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Social security entitlements and early-stage entrepreneurial activity; an empirical analysis

Peter Brouwer
Jolanda Hessels
André van Stel
Sander Wennekers

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Peter Brouwer   EIM Business and Policy Research, Zoetermeer, The Netherlands

Jolanda Hessels   EIM Business and Policy Research

André van Stel   Max Planck Institute for Research into Economic Systems, Jena, Germany, and EIM Business and Policy Research

Sander Wennekers   EIM Business and Policy Research

Abstract:
This exploratory study focuses on the relation between social security entitlements and the rate of early-stage entrepreneurial activity at the country level. Using a sample of countries participating in the Global Entrepreneurship Monitor, we explore how various measures of entrepreneurial activity are related to 'replacement rates' in case of unemployment and illness/disability. The results of our empirical study indicate that social security entitlements of employees have a significant negative influence on the level of early-stage entrepreneurship at the macro level. However, the results of our study do not support the hypothesis that the relative level of social security benefits for self-employed, compared to that for employees, has an additional impact on entrepreneurial activity.

Correspondence Address:
Jolanda Hessels
EIM Business and Policy Research
P.O. Box 7001
2701 AA Zoetermeer
The Netherlands
E-mail: joh@eim.nl

1. INTRODUCTION

Entrepreneurship as an occupational choice[1] has been the subject of analysis in many empirical studies. Determinants of entrepreneurial activity include economic as well as technological, demographic, social and cultural factors. A potentially relevant determinant that has so far received little attention is social security entitlements.

Institutional arrangements of social security in the case of illness or unemployment may in various ways influence decisions of individuals when choosing between wage employment and self-employment. A generous social security system may lead to fewer but also to more self-employed. There may be a negative impact on self-employment in so far as generous social security benefits for employees increase the opportunity costs of entrepreneurship. Social security in general may have a positive effect on entrepreneurial activity by creating a safety net in case of business failure. The difference in the social security entitlements between self-employed and employees may be of particular relevance.

Only few studies have empirically explored social security as a determinant of entrepreneurship (e.g. Parker and Robson, 2004; Wennekers *et al.*, 2005; Steinberger, forthcoming). These studies report evidence for a negative effect of social security on the level of entrepreneurship. However, these studies have serious limitations. Parker and Robson, using original OECD Labour Force Statistics data 1972-1996 for a panel of 12 countries, find negative effects of employers' social security contributions and the unemployment benefit replacement rate on the aggregate self-employment level. They do not focus on early-stage entrepreneurial activity, and so their analysis is only loosely related to occupational choice. Wennekers *et al.* have a stronger focus on occupational choice by explaining the rate of nascent entrepreneurship. However, they include total social security expenditures as a control variable in their analysis, which is a very crude measure of social security entitlements. Steinberger uses a dynamic occupational choice model to link entrepreneurial activity with the size of the public pension system. The size of the system is measured by social security contributions made for old-age, survivor and disability pensions. Unemployment, sickness or accident insurance contributions are not included. Hence, this is a rather crude measure for social security entitlements as well.

Furthermore, previous studies generally do not make a distinction between the social security entitlements of employees and self-employed. Finally, previous research has often concentrated on social security in case of unemployment and has not included social security in case of illness or disability in the analysis.

Our study is an empirical investigation of the influence of social security benefits in the case of unemployment and illness/disability on early-stage entrepreneurial activity at the country level as measured by the Global Entrepreneurship Monitor. In addition, we take account of the *difference* in social security entitlements between employees and self-employed.

The paper is organized as follows. In section 2 we discuss the relevant literature and state our hypotheses. In the subsequent section we elaborate the main data used to test our hypotheses. Next, we present the results of our regression analysis. A final section presents our conclusions.

2. LITERATURE ON SOCIAL SECURITY AND ENTREPRENEURSHIP

Entrepreneurship as an occupational choice has been the subject of analysis in many theoretical and empirical studies. The level of entrepreneurship can be explained by a broad

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[1] Also known as business ownership or self-employment.

range of other factors, including economic as well as non-economic conditions, such as technology, demography, culture and institutions. Verheul *et al.* (2002) present a theoretical framework in which these influences have been integrated. One of the factors that may influence the decision of an individual to become self-employed is the level of social security benefits in case of unemployment or illness/disability. As discussed in the Introduction, generous social security may lead to fewer but also to more self-employed. There is a negative impact in so far as social security entitlements for employees increase the opportunity costs of entrepreneurship. In addition, when unemployment benefit schemes are relatively generous this may reflect a lower 'urgency' for the unemployed to engage in entrepreneurial activity as an inevitable choice for work and income (Bosma *et al.* 2005). On the other hand, social security may have a positive impact on entrepreneurial activity by creating a safety net in case of business failure.

Occupational choices by individuals involve the options to become an employee, to engage in self-employment or not to participate in the labour market. The framework by Verheul *et al.* (2002) views these decisions as being taken on the basis of an assessment of the potential risks and rewards of the various options. The model also assumes that individuals compare both the expected financial and non-financial risks and rewards of the alternatives. Non-financial aspects concern autonomy or social status and prestige (Acemoglu 1994). In their assessment, individuals take into account environmental factors (opportunities and opportunity costs) as well as their individual characteristics (means, skills and preferences).

Risks play an important role in the assessment of the various employment alternatives. Even when expected income of entrepreneurship is high, so is the disparity of entrepreneurial incomes. Some entrepreneurs will earn very high incomes but a relatively large group will face low incomes or even poverty (see e.g. Folkeringa and Vroonhof, 2002; Folkeringa and Vroonhof, 2004). Moreover, the risk of failure is also high, and it is never sure in the start-up phase whether an enterprise will become successful. Approximately 50% to 60% of new business start-ups survives the first three years of activity (Eurostat, 2004). Besides, to start as an entrepreneur may imply that one loses certain entitlements to future social security benefits. This will raise the opportunity costs of being self-employed and it will positively influence preferences for choosing for or staying in wage employment. An additional and related factor raising opportunity costs of self-employment is the degree of 'employment protection' ensuing from the regulation of dismissal and temporary employment (Bosma *et al.*, 2005)[2].

In an earlier empirical study at the micro level, indications have been found that social security indeed plays a role in the decision to become self-employed. A study by Bosch *et al.* (1998) surveyed a group of (former) employees that started their own enterprises about the barriers they were facing. The results bear out that the lack of income security and social security played an important role in the decision making process of these self-employed people before they started their own enterprise.

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[2] Bosma *et al.* focus on the relation between employment protection and early-stage entrepreneurial activity in a group of OECD countries. They find that lower levels of employment protection are associated with higher rates of entrepreneurial activity.

At the macro level, thus far only few empirical studies have tried to explain whether social security plays a role in explaining the rate of entrepreneurship. For example, Wennekers *et al.* (2005) investigate the determinants of nascent entrepreneurship across countries, using total social security expenditures as a percentage of GDP as one of the control variables. They found a negative effect on nascent entrepreneurship, suggesting that in countries with a generous social security system people experience little incentive to set up their own businesses. Another empirical study (Steinberger, forthcoming) has investigated the effects of the social security contribution rate on the level of entrepreneurial activity. The results of this study indicate that the level of social security contribution negatively affects the level of entrepreneurial activity within an economy. This means that a negative relationship has been identified between generous social security provisions and the amount of self-employed in a country.

A major disadvantage of the measures used by these studies is their aggregate character. For example, no distinction is made between the number of beneficiaries and the level of social security benefits for individuals. Hence, when social security expenditures in a country are relatively high, this may reflect a high number of beneficiaries rather than a high level of social security benefits. However, it is the level of social security benefits in case of unemployment or illness that may influence the decision of an individual to become self-employed. For this reason the focus in our study will be on that aspect of social security. Social security is expected to have a negative impact on the decision of an individual to become self-employed in so far as generous social security for employees increases the opportunity costs of entrepreneurship. This leads to our first hypothesis:

> *Hypothesis 1: Higher social security entitlements of employees are negatively related to the level of entrepreneurial activity in a country.*

Another disadvantage of the aforementioned studies at the macro level is that no distinction is made between the social security entitlements of employees and those of self-employed persons, while in reality these may very well differ form one another. With respect to social security systems three types of regulation can be identified (Pieters and Schoukens 1994): universal regulations, general regulations and categorical regulations. Universal regulations apply to all professions within the labour force or sometimes even to the whole population. The existence of universal regulations implies that the self-employed are insured in the same way and by means of the same laws as employees. A general regulation applies to either all employees or all self-employed. In this case, different regulations exist for employees as compared to self-employed. Categorical regulations hold only for specific groups of self-employed or employees. A categorical regulation may involve laws applying to specific professional categories. It may also involve a specific regulation within an existing law. Social security entitlements of entrepreneurs are often limited as compared to the social security benefits for employees (see e.g. Bosch and Westhof 1997).

In the literature, little attention has been paid to the specific social security position of self-employed persons. Baenen and Visser (1996) compare the social security system of Belgium, Germany, the United Kingdom and the Netherlands with respect to self-employed. For this purpose a Social Protection Index (SPI) was developed. The SPI can be regarded as an instrument for measuring and comparing differences in the level of social security within and between various countries. The SPI's, in the four countries studied by Baenen

and Visser, show that the benefit rates for self-employed persons are often very low. This implies that in practice, the self-employed often have to rely on social assistance schemes for their income protection. In another study, De Muijnck *et al.* 2003 indicate that in most EU countries employees have 'more' social security as compared to self-employed, in terms of lower contributions and higher benefits. The transition to entrepreneurship may be particularly troublesome for employee-starters, since they are used to a secure wage and a relatively good social security position as dependent employees. When the difference between the social security position of employees and that of self-employed is larger, than the opportunity costs of entrepreneurship will be higher and this will have a negative impact on the entrepreneurial activity in a country. When the difference is small, social security may even have a positive effect on entrepreneurial activity by creating a safety net in the case of business failure. Therefore, we state the following hypothesis:

> *Hypothesis 2: the more the social security entitlements of entrepreneurs resemble those of employees, the higher the level of early-stage entrepreneurial activity in a country will be.*

Social security benefits may relate to unemployment as well as to illness/disability. Research into social security as a determinant of entrepreneurship thus far has concentrated on the former and not on the latter category, although both may be relevant. First, an entrepreneur bears most of the risk of not having enough work (De Muijnck *et al.* 2003). A transition to self-employment often implies that one loses unemployment insurance. In some cases a dependent employee who becomes self-employed will lose all employment protection immediately and completely (European Commission 2004). Second, health and disability insurance may also harbour a disincentive to become self-employed, either because the degree of social protection for self-employed is relatively low or because self-employed have to pay a double contribution, i.e. both employers' and employees' premiums. Which of these two types of social security is the most relevant for the self-employment decision? *Ceteris paribus*, we expect social security for the case of unemployment to have a higher impact on self-employment than social security with respect to illness/disability. The main reason is that the risk of business failure[3] is much higher than the risk of unemployment, while the risk of becoming ill is not expected to differ between self-employed and employees. Therefore, the following hypothesis is formulated:

> *Hypothesis 3: Social security entitlements of individuals with respect to unemployment have a stronger effect on the level of (early-stage) entrepreneurial activity in a country than social security entitlements with respect to illness/disability.*

At the micro level people may have different motives for becoming self-employed. Some people mainly start a new business to exploit a perceived business opportunity. These people usually elect to start a business as one of several possible career options. This is for example the case when people choose to become an entrepreneur because they want to be their own boss, to realise a dream or to try and earn more money than in wage employment. This is commonly referred to as opportunity-based entrepreneurship. Other people are pushed into entrepreneurship because all other options for work are either absent or unsatisfactory. Entrepreneurship then is the last resort to work and income. This is for example the case if someone is unemployed and is not able to find a paid job. Since this type of en-

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[3] Business failure thus is one of the major deterrents from self-employment (European Commission 2004).

trepreneurship is necessity driven it is commonly referred to as necessity-based entrepreneurship.

There is a clear variation in the distribution of opportunity and necessity entrepreneurship across countries. As a country's level of per capita income rises, its percentage of opportunity entrepreneurship also goes up (Acs *et al.*, 2004). Social security as a determinant of entrepreneurship is quite likely to have a negative effect on opportunity-based entrepreneurship. When entrepreneurship is opportunity driven this represents a situation in which people will be able to make a choice between various career options. People may be more inclined to exploit business opportunities when opportunity costs of entrepreneurship are low. Based on the above we argue for a strong and negative relationship between social security entitlements and the level of opportunity-based entrepreneurship.

In the case of necessity-based entrepreneurship there are two countervailing effects. On the one hand, opportunity costs of self-employment are not relevant when people have no other choices for work. On the other hand, unemployed people who cannot find a job may prefer unemployment to self-employment when unemployment benefits are generous. This implies a negative effect of social security. On balance we expect the overall effect of social security on necessity-based entrepreneurship to be negative but small. The following hypotheses are formulated:

> *Hypothesis 4A: The social security position of individuals has a relatively strong negative influence on the level of opportunity based entrepreneurial activity in a country.*

> *Hypothesis 4B: The social security position of individuals has a relatively weak negative influence on the level of necessity based entrepreneurial activity in a country.*

3. DATA

In this section we discuss our data. We use various data on early-stage entrepreneurial activity from the Global Entrepreneurship Monitor. Following Wennekers *et al.* (2005), whose investigation into the determinants of nascent entrepreneurship in 36 countries participating in GEM is our starting point, we also employ GEM data for 2002. The number of countries participating in GEM is highest in 2002, which implies the highest possible number of observations for our analysis. Data on social security benefits are taken from OECD statistics and own calculations based on information in MISSOC (Mutual Information System on Social Protection from the European Commission). Data for several control variables are taken from standardized national statistics. Details on the data used in this paper are provided below.

Entrepreneurial activity
Several measures of entrepreneurship are used in this paper. These are taken from the GEM 2002 Adult Population Survey. This database contains various entrepreneurial measures that are constructed on the basis of surveys of at least 2,000 respondents per country. We use the following measures.

- **Total early-stage Entrepreneurial Activity rate (TEA)**. This variable is defined as the percentage of the adult population (18-64 years old) that is either actively involved in starting a new venture (nascent entrepreneur) or the owner/manager of a business

that is less than 42 months old (young business entrepreneur). Hence the TEA rate combines two sub indexes, the nascent entrepreneurship rate and the young business entrepreneurship rate.

- **Nascent entrepreneurship rate**. This is the number of people that are actively involved in starting a new venture, as a percentage of adult population. An individual may be considered a nascent entrepreneur if the following three conditions are met: if he or she has taken action to create a new business in the past year, if he or she expects to share ownership of the new firm, and if the firm has not yet paid salaries or wages for more than three months (Reynolds *et al.*, 2002, p. 38).

- **Young business entrepreneurship rate**. This is the percent of adult population that is the owner/manager of a business that is less than 42 months old.

- **Established business entrepreneurship rate**. This is the percent of adult population that is the owner/manager of a business that is more than 42 months old.

- **TEA Opportunity rate and TEA Necessity rate**. The Global Entrepreneurship Monitor distinguishes two basic (classes of) dominant reasons or motives why individuals participate in entrepreneurial activities: (a) primarily, they perceive a business opportunity (i.e., they elect to start a business as one of several possible career options), or (b) they see entrepreneurship as their last resort (i.e., they feel compelled to start their own business because all other options for work are either absent or unsatisfactory). Using this categorization it is possible to label more than 97 percent of those who are active as either "opportunity" or "necessity" entrepreneurs (Reynolds *et al.*, 2002, p. 15). On average for the countries participating in GEM 2002, three quarters of total entrepreneurial activity consists of opportunity entrepreneurs.

Social security benefits
The influence of social security on the decision to become an entrepreneur takes place at the micro level. Therefore we use an indicator of the social security position of individuals, rather than more commonly used macro-economic indicators of social security. We use the concept of "replacement rates" to indicate the social security position of individuals. Replacement rates denote the level of (cash) benefits a person is entitled to, relative to the income previously earned through work. Thus far replacement rates are mainly used within the context of employees in the case of unemployment. In our analysis we use replacement rates in case of illness/disability as well as unemployment. Furthermore, additional data indicating the social security entitlements of self-employed are used, since in several countries the social security position of self-employed is known to differ from that of employees.

It is not possible to use national data sources, because of differences in existing definitions and the lack of comparability between national statistics. Data on replacement rates in the case of unemployment for employees are taken from OECD, *Benefits and Wages* (2002). We use the replacement rates in the first year of unemployment, in the case of a single person, earning the average production worker wage[4]. Replacement rates in the case of ill-

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[4] In this study we confine ourselves to the replacement rates in the first year of unemployment or illness/disability for a single person, earning the average wage. Possible extensions to the study are the analyses of other cases: later years of unemployment or illness/disability, different family types and other earnings levels.

ness/disability are derived from data available in MISSOC (Mutual Information System on Social Protection from the European Commission). Similar to the unemployment replacement rates, the cash benefits in the first year a single person becomes ill or disabled, are related to the average income (from OECD National Accounts) within that country.

Since we are particularly interested in the relationship between social security benefits and entrepreneurship, we also need information on the social security entitlements of entrepreneurs. Internationally comparable data on social security benefits for entrepreneurs are scant. Therefore, we have not calculated specific replacement rates for self-employed people. Instead, we have chosen to use information from MISSOC, to indicate whether the social security position of entrepreneurs is equally or less[5] favourable than for employees.

The data for the replacement rates were gathered for as many countries participating in GEM 2002 as possible. Furthermore, we could also obtain data on replacement rates for Portugal and Greece, which did not participate in GEM 2002 but did participate in GEM 2001 and 2003, respectively[6]. All in all we have data on unemployment replacement rates for 24 countries (for the case of a single person in the first year of unemployment). For six of these countries however we could not find data for the replacement rate of self-employed compared to wage-employed, and for the illness replacement rate. In Table 1 the data on replacement rates and total entrepreneurial activity rates used in this paper are displayed. The countries are ranked on the basis of the unemployment replacement rate for employees. We see that the Netherlands has the highest replacement rate whereas Ireland has the lowest replacement rate.

INSERT TABLE 1 ABOUT HERE

Control variables
Wennekers *et al.* (2005) use a wide selection of candidate explanatory variables that might influence entrepreneurial activity in a country. These variables may be seen as indicators of aggregate conditions in five different domains. These aggregate conditions influence opportunities, resources, skills and preferences with respect to entrepreneurship of individuals, which, in turn, may impact the level of entrepreneurship at the macro level (Verheul *et al.*, 2002). Basically, in this paper we use the same variables as Wennekers *et al.* (2005) to act as controls (bearing in mind that our main interest is the effect of social security benefits). The control variables used in this paper are listed below, ordered by domain of aggregate conditions. For most of these variables the source of these data is the *World Competitiveness Yearbook* (by the Institute for Management Development), or the *Global Competitiveness Report* (by the World Economic Forum). We refer to Wennekers *et al.* (2005) for details.

Technology indicators

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[5] For the cases we study the social security position is never more favourable for entrepreneurs than for employees.

[6] For Portugal and Greece we estimated the various entrepreneurship indexes for 2002 by combining their values in 2001 (Portugal) or 2003 (Greece) with the average growth rates of the corresponding entrepreneurship measures in nearby countries which participated in both 2001 and 2002 (in the case of Portugal: France and Spain) or in 2002 and 2003 (in the case of Greece: Croatia, Italy and Slovenia). This may be plausible as the relative rankings between countries in entrepreneurial activity appear to be quite stable over time (Reynolds *et al.*, 2002). For the ratio opportunity versus necessity entrepreneurs we used the corresponding ratio of 2001 (Portugal) or 2003 (Greece).

- Innovative capacity index 2001. This variable is taken from Chapter 2.2 of the Global Competitiveness Report 2001-2002. It describes national innovative capacity as "a country's potential –as both a political and economic entity– to produce a stream of commercially relevant innovations. This capacity is not simply the realized level of innovation but also reflects the fundamental conditions, investments, and policy choices that create the environment for innovation in a particular location or nation." (Porter and Stern, 2002, p. 105).
- Number of computers per capita 2001.
- Number of Internet subscribers per capita 2001.

Demography
- Age structure of population 2002. These are the shares in total population of five age groups: 20-24 years, 25-34; 35-44; 45-54 and 55-64 years.
- Female share in total labour force 2001.
- Population growth 1996-2002.

Culture
- Incumbent business ownership 2002. This variable is computed as the sum of the young business entrepreneurship rate and the established business entrepreneurship rate, both taken from GEM.
- (Former) communist country dummy. Over many decades of the 20th century, the dominant culture in (former) communist countries has grown to be unfavourable or even hostile to self-employment. We control for this negative impact on entrepreneurship by introducing a (former) communist country dummy. The variable has value 1 for Russia, Hungary, Poland, China, Croatia and Slovenia, and value 0 for all other countries participating in GEM 2002.

Institutions
- Social security cost (2000). This variable measures the employers' compulsory social security contribution as a percentage of GDP per capita.
- Tax revenue as % GDP (1999).
- Number of permits required to start a new business.
- Number of days required to start a new business.

Economic factors
- Per capita income 2001. Gross national income per capita in 2001 is expressed in purchasing power parities per US$. These data are taken from the 2002 World Development Indicators database of the World Bank.
- Real GDP growth 2001.
- Unemployment rate 2001.

4. EMPIRICAL ANALYSIS

Correlation analysis
In analysing the effect of social security benefits on entrepreneurial activity we start with a simple correlation matrix. Table 2 displays the correlations between the various replacement rates and the TEA index for 15 countries. These are the 18 countries for which all

measures are available (see Table 1) but excluding Iceland, Norway and Switzerland. These countries have extreme values for the illness replacement rate (employees), hence including these countries in the sample may disturb the validity of the analysis. We see that the unemployment replacement rate is significantly and negatively correlated with the TEA index, suggesting that more generous unemployment benefits discourage entrepreneurial activity, as the opportunity costs of self-employment are higher. However, to confirm this relation we have to take account of other factors that may also influence entrepreneurial activity in countries. To this end we carry out a regression analysis, as reported in the next section.

Also noteworthy in Table 2 is the significant positive correlation between unemployment replacement rates and illness replacement rates. This indicates that countries also differ in the overall generosity of their social security systems.

INSERT TABLE 2 ABOUT HERE

Regression analysis: the basic model
As mentioned earlier the starting point of our regression analysis is the paper by Wennekers *et al.* (2005). For 36 countries they found a significant U-shaped relation between the nascent entrepreneurship rate and the level of per capita income[7]. Furthermore, they found significant effects of various control variables including the incumbent business ownership rate, a (previously) communist country dummy and total social security cost. Starting out with their specification, we adapt our regression model towards a specification including our replacement rate variables. This process is described below.

INSERT TABLE 3 ABOUT HERE

As a first step, we change the dependent variable. As we are also interested in actual businesses, and not only nascent entrepreneurs, we use the TEA index as dependent variable. To avoid measuring the young business entrepreneurs both at the left-hand side and at the right-hand side of the equation, we use the established businesses index as measure for incumbent business ownership. We also include the two extra countries Greece and Portugal so that the number of observations becomes 38. This results in the specification in the first column of Table 3. The main results from the Wennekers *et al.* (2005) study remain intact. The overall model fit is comparable, and parameter estimates for all variables in the model have the same sign. A 'stronger' test is moving from 38 observations to 15 observations as more than half of the observations are lost. As mentioned earlier, this sample is formed by the 18 countries for which all replacement rates are available (see Table 1) but excluding Iceland, Norway and Switzerland, which have extreme values for the illness replacement rate. The communist country dummy was removed as in the 15-country sample only one former communist country is included (Hungary). Results are quite robust to this change in the sample. Only the effects of established businesses and social security cost are some-

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[7] The 36 countries include 22 of the countries listed in Table 1 (not Greece and Portugal), and Russia, South Africa, Mexico, Argentina, Brazil, Chile, Singapore, Thailand, China, India, Slovenia, Hong Kong, Taiwan and Israel.

what less strong (second column). Now, using this sample we can include the replacement rates for unemployment and illness in the model[8]. This allows us to test whether the model fit improves by using the replacement rates instead of the social security cost variable from the World Competitiveness Yearbook[9]. In both cases we also include a dummy variable indicating whether the replacement rate for self-employed is equal or lower compared to that of wage-employed individuals[10]. Results are in columns 3 and 4. The results for the control variables are remarkably stable. Parameter estimates for both the established businesses index and the per capita income variables shaping the U-curve, are significant and have values that are not very different compared to the 38-country sample. This robustness suggests that the small number of observations is not an obstacle for our regression analysis. Focusing on the replacement rate variables, we see that the replacement rate for unemployment is negative and highly significant whereas no significant effect of the replacement rate for illness is found. We also note that, by using the unemployment replacement rate instead of the social security cost variable, the model fit is significantly improved (adjusted R^2 of 0.85 instead of 0.55; compare the second and third column of Table 3).

Additional control variables and entrepreneurship measures
Thus far we have not taken account of the various control variables introduced in Section 3. To test their potential influence, we have included, in separate regressions, the control variables mentioned in Section 3. Those variables that are significant at 10% level for both specifications of columns 3 and 4 in Table 3, will be included in the remainder of our analysis[11]. It turns out that only the female labour share variable is significant in both specifications. The effect is negative, as expected (Noorderhaven *et al.*, 2004). See columns 5 and 6. Hence we include this variable in the remainder of our regressions.

In addition, the basic model only investigates the variation in total entrepreneurial activity rates as the dependent variable. In Tables 4 and 5 we also investigate whether estimation results become different if alternative early-stage entrepreneurship measures are used as dependent variable. In particular we investigate various GEM measures introduced in Section 3. The starting points for the regressions in Tables 4 and 5 are the specifications in columns 5 (using the unemployment replacement rate) and 6 (using the illness replacement rate) of Table 3, respectively. In both tables female labour share is included whereas the dummy variables for self-employed have been omitted, as they were not significant in Table 3. We limit the number of independent variables in the regression, in order to safeguard adequate degrees of freedom given the low number of observations. Nevertheless, in the second panel of Tables 4 and 5 we do include the self-employed replacement rate dummies as a robustness test.

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[8] We do not include both replacement rates in one model as the number of variables may become too large given the small number of observations. Also, the replacement rates for unemployment and illness are significantly correlated (see Table 2) which may cause problems of multicollinearity.

[9] This is not a priori obvious as correlations between the social security cost variable on the one hand, and the unemployment replacement rate and illness replacement rate on the other hand, are remarkably low (0.2 and 0.4 respectively; 15 observations).

[10] The dummy has a non-zero value for countries in which the social security position, as indicated by the replacement rate, is less favourable for self-employed.

[11] For this test we excluded the self-employed replacement rate dummies as they are not significant in columns 3 and 4 of Table 3.

Results for unemployment replacement rates
In Table 4 we see that the replacement rate for unemployment is negatively and significantly correlated with overall TEA, opportunity TEA, the young businesses index and the nascent index. The effect is negative but not significant for necessity TEA.

From the results of the regression analyses, with various measures of entrepreneurship as dependent variable, an interesting picture emerges. First, social security benefits in the case of unemployment clearly impact early-stage entrepreneurship. Second, nascent entrepreneurship is more strongly affected by social security benefits, than are young businesses. This result is intuitively clear, since such considerations are most likely to be relevant in the earliest stages of starting a new venture. Third, the level of opportunity entrepreneurship is influenced by the replacement rates, whereas necessity entrepreneurship is not or only weakly so. This finding is as expected in hypothesis 4.

Looking at the second panel of Table 4 we see that the replacement rate dummy for self-employed has no impact on the various TEA measures but it does seem to have some impact on the young businesses index (note that adjusted R^2 increases slightly for this specification). The last two panels include two robustness tests by increasing the sample to 18 and 24 countries, respectively. The 18 countries include the three countries with an outlier value for the illness replacement rate (this should not have an impact here as we look at the unemployment replacement rate only) while the 24 countries include all countries from Table 1 (including those for which no illness replacement rate is available). Note that the control variables are not reported in these panels. We see that the results for the unemployment replacement rates are robust to these changes. The coefficient is negative and significant in all cases, including necessity TEA (fourth panel)[12].

Results for illness replacement rates
Comparing the fourth and sixth column of Table 3, we see that the inclusion of female labour share does not change the coefficient of the illness replacement rate but does increase the t-value. This is an indication that the variable may have an impact on entrepreneurship after all, as the model is now better specified. In particular, columns 2 and 3 of Table 5 suggest that the illness replacement rate impacts opportunity entrepreneurship rather than necessity entrepreneurship. This is a plausible result as the necessity entrepreneurs are not in the position to weigh the replacement rate in their decision to become entrepreneur. They have no other employment options.

From the second panel it is clear that there is no additional effect of the replacement rate dummy for self-employed. Finally, from the third panel, which uses 18 observations, we see that the effect for the illness replacement rate is not robust to including Iceland, Norway and Switzerland in the sample. This is caused by the outlier values for these countries

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[12] Note that adjusted R^2 values for the 24-country sample are lower compared to the other samples. The U-shaped relation between entrepreneurship and per capita income is not significant for this sample.

(see Table 1) and it supports our decision to exclude these countries from our original sample.

5. CONCLUSIONS AND DISCUSSION

Summary of main results

In this study we have explored the relationship between social security entitlements and early-stage entrepreneurial activity across a number of economically developed countries. Empirical data on entrepreneurship were taken from the Global Entrepreneurship Monitor, whereas data on social security benefits were taken from OECD or based upon information in MISSOC. First, we examined how replacement rates for employees in case of unemployment and illness/disability impact on various aggregate measures of early-stage entrepreneurial activity. Second, we explored the additional influence of the relative social security entitlements of self-employed as compared with those of employees.

We find clear evidence of a significantly negative effect of social security benefits on entrepreneurship. Furthermore, it appears that using replacement rates in the analyses yields a better model fit as well as a stronger relation with entrepreneurship, than the social security measures at the macro level used in previous studies. This supports our hypothesis that social security entitlements at the micro level influence the rate of entrepreneurship at the macro level. More specifically, the results of our analyses show a convincing effect of the unemployment replacement rate for employees, while the effect for the replacement rate in case of illness of employees is not significant in most cases.

The results differ somewhat for different measures of entrepreneurial activity. The negative effect of the unemployment replacement rates for employees is strongest for nascent entrepreneurs, but also a significant negative effect on young businesses can be identified. These results suggest that social security benefits particularly affect people who are trying to start an enterprise or who have recently started one. Furthermore, the replacement rates for employees have a significant negative effect on opportunity entrepreneurship in most regressions, but the results for necessity entrepreneurship are weaker. Interestingly, the replacement rates for illness of employees also have a significant negative effect on opportunity entrepreneurship.

Discussion

From the results it is clear that the social security entitlements of employees have a negative effect on the rate of early-stage entrepreneurship. However, the results of our study do not support the hypothesis that the relative level of social security benefits for self-employed, compared to that for employees, has an additional impact on entrepreneurial activity. The only exception is a negative effect on young businesses for unemployment replacement rates of self-employed being less favourable than those of employees.

One possible conclusion that can be drawn from these results is that social security benefits do not necessarily (or only) influence the choice between entrepreneurship and wage-employment, but rather (or also) the decision to participate on the labour market in general. This reasoning particularly applies to people who are unemployed (or otherwise economically inactive) and their decision to participate on the labour market either as employee or

as entrepreneur. However, it is more common for people to become an entrepreneur after having been wage-employed. So, why is the decision to switch from being an employee to becoming an entrepreneur not affected by a difference in social security position? This may have to do with the more general level of insecurity of becoming an entrepreneur, as compared to being an employee. When a person is wage-employed he or she will have a rather good idea of possible risks and the implications for his or her income. The possible risks in the case of entrepreneurship are likely to be less clear to them. Furthermore, the higher risks of entrepreneurship are not limited to a possibly less favourable social security position in case of unemployment or illness. Other potential risks may be of much greater importance to an individual: very low income, loss of invested money, running into debt, loss of status when failing, etc. In addition to the potentially greater risks of being an entrepreneur, one also loses forms of employment protection only applicable to employees (e.g. concerning dismissal procedures)[13].

Our conclusions imply that in order to stimulate entrepreneurship policy makers should also focus on increasing labour participation in general. When a larger share of the adult population participates on the labour market, *ceteris paribus* this will lead to more entrepreneurs as well. One possible way of stimulating labour participation is by implementing a social security system that is less generous and actively stimulates people to earn a living by participating on the labour market. In addition, policy makers may try to influence the decision of people to become self-employed instead of wage-employed. They may do so by mitigating some of the differences between the risks faced by employees and entrepreneurs, such as those related to social security entitlements. The results of our analyses indicate that converging social security benefits for wage earners and self-employed will have the greatest effect on entrepreneurship if they are achieved by decreasing the social security entitlements of employees. Whether societies are willing to pay this price in order to stimulate entrepreneurship remains a political choice.

Limitations of the current study and suggestion for further research
The present study has several limitations. First, due to data restrictions we have only been able to incorporate a limited number of countries. Also, we have confined ourselves to the replacement rates in the first year of unemployment or illness for a single person, earning the average wage. Third, we have used a very simple dummy variable as a rough indicator for the social security position of entrepreneurs as compared to employees. Finally, the specification of our model is very straightforward and has not yet considered interaction effects.

Notwithstanding these obvious limitations, we find clear evidence of a negative influence of replacement rates on entrepreneurial activity while using proven models with several control variables. We feel these results encourage further research into this relationship. Straightforward extensions to this study are the analysis of more countries and of other cases, such as benefits beyond the first year of unemployment or illness/disability, different family types (married couple, single parent, etc.) and other earnings levels. However, the most valuable, and probably most elaborate, line of research would be to use better indica-

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[13] There are significant positive correlations (coefficients around 0.5) between the replacement rates we use in our analyses and the employment protection index, as reported by the OECD (2004), for the countries in our sample.

tors for the social security position of entrepreneurs. Preferably, absolute replacement rates for entrepreneurs in a large number of countries should be available, similar to the replacement rates for employees available for employees. In this case, the effect of the actual magnitude of the difference in social security position between entrepreneurs and employees can be studied. Next, other aspects of social protection such as job security might be added to the model (see Bosma et al, 2005). Finally, a multiplicative term may be incorporated in order to study possible interaction between the overall level of social security and the effect of relative social security entitlements of entrepreneurs.

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Table 1 Replacement rates and total entrepreneurial activity in 24 countries [1]

	Unemploy-ment re-placement rate (employees)	Unemployment repl. rate, dummy self-employed [2]	Illness replacement rate (employees)	Illness repl. rate, dummy self-employed [2]	Total entre-preneurial activity rate, 2002
Netherlands	82	1	70	1	4.6
Switzerland	81	1	0	0	7.1
Portugal	79	1	65	1	4.8 [3]
Spain	74	1	73	1	4.6
France	71	1	43	1	3.2
Sweden	71	0	80	1	4.0
Japan	67	N.A.	N.A.	N.A.	1.8
Norway	66	1	100	1	8.7
Finland	65	0	70	0	4.6
Belgium	64	1	57	1	3.0
Denmark	63	1	61	1	6.5
Canada	62	N.A.	N.A.	N.A.	8.8
Germany	60	1	73	1	5.2
United States	58	1	38	0	10.5
Korea	55	N.A.	N.A.	N.A.	14.5
Iceland	55	0	10	0	11.3
Hungary	48	0	71	1	6.6
Greece	47	1	54	1	9.4 [3]
United Kingdom	46	0	18	1	5.4
Italy	42	1	77	1	5.9
New Zealand	39	N.A.	N.A.	N.A.	14.0
Poland	36	N.A.	N.A.	N.A.	4.4
Australia	33	N.A.	N.A.	N.A.	8.7
Ireland	31	1	21	1	9.1

[1] Replacement rates refer to a single person in the first year of unemployment or illness.

[2] This variable indicates whether the replacement rate for self-employed individuals is approximately equal (value 0) or lower (value 1) compared to the replacement rate for wage-employed individuals.

[3] Estimated value.

Table 2 Correlations between replacement rates and total entrepreneurial activity (15 countries)

	TEA	Unempl. RR, employees	Unempl. RR, self-employed [1]	Illness RR, employees	Illness RR, self-employed [1]
TEA	1				
Unempl. RR, employees	-.61 **	1			
Unempl. RR, self-empl. [1]	.19	.11	1		
Illness RR, employees	-.42	.49 *	-.05	1	
Illness RR, self-empl. [1]	-.31	-.04	.21	.08	1

Note: **: $p<0.05$; *: $p<0.10$.

[1] This is a dummy variable indicating whether the replacement rate for self-employed individuals is approximately equal (value 0) or lower (value 1) compared to the replacement rate for wage-employed individuals.

Table 3 Investigating the impact of social security benefits on entrepreneurial activity

	Dependent variable Total Entrepreneurial Activity rate (TEA)					
Constant	18.2 ***	18.9 **	18.2 ***	17.3 **	26.7 ***	33.8 ***
	(7.3)	(3.0)	(5.4)	(2.8)	(5.3)	(4.7)
Established businesses	.37 ***	.21	.27 ***	.29 **	.28 ***	.25 **
	(3.0)	(1.8)	(4.2)	(2.4)	(5.1)	(3.1)
Communist country	-3.9 **					
	(2.5)					
Social security cost (WCY)	-.073 *	-.052				
	(1.9)	(1.3)				
Unemployment replace-ment rate (employees)			-.082 ***		-.064 ***	
			(5.0)		(4.0)	
Unemployment RR, dummy self-employed [1]			.65			
			(1.2)			
Illness replacement rate (employees)				-.026		-.026
				(1.1)		(1.5)
Illness RR, dummy self-employed [1]				.94		
				(0.6)		
Female share in total la-bour force					-.19 *	-.33 **
					(2.2)	(2.9)
Per capita income	-1.06 ***	-1.31 **	-1.07 ***	-1.36 **	-1.20 ***	-1.44 ***
	(4.0)	(2.8)	(3.9)	(2.6)	(4.8)	(4.0)
Per capita income, squared	.022 ***	.030 **	.026 ***	.033 **	.030 ***	.034 ***
	(3.0)	(3.0)	(4.6)	(2.8)	(5.6)	(4.5)
Adjusted R^2	.63	.55	.85	.53	.89	.74
Observations	38	15	15	15	15	15

Note: Absolute t-values between parentheses. ***: $p<0.01$; **: $p<0.05$; *: $p<0.10$.

[1] This variable indicates whether the replacement rate for self-employed individuals is approximately equal (value 0) or lower (value 1) compared to the replacement rate for wage-employed individuals.

Table 4 Investigating the impact of social security benefits related to unemployment

	Dependent variable				
	TEA	TEA OPP.	TEA NEC.	Young businesses	Nascents
Constant	26.7 *** (5.3)	13.2 * (2.2)	8.9 ** (2.9)	11.1 *** (3.5)	17.4 *** (4.6)
Established businesses	.28 *** (5.1)	.23 *** (3.6)	.10 ** (3.1)	.19 *** (5.5)	.084 * (2.1)
Female share in total labour force	-.19 * (2.2)	-.061 (0.6)	-.063 (1.2)	-.046 (0.8)	-.13 * (2.0)
Unemployment replacement rate (employees)	-.064 *** (4.0)	-.040 * (2.1)	-.016 (1.6)	-.030 ** (3.0)	-.041 *** (3.5)
Per capita income	-1.20 *** (4.8)	-.77 ** (2.6)	-.40 ** (2.6)	-.58 *** (3.7)	-.80 *** (4.3)
Per capita income, squared	.030 *** (5.6)	.022 *** (3.5)	.008 ** (2.4)	.014 *** (4.0)	.021 *** (5.3)
Adjusted R^2	.89	.76	.72	.84	.85
Observations	15	15	15	15	15
	Results including dummy replacement rate self-employed				
Unemployment replacement rate (employees)	-.058 ** (2.8)	-.035 (1.4)	-.017 (1.3)	-.020 (1.7)	-.045 ** (2.9)
Unemployment RR, dummy self-employed [1]	-.41 (0.5)	-.33 (0.3)	.041 (0.1)	-.71 (1.6)	.24 (0.4)
Adjusted R^2	.88	.74	.68	.86	.84
Observations	15	15	15	15	15
	Robustness test: 18 observations [2]				
Unemployment replacement rate (employees)	-.076 *** (3.3)	-.048 ** (2.5)	-.015 (1.7)	-.032 ** (2.2)	-.051 *** (4.0)
Unemployment RR, dummy self-employed [1]	-.24 (0.2)	-.019 (0.0)	-.060 (0.2)	-.53 (0.9)	.30 (0.6)
Adjusted R^2	.78	.78	.72	.74	.83
Observations	18	18	18	18	18
	Robustness test: 24 observations [3]				
Unemployment replacement rate (employees)	-.108 ** (2.7)	-.080 ** (2.7)	-.017 * (1.7)	-.049 * (2.0)	-.068 ** (2.8)
Adjusted R^2	.35	.40	.54	.33	.30
Observations	24	24	24	24	24

Note: Absolute t-values between parentheses. ***: p<0.01; **: p<0.05; *: p<0.10.

Estimations in lower three panels of the table use the same control variables as used in the upper panel.

[1] This variable indicates whether the replacement rate for self-employed individuals is approximately equal (value 0) or lower (value 1) compared to the replacement rate for wage-employed individuals.

[2] Including Iceland, Norway and Switzerland which have extreme values for the illness replacement rate.

[3] All countries for which unemployment replacement rates are available (see Table 1).

Table 5 Investigating the impact of social security benefits related to illness

	Dependent variable				
	TEA	TEA OPP.	TEA NEC.	Young businesses	Nascents
Constant	33.8 *** (4.7)	18.1 ** (3.0)	10.7 *** (3.2)	14.5 *** (3.8)	21.9 *** (4.2)
Established businesses	.25 ** (3.1)	.21 ** (3.1)	.097 ** (2.6)	.17 *** (4.0)	.071 (1.2)
Female share in total labour force	-.33 ** (2.9)	-.15 (1.5)	-.10 * (1.9)	-.11 * (1.8)	-.22 ** (2.7)
Illness replacement rate (employees)	-.026 (1.5)	-.026 * (1.8)	-.005 (0.7)	-.014 (1.6)	-.013 (1.1)
Per capita income	-1.44 *** (4.0)	-.90 ** (3.0)	-.47 ** (2.8)	-.69 *** (3.6)	-.96 *** (3.7)
Per capita income, squared	.034 *** (4.5)	.024 *** (3.8)	.009 ** (2.6)	.016 *** (3.8)	.024 *** (4.3)
Adjusted R^2	.74	.74	.65	.74	.70
Observations	15	15	15	15	15
	Results including dummy replacement rate self-employed				
Illness replacement rate (employees)	-.028 (1.5)	-.027 (1.8)	-.005 (0.5)	-.014 (1.4)	-.016 (1.3)
Illness RR, dummy self-employed [1]	-.69 (0.5)	-.34 (0.3)	.26 (0.4)	.16 (0.2)	-.94 (1.0)
Adjusted R^2	.72	.71	.62	.71	.70
Observations	15	15	15	15	15
	Robustness test: 18 observations [2]				
Illness replacement rate (employees)	-.009 (0.6)	-.007 (0.6)	-.003 (0.7)	-.006 (0.7)	-.003 (0.3)
Adjusted R^2	.55	.66	.67	.55	.59
Observations	18	18	18	18	18

Note: Absolute t-values between parentheses. ***: p<0.01; **: p<0.05; *: p<0.10.
Estimations in lower two panels of the table use the same control variables as used in the upper panel.
[1] This variable indicates whether the replacement rate for self-employed individuals is approximately equal (value 0) or lower (value 1) compared to the replacement rate for wage-employed individuals.
[2] Including Iceland, Norway and Switzerland which have extreme values for the illness replacement rate.