 60% increase in the rate of male self-employment and an 82% increase in the female equivalent. Adding in membership to the Phonograms Convention – a convention created to entice countries with a weak commitment to IPRS to sign up – to counterfactual 3 yields counterfactual 4. It is noteworthy that this causes the effect of this group of IPR conventions on male self-employment to become insignificant and in fact reduces female self-employment. Thus, counterfactual 4 indicates that IPR conventions created to accommodate 'weak' or 'half-hearted' support for IPRS can undermine the positive effects of more robust conventions such as TRIPS and Rome.

4. Conclusion

The paper sets out to test the impact of IPR laws, institutions and culture on the least innovative segment of the entrepreneurial economy, namely the self-employed. While there are highly innovative firms within this segment the vast bulk are mainly imitation intensive firms (as reflected in Global Entrepreneurship Monitor statistics). They are what Bhide (2000) describes as 'marginal' firms both in terms of their level their economic performance and degree of innovativeness. However, analyses such as Audretsch and Thurik (2004) have shown that despite this feature the self-employed sector provide and important bedrock to the entrepreneurial economy more widely. Therefore, it is important to know how the level of self-employment is affected by the IPR regime. This is especially the case because unlike R&D oriented large firms who are predominantly net producers of intellectual capital, most self-employed ventures are small imitative net users of innovation who may well be expected to suffer from a vibrant IPR regime.

The paper draws on the dual impact of IPRs on economic welfare emphasized in the law and economics literature. This highlights that IPRs tend to have both a positive innovation *creation* and a negative innovation *access* effects. In terms of the small business economics literature too these would be expected to have similar effects (through the profit function) on the mainly imitative self-employed sector. The paper sets

out to estimate the net effect of these conflicting impacts through the various elements that comprise an IPR regime including the political system, the laws, and institutions as well as a general familiarity with and respect for IPR related products. Cumulatively, the analysis indicates that a well developed IPR regime has a net positive effect on the self-employed sector. Since the self-employed sector is possibly the only segment of the enterprise base where IPRs may be expected to have a negative effect it provides a useful contribution to our empirical understanding of the effects of IPRs on the entrepreneurial economy more widely.

In arriving at this conclusion we first control for non IPR related influences on the self-employed sector. In so doing, we find that self-employment appears to be negatively related to the wage rate and cost of capital and is influenced by an unemployment push effect. Primary education has a positive effect on male self-employment as does the English language. The extent to which the economy has a high percentage of GDP accounted for by the technology sector and agriculture are also positive influences. In the same fashion an open economy also tends to be associated with higher levels of self-employment indicating that the infant industry argument does not appear to hold in terms of the self-employed enterprise sector. We also find some tentative evidence for the existence of Baumol's (1990) destructive enterprise theory as it relates to common (and perhaps civil) law countries in that these legal systems seem to cause a reduction in self-employment. We also observe that high consumption of media related products such as computers, TV and cable TV (which we initially included in order to test for IPR related product role model and knowledge access effects) having a negative effect on self-employed enterprise activity. We think this is possibly because they may cause an increased preference for leisure over enterprise activity.

The main result of the paper that a more developed IPR regime is beneficial for the self-employed enterprise sector is not common across all the elements that comprise an IPR regime. The result is mainly driven by a positive effect of international IPR conventions and agreements. Contrary to some of the most vocal objections to the TRIPS Agreement we find that rather than undermine the self-employed enterprise base it actually boosts it. We find that half-hearted IPR conventions, in the case the Phonograms Convention, designed to accommodate countries with a weak desire to support IPRS undermines this positive effect. We did not find any evidence to suggest that the organizations which tend to be associated with the enforcement of IPR laws such as Interpol, ISO, PCA, UNCTAD, UNESCO, WIPO and the WTO had any effect over and above WIPO and the WTO helping to create TRIPS in the first place. We also found that democracies boost self-employment rates which is what one would expect in terms of the political conditions necessary to promote free enterprise thought and expression. Turning to the actual use of some of these laws, we do find that patent registrations by foreigners reduce self-employment which is likely to reflect a limitation of access to innovation for the self-employed sector. However, we do not find that a lack of access to copyright IPRs has the

same effect when testing the impact of consumer purchases of pirate CDs on self-employment.

Thus, in general we find that the most fundamental tenets of IPR laws, namely the existence of the laws themselves, their specificity and strength, and a democratic society in which to accommodate them are three very positive drivers of self-employment. This indicates that in terms of enterprise policy in developing economies an emphasis on political economy aspects are very important. Indeed the evidence in the paper indicates that the medium standing practice of international economic development aid where recipient countries have been encouraged to embrace democracy and IPRs (in particular, the TRIPS) seems to have been prudent. Most likely these initiatives would have acted to boost the self-employed enterprise base in developing and transition economies.

References

Arrow, K. J. (1962), Economic Welfare and the Allocation of Resources to Invention. In R.R. Nelson (ed) *The Rate and Direction of Inventive Activity*, Princeton University Press.

Audretsch, D.B. (1995), *Innovation and Industry Evolution*, Massachusetts: The MIT Press.

Audretsch, D. and Thurik, R. (2004), A Model of the Entrepreneurial Economy, *International Journal of Entrepreneurship Education*, 2(2): 143-166.

Baumol, W. J. (1990), 'Entrepreneurship: Productive, Unproductive and Destructive', *Journal of Political Economy*, vol 98, no 5, 1990, pp 893-921.

Besen, S.M. and Raskind, L.J. (1991), An Introduction to the Law and Economics of Intellectual Property, *Journal of Economic Perspectives*, 5: 3-27.

Bhide (2000), *The Origin and Evolution of New Business*, Oxford: Oxford University Press.

Blanchflower, D. and Oswald, A. (1998), What Makes an Entrepreneur? *Journal of Labor Economics*, 1998, 16, 26-60.

Bosma, N. and Harding, R. (2006), *Global Entrepreneurship Monitor*, Babson, Wellesley, MA and London Business School, London.

Burke, A.E. (1996), How Effective are International Copyright Conventions in the Musdic Industry? *Journal of Cultural Economics*, 20: 51-66.

Burke, A.E, FitzRoy, F. and Nolan, M., (2000), When Less is more: Distinguishing Between Entrepreneurial Choice and Performance, *Oxford Bulletin of Economic and Statistics*, v62, n5, pp. 565-587.

Burke, A.E, FitzRoy, F. and Nolan, M., (2002), Self-employment Wealth and Job Creation: The Roles of Gender, Non-pecuniary Motivation and Entrepreneurial Ability, *Small Business Economics*, 19: 255-270.

Cornish, W.R. (1999), *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights (4rd Ed)*, Sweet & Maxwell, London.

Evans, D. and Jovanovic, B., (1989), An Estimated model of Entrepreneurial Choice under Liquidity Constraints, *Journal of Political Economy*, v97, n4, pp.519-535

Gompers, P. and Lerner, J. (2002), *The Venture Capital Cycle*, MIT Press, Cambridge MA and London.

Kihlstrom, R.E., and Laffont, J-J. (1979), 'A General Equilibrium Theory of Firm Formation Based on Risk Aversion', *Journal of Political Economy*, vol 87, no 4., 1979, pp 719-748.

Landes, W. M. (2003), Copyright, in Ruth Towse (Ed) '*A Handbook of Cultural Economics*, Cheltenham: Edward Elgar.

Martin, S. (2002), *Advanced Industrial Economics* (2nd ed), Oxford: Blackwell Publishers.

Parker, S. (2004), *The Economics of Self-Employment and Entrepreneurship*, Cambridge University Press, Cambridge.

Schmitz, J.A. (1989), Imitation, Entrepreneurship and Long-run Growth, *Journal of Political Economy*, 97: 721-739.

Schultz, T.W. (1975), 'The Value of the Ability to Deal with Disequilibria', *Journal of Economic Literature*, vol 13, 1975, pp 827-846.

Schultz, T.W. (1980) Investment in Entrepreneurial Ability, *Scandinavian Journal of Economics* 82(4): 437-48.

Schumpeter, J.A. (1942), *Capitalism, Socialism and Democracy*. New York: Harper Row.

Storey, D. (1994), *Understanding the Small Business Sector*, Routledge, London, UK.

Appendix 1: Sample Countries

Australia
Austria
Belgium
Canada
Czech Republic
Denmark
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Korea, Rep.
Netherlands
New Zealand
Norway
Poland
Portugal
Romania
Singapore
Slovak Republic
Slovenia
Spain
Sweden
Switzerland
Thailand
Turkey
United Kingdom
United States

Appendix: Summary Statistics

Variable	Males/All				Females			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Self-Employment (%)	18.11	7.31	8.30	42.20	9.62	4.83	3.40	25.50
GDP per capita (1995 US Dollars)	21,063	12,074	1,297	44,775				
Unemployment rate (% of total workforce)	7.47	3.54	0.9	22				
Real wage (1995 US Dollars)	17.94	60.12	0.00	301.35				
Pupils in Primary Education (% of population)	0.38	0.07	0.27	0.59				
Non-resident patent registrations (1000s)	75,341	44,259	5,205	199,565				
Life expectancy (Years)	73.01	3.28	65.20	77.70	79.70	2.35	70.40	84.60
English	0.30	0.46	0.00	1.00				
IT expenditure (% of GDP)	6.20	2.05	1.00	13.60				
Trade (% of GDP)	84.75	57.38	18.44	329.19				
Membership of Conventions (duration; years)								
Trips	2.41	1.43	0.00	5.00				
Rome	9.98	11.95	0.00	36.00				
Geneva	12.87	10.48	0.00	27.00				
IPR Related Goods (per 1000 of population)								
Computers	219.26	131.82	15.48	572.10				
Cable TV	132.68	102.71	0.81	380.71				
TV	513.28	148.65	225.58	891.81				
Internet	111.48	115.86	2.21	489.87				
Political system								
Republic	0.50	0.50	0.00	1.00				
Constitutional monarchy	0.21	0.41	0.00	1.00				
Other democracy	0.29	0.46	0.00	1.00				
Legal system								
Civil law	0.71	0.46	0.00	1.00				
Common law	0.31	0.46	0.00	1.00				
Population (millions)								
Aged 14 or less	3.92	6.59	0.03	30.80	3.84	64.90	0.03	29.40
Aged 15-64	13.50	20.50	0.09	92.40	13.90	21.30	0.09	94.00
Aged 65 or more	2.25	3.42	0.01	14.90	3.46	5.07	0.02	20.90
Employment (% of total)[4]								
Agriculture	8.76	8.48	0.30	49.40	5.37	6.74	0.10	51.50
Industry	38.44	6.02	22.10	50.30	18.04	6.32	9.30	32.20
Services	52.60	9.37	28.50	66.80	76.33	10.11	31.70	88.40

Note: In cases where the variable is gender specific, the summary statistics are reported for both male and female sub-samples.