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Active labor market programs' effects on entrepreneurship and unemployment

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Abstract Many countries are turning to active labor market programs (ALMP) to increase individuals' incentive to start a business and to reduce unemployment, but research on the effectiveness of such programs has produced mixed results and is still inconclusive at the macroeconomic level. This article examines the importance of ALMP targeted at entrepreneurship to explain cross-country differences in aggregate entrepreneurship rate. By using GEM data over the period 2002–2013 on OECD countries, our results show a positive impact of ALMP on the rate of necessity entrepreneurship but no significant effect on the rate of opportunity entrepreneurship. We further established that generous unemployment benefits reduce the positive outcome of ALMP on the aggregate rate of necessity entrepreneurship. Moreover, because most businesses started out of necessity do not create new jobs, we find that the economic spin-off of such programs in terms of unemployment reduction is very limited.

Keywords Entrepreneurship · Active labor market programs · Start-up incentives · Unemployment benefits · Unemployment

JEL classifications M21 · J65 · H50

1 Introduction

According to the European Commission, micro enterprises account for more than 90% of all firms and employ almost one-third of the total private labor force in Europe.[1] Those figures place entrepreneurship and small-business creation as a key element in fighting social exclusion and unemployment (Acs 2008; Carree and Thurik 2008; Parker 2009). In recent years, the role of entrepreneurship in fighting unemployment has been afforded greater attention following a dramatic increase in unemployment rates as a result of the global economic crisis. Policy makers have focused on self-employment by dedicating government resources to a specific form of active labor market program (ALMP) aiming to enhance the creation of new ventures by the unemployed.[2]

Emeran Nziali presented a first version of this paper at the 2014 BCERC. He died several months after, in December 2014. The three other authors have worked on the paper in memory of Emeran. He is sorely missed.

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[1] Micro enterprises are defined as companies hiring less than 10 people. See European Commission report (2014) on start-up incentives in Europe

[2] In the rest of the paper, we use the term ALMP to refer to start-up incentive policies, i.e., all types of policies targeted at entrepreneurship.

However, the economic benefit of such programs can only be confirmed if entrepreneurship actually reduces unemployment in any one country.

The relationship between entrepreneurship and unemployment is ambiguous. Several scholars have criticized the generalization of such programs and argued that indiscriminately encouraging entrepreneurship is bad public policy (Acs et al. 2016; Åstebro 2017; Blanchflower 2004; Hurst and Pugsley 2011; Lerner 2009; Parker 2007; Shane 2008, 2009). At the same time, Thurik et al. (2008) find evidence that unemployment fosters self-employment (the "refugee" effect) and that self-employment reduces unemployment in subsequent periods (the "entrepreneurial" effect), the latter effect being considerably stronger than the former. This suggests that the effectiveness of ALMPs is an issue that deserves further scrutiny, especially since providing an insight into the contribution of ALMPs to unemployment reduction is of practical relevance for both policy makers and taxpayers.

In this paper, we analyze the effect of ALMPs at the macroeconomic level to understand whether such policies (i) contribute to increasing entrepreneurship rates and (ii) contribute to reducing unemployment rates.

Regarding the first issue of the effect of ALMPs on entrepreneurship rates, we conjecture that the effectiveness of ALMPs will depend on the type of entrepreneurship fostered by such programs and on the institutional environment. ALMPs will only contribute to raising entrepreneurship rates if labor market institutions, and more specifically social security systems, are conducive to the success of ALMPs in stimulating self-employment among the unemployed. The economic literature has identified generous unemployment benefits as lying at the heart of the conventional explanation for low self-employment rates (Carrasco 1999; Evans and Leighton 1990). Generous labor market institutions may create rigidities, thus lowering incentives to adopt risky behavior such as engaging in self-employment, which in turn may reduce the positive outcome expected from ALMPs.

The second issue under consideration in this paper is the role of ALMPs in unemployment reduction. Policies targeted at entrepreneurship are appealing because they have two potential positive effects on employment. Firstly, stimulating self-employment among the unemployed is deemed to be a good way to help individuals re-enter the labor market, especially when employment opportunities in the traditional labor market are scarce. ALMPs enable escape from unemployment through starting a self-employed paid activity. Secondly, profit aspirations lead entrepreneurs to hire workers in order to ensure their firm's growth, which stimulates job creation and employment opportunities in the future. The effects of ALMPs on overall employment are likely to be more significant in this last scenario as they contribute to the creation of paid employment opportunities. Therefore, the impact of ALMPs in terms of unemployment reduction is likely to depend on whether individuals are willing to make their company grow and hire workers, or whether they simply want to become and remain self-employed as a way out of unemployment.

We conjecture that ALMPs will only reduce aggregate unemployment if the type of entrepreneurship they foster contributes to additional job creation. Not all entrepreneurs are willing to grow their ventures (Delmar and Wiklund 2008; Hurst and Pugsley 2011).[3] In fact, many nascent entrepreneurs do not pursue profit opportunities but rather consider self-employment as a necessity to overcome the dissatisfaction with their current situation in terms of unemployment, family pressure, and need for survival (Benzing and Chu 2009; Hessels et al. 2008). For necessity entrepreneurs, generating profits, wealth, and innovation is not their first motivation. They are unlikely to dedicate time to enhancing growth and profits and pursuing a transformation that might require hiring workers. Their main objective is rather to generate enough activity and revenue for themselves (Minniti et al. 2005; Poschke 2013). However, for opportunity entrepreneurs with high wealth and growth aspirations, hiring workers is part of their business project. Opportunity and necessity entrepreneurs therefore have a differential impact on economic growth and job creation (Valliere and Peterson 2009; Wennekers et al. 2005; Wong et al. 2005). Hence, distinguishing the effects of ALMPs on opportunity and necessity entrepreneurship types is important in gaining a better understanding of their economic impact on unemployment rates.

To the best of our knowledge, this article is the first to provide such empirical evidence at the macroeconomic

[3] There is evidence that most entrepreneurs do not create additional jobs in the first years of operations and do not innovate (e.g., Acs et al. 2016; Åstebro and Tåg 2015; Shane 2008). This prompts some scholars to distinguish self-employment and small business activity from "real"—or "Schumpeterian"—entrepreneurship (Henrekson and Sanandaji 2014; Sanandaji and Leeson 2013). In this paper, we use the terms self-employment and entrepreneurship interchangeably.

level. A large body of the literature has analyzed the macro-level determinants of entrepreneurship,[4] including human capital determinants, the level of economic development, and institutions (Baumol 1990; Wennekers et al. 2010; Evans and Leighton 1990; Shane 2003). However, little attention has been paid to country differences in terms of ALMP spending and impact on aggregate entrepreneurship rates. Yet, all countries in our analysis have some form of start-up incentives for the unemployed. Although start-up incentive programs account for a small fraction of ALMPs in terms of budget allocation, they can influence countries' aggregate entrepreneurship rates in significant ways, especially given that lack of capital can be a major impediment to becoming an entrepreneur (Blanchflower and Oswald 1998; Cabral and Mata 2003; Evans and Jovanovic 1989).

We used GEM data for the period 2002 through 2013 on a sample of OECD countries and included a disaggregated measure of countries' social security systems and ALMPs. The results of the study are as follows. First, we found that ALMPs are a major positive determinant of necessity entrepreneurship but not opportunity entrepreneurship, the latter rather being contingent on economic growth. Secondly, we found that there are moderating factors that limit the direct impact of ALMPs on entrepreneurship. More precisely, we found that the positive effect of ALMPs on necessity entrepreneurship is reduced by generous unemployment benefits. Finally, we observed that the economic outcome of ALMPs in terms of unemployment reduction is limited. We found that opportunity-driven entrepreneurship is a main driver of unemployment reduction in one country but it is not related to cross-country differences in terms of ALMP spending. We interpret this result as being a consequence of two potential drawbacks of ALMPs. Firstly, there might be an adverse selection problem in which ALMPs attract mainly necessity entrepreneurs, whose economic outcome in terms of employment creation is lower. Secondly, there might be deadweight loss effects in which some opportunity-entrepreneurs would have started their businesses even in the absence of the program.

The remainder of the paper is structured as follows: Sect. 2 presents our study's conceptual framework and the theoretical background from which our hypotheses are derived. Section 3 describes the data and the main variables. Section 4 details the econometric methodology. Section 5 then presents the main results while Sect. 6 concludes by discussing the results and providing recommendations for economic policy.

[4] See Parker (2004) chapter 4 for a review of the literature.

2 Conceptual framework and hypotheses

Governments around the world implement policies promoting self-employment for unemployed workers. Most studies give useful insights into the role of ALMPs on entrepreneurship at the individual level but provide no information on the macroeconomic and institutional determinants of national differences in entrepreneurship rates (see Boone and Van Ours 2004, for a review). We are aware of only two articles analyzing the role of labor market institutions with macro panel data. The first is Parker and Robson (2004), who use OECD panel data from 1972 to 1996 to analyze the determinants of aggregate self-employment rates. However, OECD does not enable early-stage activity to be captured nor entrepreneurial motivation to be identified (opportunity or necessity). The second study is by Koellinger and Minniti (2009), who use the Global Entrepreneurship Monitor (GEM) data on a panel of 16 OECD countries. The advantage of GEM data is the opportunity to distinguish entrepreneurs who are opportunity-driven from those who become entrepreneurs out of necessity. The drawback of their study is that they only include unemployment benefits as a measure of the state's generosity, without taking into account social security contributions and ALMPs.

Therefore, we adopt a macroeconomic perspective and more finely tuned measures in order to analyze the following: (i) whether countries with generous start-up incentives from ALMPs perform better in terms of entrepreneurship rates; (ii) whether unemployment benefits alter the expected positive outcome of ALMPs on entrepreneurship rates; and (iii) whether ALMPs aiming to foster entrepreneurship contribute to reducing unemployment over time.

2.1 The effects of ALMPs on entrepreneurship rates

As far as we know, most studies analyzing the impact of ALMPs on entrepreneurship participation have so far used micro-economic data. From a micro-economic perspective, studies have analyzed (i) whether the program improves participants' labor market prospects and (ii) whether the subsidy leads to successful businesses, additional jobs, and innovation. For instance, the impact of ALMPs on entrepreneurship has been analyzed in

terms of survival rate, business performance, and probability of becoming self-employed (e.g., Baumgartner and Caliendo 2008; Caliendo and Kritikos 2010; Røed and Skogstrøm 2014). These studies generally show the positive effect of ALMPs on the rate of business creation and on business longevity.[5]

This suggests that ALMPs would have a higher impact on the rate of necessity entrepreneurs (than the rate of opportunity entrepreneurs) at the macroeconomic level, because ALMPs are almost exclusively targeted towards unemployed individuals. Indeed, the literature has traditionally defined two motivations for self-employment depending on the entrepreneurs' status at the time of business creation. Entrepreneurs coming from unemployment are said to have push motives of termination of unemployment, which makes them start ventures out of necessity. On the other hand, entrepreneurs that come from employment are said to have pull motives, such as pursuing an attractive opportunity or profit aspiration for personal interest (Baptista et al. 2014; Reynolds et al. 2001). As most ALMPs target unemployed individuals who are likely to start a business out of necessity because of the lack of satisfactory employment prospects, it is logical to expect stronger ALMP effects for this part of the population.

However, this reasoning needs further consideration because prematurely classifying employed and unemployed workers as opportunity- or necessity-driven entrepreneurs may lead to incorrect classification. First, we cannot exclude the possibility of a moral hazard problem in which some employed individuals with a good business opportunity voluntarily enter unemployment to benefit from the start-up subsidy. In this case, the sample of opportunity entrepreneurs among unemployed individuals may increase with ALMPs because some employed individuals with entrepreneurial intention voluntarily exit their jobs in order to benefit from start-up subsidies. For instance, Bergmann and Sternberg (2007) show that a policy change[6] providing financial support for start-ups created by the unemployed in Germany positively influenced both nascent necessity and nascent opportunity activities. In such conditions, it is plausible that employed people willing to start a business would opt to become unemployed in order to access the support instruments available for launching start-ups from unemployment.

Secondly, prematurely classifying employed and unemployed workers as opportunity- or necessity-driven may not reflect the reality. For example, according to individual GEM statistics in 2013, 2.41% of unemployed individuals are necessity entrepreneurs and 3.41% of them are opportunity entrepreneurs. These figures suggest that the pool of opportunity entrepreneurs is also large among unemployed individuals. Caliendo and Kritikos (2010) find for instance that unemployed individuals applying for ALMPs in Germany are motivated by both push and pull factors.

Thirdly, necessity versus opportunity entrepreneurship is a self-reported measure implying a high degree of subjectivity. Indeed, entrepreneurs' motives are complex and often combine necessity and opportunity drivers, with the balance shifting over time according to the circumstances (Williams and Williams 2012). A large pool of unemployed individuals may want to start a business essentially to exit unemployment but may still perceive themselves as opportunity entrepreneurs because they have identified a good business opportunity. Self-perception of being an opportunity entrepreneur may be even more important in countries offering generous ALMPs as financial programs aiming to support business creation may not only affect the incentive to actually create new firms but also help individuals learn about their type by experimenting with setting up a firm without taking large financial risks (Hombert et al. 2013).

Thus, the relationship between ALMPs and distinct rates of entrepreneurship (necessity vs opportunity) might not be as trivial as one might think and deserves to be tested. Although previous findings (e.g., Bergmann and Sternberg 2007) suggest ALMPs to be an important determinant of both necessity and opportunity entrepreneurship rates, we still hypothesize that, from a macroeconomic perspective, ALMPs will be a more important determinant of necessity entrepreneurship than of opportunity entrepreneurship because opportunity entrepreneurs would have started their business even in the absence of the program. In contrast, necessity entrepreneurs may consider ALMPs to be an essential stimulus in order to start a business as they

[5] See European Employment Policy Observatory Review (2014) for a very detailed review of evaluation policy analysis on a large sample of countries.

[6] Including the introduction of the highly mediatized "Me Inc." instrument. "The media-friendly treatment of the subject of self-employment and buzzwords such as "Ich-AG" ("Me Inc.") have considerably increased the acceptance and chances of launching a start-up from unemployment. It can be assumed that in 2003 and 2004, almost every unemployed person in Germany knew that he or she could get financial support when starting a business." (Bergmann and Sternberg 2007: 217–218).

have less access to financial capital, making them more dependent on subsidies and loans (Brewer and Gibson 2014).

> *Hypothesis 1*: Start-up incentives stemming from ALMPs are more likely to determine the rate of necessity entrepreneurship than the rate of opportunity entrepreneurship.

2.2 The moderating role of unemployment benefits

Motivation towards entrepreneurship is not the only factor explaining the economic outcome of ALMPs: countries' institutional characteristics also matter. The institutional environment is an important determinant of value-adding entrepreneurial behavior (Baumol 1990; Minniti 2008; North 1990). Therefore, we expect the impact of ALMPs on self-employment rates to vary across countries depending on their labor market institutions. Specifically, we argue that generous unemployment benefits may lower incentives to adopt "risky behavior" such as entering self-employment, which in turn may reduce the positive outcome expected by ALMPs.

High unemployment benefits raise the opportunity cost for unemployed workers in terms of leaving unemployment to pursue self-employment. Generous unemployment benefit schemes increase the reservation wage and reduce work incentives, hence discouraging unemployed workers from engaging in entrepreneurial activity.[7] A high replacement rate may also discourage salaried workers from leaving paid employment for self-employment because of a fear of loss of benefits (Parker and Robson 2004). To the extent that high unemployment benefits provide a disincentive to become self-employed, ALMPs may have a lower expected outcome in countries with generous welfare states.

This reasoning is supported by Røed and Skogstrøm (2014), who show that both participation in entrepreneurship-oriented ALMPs and a temporary loss of unemployment benefits increase the transition rate to entrepreneurship. In the same vein, this conjecture is supported by the results of Román et al. (2013), who find that the positive association between public expenditures promoting self-employment and entrepreneurship is conditional on unemployment rates. They highlight a much stronger impact of ALMPs when unemployment is low than when unemployment is high. Given that countries with high unemployment benefits exhibit higher unemployment rates, their results corroborate the idea that unemployment benefits may play a moderating role in the relationship between ALMPs and entrepreneurship.

The moderating role of unemployment benefits may be even more important for necessity entrepreneurs as they might not start a business if they could have a wage job (Evans and Leighton 1990; Masuda 2006; Storey 1991). Individuals without any pull motives may prefer to remain unemployed rather than enter self-employment, especially in countries with high-unemployment benefits that offer good conditions for pursuing the search for paid employment (Bergmann and Sternberg 2007). In contrast, opportunity entrepreneurs would still exert investment efforts to develop business ideas even in the presence of generous unemployment benefits as their main motivation is not to become self-employed to earn a living but rather to achieve social status, make higher income, or pursue a market opportunity (Giacomin et al. 2007). This line of thought leads us to the following hypothesis:

> *Hypothesis 2*: Unemployment benefits have a negative moderating effect on the relationship between start-up incentives and entrepreneurship rates, i.e., high levels of unemployment benefits reduce the effect of start-up incentives on entrepreneurship rates.

2.3 The effectiveness of entrepreneurship-focused ALMPs in reducing unemployment

Analyzing whether ALMPs raise necessity or opportunity entrepreneurship rates is a difficult yet important question in identifying the repercussions of ALMPs for unemployment reduction. In fact, the literature on the impact of entrepreneurship-related public policy on unemployment is relatively limited, the relationship between entrepreneurship and unemployment being itself complex and difficult to study (Thurik et al. 2008). Nevertheless, such literature suggests that necessity and opportunity-based entrepreneurship might have different impacts in terms of job creation and unemployment reduction.

[7] See Koellinger and Minniti (2009), Parker and Robson (2004), and Staber and Bogenhold (2000), for evidence on macroeconomic data. See Alba-Ramirez (1994), Carrasco (1999), Evans and Leighton (1990), Røed and Skogstrøm (2014), and Román et al. (2013), for evidence on micro-economic data.

On the one hand, some studies suggest that necessity entrepreneurs might indeed contribute to the reduction of unemployment. For instance, Poschke (2013) analyzes GEM data and observes that "the average age of firms run by necessity entrepreneurs is not statistically significantly different than other firms, suggesting a similar survival rate." (p. 660). The author concludes that "necessity entrepreneurship is thus not purely a short-lived phenomenon of people, for example, trying to bridge an unemployment spell. Many firms run by these entrepreneurs are there to stay, although they are smaller and expect to grow less than other firms." (p. 660–661). In a similar vein, Valliere and Peterson (2009) suggest that necessity entrepreneurs might have an important role in the reduction of unemployment, especially in emerging countries, even though they do not make a significant contribution to economic growth. Using a longitudinal dataset of Portuguese start-ups, Baptista et al. (2014) also find similar survival rates between opportunity-based and unemployment-driven entrepreneurs. In addition, Koellinger (2008) finds that unemployed individuals are more likely to start innovative, rather than imitative, businesses, suggesting that firms started out of necessity might indeed have high growth potential.

On the other hand, several studies also suggest that opportunity entrepreneurship is more likely to create new jobs and that the contribution of necessity entrepreneurs to the reduction of unemployment at the aggregate level is rather small. For example, Acs and Varga (2005) studied 11 countries and found that opportunity entrepreneurship has a positive and significant effect on economic development, whereas necessity entrepreneurship has no effect. Burke et al. (2000) find a net positive effect on employment for qualified entrepreneurs with a university degree, whereas necessity entrepreneurs tend to be less qualified in terms of human capital (Block et al. 2015a, b; Poschke 2013; Thurik et al. 2002). In addition, necessity entrepreneurs are less likely to take risks (Block et al. 2015b), exploit profitable opportunities (Block and Wagner 2010), be satisfied with their ventures (Block and Koellinger 2009), and to expect them to grow (Poschke 2013). As employment growth in small businesses and start-ups is highly dependent on growth motivation (Delmar and Wiklund 2008) and typically seen as risky (Wennberg et al. 2016), it is not surprising that growth-oriented businesses are not associated with (being rather opposed to) necessity entrepreneurship (Valliere and Peterson 2009; Wong et al. 2005). Moreover, given their lack of capital- and/or knowledge-based resources, necessity entrepreneurs are more likely than other entrepreneurs to pursue a cost leadership strategy and less likely to pursue a differentiation strategy (Block et al. 2015a, b). This also puts limits on the growth of their firms, since cost leadership requires, especially at the start-up phase, a willingness for managers and their employees to work for low wages.

Therefore, albeit not entirely conclusive, previous literature tends to suggest that opportunity entrepreneurship is more likely to reduce unemployment than necessity entrepreneurship. Thus, we hypothesize the following:

> *Hypothesis 3*: The rate of opportunity entrepreneurship is more likely to be associated with a reduction of unemployment than the rate of necessity entrepreneurship.

This line of thought suggests that, if it is true that ALMPs self-select entrepreneurs with a push motive, then the expected outcome of ALMPs in terms of unemployment reduction may be very limited. Indeed, the economic spin-off of such programs is likely to depend on the business survival, success, innovation and most importantly, employment prospects, which are themselves dependent upon the nature of entrepreneurship (necessity- versus opportunity-driven). This suggests a somewhat paradoxical conclusion: although ALMPs providing start-up incentives aim to reduce unemployment by helping the unemployed to become self-employed, unemployment at the macro-level may not shift down if ALMPs favor necessity entrepreneurs. In other words, if ALMPs increase the rate of necessity entrepreneurship but not the rate of opportunity entrepreneurship, unemployed individuals might well become self-employed and still the aggregate level of unemployment might not change significantly since most businesses started out of necessity do not create new jobs. Hence, if hypotheses 1 and 3 are confirmed, ALMP impact on aggregate unemployment might be very limited.

3 Data and variables

We constructed the dataset to test our hypotheses by merging data from the GEM with a range of time-

varying national institutional indicators and macroeconomic controls. GEM conducts a representative population survey of at least 2000 individuals in each participating country every year. We use data collected through the GEM adult population surveys over the period 2002–2013 (for details of the sampling procedure, see Reynolds and Hechavarria 2008).

3.1 Variables of interest

Entrepreneurship rates We use entrepreneurial activity from the GEM adult population survey as our dependent variable. The total early-stage entrepreneurial activity (TEA) is defined as the percentage of the adult population that is involved in a nascent firm (that is a firm for which no wages have been paid for over 3 months) or a young firm (that is a firm for which no wages have been paid for 3 to 42 months).

One main advantage of GEM with respect to existing data on entrepreneurship is the opportunity to separate out the motivations of entrepreneurial activities into necessity entrepreneurship and opportunity entrepreneurship.

Start-up incentives Our variable of interest provided by the OECD is a measure of ALMPs targeted at entrepreneurship, defined as national expenditure on start-up incentives as a percentage of GDP, i.e., programs encouraging unemployed workers and targeted groups to start their own businesses or to become self-employed. Start-up incentive measures represent only a small share of ALMP spending in OECD countries and the amount of such measures varies across countries in our analysis. Taking an average figure for the period of observation, start-up incentive spending is the highest in Germany, Spain, France, Greece, Italy, Slovenia, and Sweden. In contrast, countries such as the USA, the United Kingdom, Portugal, and Belgium have relatively low averages (see Appendix A for the descriptive statistics per country). Start-up incentives take the form of different schemes including training, income support, and lending business capital. Lending programs at preferential rates are in place in almost all countries. However, other start-up incentive measures are specific to some countries and can take different forms.[8] The difficulty of analysis across different countries is providing a meaningful measure of ALMPs that allows for comparison of the different schemes. We take into account overall government expenditure on start-up incentives as a percentage of GDP. This measure provides a good picture of government incentives to promote self-employment through allocating sufficient resources to entrepreneurs. A high index reflects the generosity of aid per entrepreneur as well as the diffusion of entrepreneurship programs to a large number of beneficiaries.

Unemployment benefits We use a more accurate measure of unemployment benefits in comparison with the measures previously used in the literature. We use a measure of net replacement rate (NRR) developed by the OECD that takes into account the share of net average wage for nearly all wage earners. In comparison, Parker and Robson (2004) and Hessels et al. (2007) use the average gross replacement rate (GRR) provided by the OECD.[9] This index is measured against the average production worker wage which presents some limitations as the vast majority of wage earners in all developed countries work outside manual occupations in the manufacturing sector. The NRR is a superior measure of unemployment benefits as it takes tax and social security contributions into account, which reflects the real replacement rate of workers due to higher taxes during in-work income than during out-of-work income. The NRR also includes housing benefits and social assistance which constitutes a substantial proportion of non-wage income. Both the GRR and NRR are calculated for a 40-year-old[10] person working full-time with continuous employment and contribution to

[8] Start-up grants as in Finland, Spain, Germany, and France, income support programs as in Germany and the UK and training programs as in Italy. See European Commission Report (2014) for more details.

[9] Other indexes have been used to capture generosity of unemployment benefits. Koellinger and Minniti (2009) measure the generosity of unemployment benefits by an index obtained by dividing the public spending on out-of-work income maintenance and support, measured in percent of GDP, by one plus the current employment rate.

[10] For most countries, the replacement rate is relatively similar regardless of whether the previous wage or marital status are considered. In the United Kingdom, there is a strong discrimination between replacement rates depending on individuals' marital status and previous wage. The replacement rate of a single earner is 20%, while the replacement rate of two earner married couples is 67%. We have run the analysis with net replacement rates based on different criteria (the replacement rate of single earner married couples without children and single earner married couples with 2 children having a previous wage of 67% of the average wage and 150% of the average wage). Our main findings are not altered by the choice of the variable. We report the results with the net replacement rate based on a 40-year-old single earner without children with a previous wage of 67% of the average wage because most studies, including OECD reports, base their conclusion on this category.

unemployment insurance since the age of 18 (OECD 2007).[11] We distinguish between short-term replacement rate, which is the proportion of net income maintained after job loss the first 12 months, and long-term replacement rate, which is the proportion of net income maintained after job loss up to 60 months.

3.2 Control variables

The macro-level determinants of entrepreneurial activity are manifold and we need to control for them in order to carefully identify the specific role of ALMPs. We suggest that the aggregate level of entrepreneurial activity in a country may be understood as the interplay between ALMPs, unemployment benefits, social security systems, and other macroeconomic determinants that are detailed below.

3.2.1 Social security systems.

We pay particular attention to measures of social security systems. Funding of the social security system can be of a different nature depending on the country. Overall, social security contributions are split between contributions paid by employers (payroll tax rate and corporate tax rate) and contributions paid by employees (income tax rate).

Payroll tax A high rate of contribution paid by employers may affect entrepreneurship in two opposite directions. On the one hand, high employer contributions may increase the incentives for firms to use self-employed contractors to reduce the cost of labor, therefore increasing the rate of entrepreneurship. On the other hand, high employer contributions may reduce the incentive to start a business, especially for entrepreneurs who plan to hire workers in the future.

We are aware of only three studies introducing payroll tax rate on entrepreneurship. The first is the study by Moore (1983) based on cross-sectional data from the 1978 Current Population Survey in the USA. He finds that an increase in the level of payroll tax raises the probability of becoming self-employed. Stabile (2004) uses a quasi-natural experiment on 1990s Canadian data by comparing the entrepreneurship rate in Ontario, where a payroll tax was introduced, and other Canadian provinces where no such tax was brought in. He finds that payroll tax increased the probability of becoming self-employed. Finally, Parker and Robson (2004) use data on 12 OECD countries over the period 1972–1996 and find no significant impact of payroll tax on aggregate entrepreneurship rates.

We include two measures of payroll tax derived from OECD indicators. The first is a tax related to social security contributions. It corresponds to compulsory payments paid to general government that confer entitlement to receive a (contingent) future social benefit. They include the following: unemployment insurance benefits and supplements, accident, injury and sickness benefits, old age, disability and survivors' pensions, family allowances, reimbursements for medical and hospital expenses or provision of hospital or medical services. Contributions may be levied on both employees and employers.[12] The second is a variable that captures the remaining payroll tax.[13] It is defined as taxes paid by employers, employees, or the self-employed, either as a proportion of payroll or as a fixed amount per person, and that do not confer entitlement to social benefits.

Income tax High income tax paid by employees may affect entrepreneurship in two opposite ways. On the one hand, employees' contributions may potentially increase entrepreneurship as they offer greater opportunity to shelter income from tax authorities for self-employed workers. In addition, high income tax is associated with high social security ensuring a safety net in case of business failure which may in turn increase entrepreneurial decisions. On the other hand, social security arrangements may also discourage workers from leaving paid employment or unemployment for self-employment because of a fear of benefits loss. In general, most results from cross-sectional microeconomic studies show that the first effect overcomes the latter, implying a positive association between income tax rates and entrepreneurship.[14] We include a measure of

[11] Unfortunately, the index does not allow unemployment generosity for all individuals in one country to be captured. In order to overcome this limitation, we introduce a measure of access to unemployment benefits defined as the ratio of unemployment benefit recipients to the number of unemployed (the database has been generously provided by David Grubb at the OECD). The variable is only available for 16 countries from 1999 to 2004, which reduces the sample in a significant way. More specifically, the coefficients are estimated on a sample of 45 observations, which does not provide consistent estimates.

[12] This variable is captured by "social security contribution" in the remainder tables.

[13] This variable is captured by "payroll tax" in the remainder tables.

[14] See Blau (1987), Bruce (2000), Evans and Leighton (1989), and Schuetze (2000) for evidence on the US and Parker (1996) for evidence on the UK

income tax derived from the OECD. Tax on personal income is defined as the taxes levied on the net income (gross income minus allowable tax reliefs) and capital gains of individuals, measured as a percentage of GDP.

Corporate tax It is not just payroll tax that affects entrepreneurship rates but corporate tax rates too. Most studies conclude that corporate income taxes have a negative impact on self-employment rates as they increase the ex-post production cost of entrepreneurship (Gordon and Cullen 2002; Djankov et al. 2010; Gentry and Hubbard 2000). Information on corporate tax is derived from the OECD statistics database. The corporate tax corresponds to the tax on corporate profits, which is defined as taxes levied on companies' net profits. It also covers taxes levied on companies' capital gains and is measured as a percentage of GDP.

3.2.2 Business cycles and other macroeconomic determinants

Besides social security systems, previous literature has examined the role of several other macro-level determinants influencing aggregate entrepreneurship rates. These include different measures of countries' economic development and business cycles, as detailed below.

Unemployment rate The aggregate level of unemployment rate has been highlighted as an important factor influencing entrepreneurial activity. Two contrasting effects are at work in explaining the relationship between aggregate self-employment and the unemployment rate. On the one hand, high unemployment rates may be associated with a lack of employment opportunities, which acts as a "push" factor into self-employment as entrepreneurship may be the only alternative option to wage work (the "refugee effect" as highlighted by Thurik et al. 2008). On the other hand, high unemployment rates may be the consequence of bad economic conjunctures which act as a "pull" factor out of self-employment, discouraging individuals from starting new ventures and contributing to the discontinuation of small ventures.

Many arguments support both hypotheses. In periods of favorable economic climates, opportunities for profit and innovation are higher (Barlevy 2007; Rampini 2004), the risk of business failure is lower (Buchmann et al. 2009; Dawson et al. 2009), and the prospect of obtaining necessary bank credit is higher (Parker 2009), which provides good economic conditions for starting a new business. These arguments support the prosperity-pull hypothesis, according to which aggregate self-employment rates are higher in periods of economic prosperity. However, other arguments support the opposite recession-push hypothesis. In periods of poor economic conditions, the prospects of finding a job are reduced and the reservation wage from wage work is lower, which in turn reduces the opportunity cost of starting a new venture (Alba-Ramirez 1994; Thurik et al. 2008).

No clear conclusion emerges from empirical studies comparing international data, as some studies find a negative relationship between unemployment rates and self-employment (Blanchflower 2000; Parker and Robson 2004) whereas others find no significant relationship (Acs et al. 1994; Koellinger and Minniti 2009; Staber and Bögenhold 1993). Using panel data, Thurik et al. (2008) find support for both the "refugee" effect (unemployment in one period Granger-causes self-employment to increase in the subsequent period) and the "entrepreneurial" effect (self-employment in one period Granger-causes unemployment to decrease in subsequent periods). Therefore, we control for countries' unemployment rate as a percentage of the labor force and take information from the World Bank Indicators Database.

GDP growth In accordance with the prosperity-pull and recession-push hypotheses, economic growth also strongly influences aggregate entrepreneurship (Audretsch 2007; Baumol and Strom 2007). High growth perspectives are associated with greater capital per worker and higher demand within a country, which positively influences the entrepreneurship rate (Acs et al. 1994). Low growth or recession periods are associated with a lack of employment opportunities which push individuals into self-employment (Thurik et al. 2008). We include the annual GDP growth rate from the World Bank Indicators.

GDP per capita GDP per capita is an important determinant of inter-country differences in entrepreneurship rates. The literature finds a U-shaped relationship between the level of GDP per capita and entrepreneurship. Low GDP per capita countries have a high rate of entrepreneurship because labor market opportunities are under-developed and self-employment is seen as an effective source of poverty alleviation (Amoros and Bosma 2014; Torres and Eminet 2004). At the other extreme, high GDP per

capita countries provide more opportunities for business ownership because of a better developed financial market, human capital, and technology (Wennekers et al. 2005, 2010). In our analysis, GDP per capita in US dollars is derived from the World Development Indicator.

Globalization There are two possible effects of globalization on entrepreneurship. On the one hand, globalization creates new market opportunities which act in favor of entrepreneurship (Acs et al. 2001). On the other hand, tougher international competition may dampen entrepreneurial initiatives (Keupp and Gassmann 2009). We include a variable of globalization measured by the sum of exports and imports of goods and services as a percentage of GDP, derived from the World Bank.

Technological progress There is also the issue of technological progress, which can impact entrepreneurship in different ways. On the one hand, research and development efforts promoting technological progress and new varieties of products create new market niches attainable for small businesses. On the other hand, high levels of technological progress may require heavy sunk cost investments, preventing the entry of new firms into the market. Countries with high levels of innovation and R&D spending create entry barriers for new firms due to the high entry costs required to compete with established innovative businesses. The literature is so far inconclusive on the impact of technological progress on entrepreneurship and finds conflicting results.[15] Technological progress is seen here by means of a variable measuring countries' research and development expenditure as a percentage of GDP, derived from the World Bank.

A summary of the interest and control variables detailed so far is given in Table 1 and the descriptive statistics (mean and standard deviation) per country are provided in Table 4.

4 Methodology

We use the Bayesian model averaging estimator in a country fixed effect linear regression context in order to control for model uncertainty. Model uncertainty is of particular importance in our case because the literature presents a number of conflicting findings on the determinants of aggregate entrepreneurship (see Arin et al. 2015, for more details). One of the reasons for the conflicting findings observed in the entrepreneurship literature is the heterogeneity of model choices made by researchers, who often choose explanatory variables in the space of all possible models and base their conclusion as if the model chosen were the true one. Indeed, a problem arises when there are many potential explanatory variables in a matrix X and one wonders which variables should be included in the final model. Some articles provide robustness checks by changing the control variables in the model to see whether the sign and/or significance level of the variable of interest change. However, this procedure can lead to incorrect inference and statistical bias. A better approach to account for model uncertainty is to apply Bayesian model averaging (BMA) to the data.

We consider the case of a normal linear regression, with $y = y_1, \ldots, y_T$ being the $T \times 1$ vector of the dependent variable, α_i is the constant, β_i the coefficients of the $T \times q$ matrix of regressors X and ε_i a $T \times 1$ vector of the normal IID error term with variance σ^2, represented as follows.

$$y_{it} = \alpha_i + \left(X_{it} - \overline{X}\right)\beta_i + \varepsilon_{it} \quad (1)$$

The unconditional BMA estimates of β_i are the weighted average of parameter estimates conditional on each model in the model space.

$$\hat{\beta} = E(\beta|y) = \sum_{i=1}^{I} \gamma_i \hat{\beta}_i$$

Estimating the coefficients β in the Bayesian framework requires estimation of the posterior model probability defined by γ_i which is given by

$$\gamma_i = p(M_i|y) = \frac{p(M_i)p(y|M_i)}{\sum_{j=1}^{I} p(M_j)p(y|M_j)}$$

where $p(M_i)$ is the prior probability of model M_i, $p(y|M_i)$ is the marginal likelihood of y given model M_i, and I is the number of possible models to be considered with $I = 2^k$ and k the number of variables in X.

ε_{it} is the idiosyncratic error term that can be deconstructed as $\varepsilon_{it} = u_i + v_{it}$, where u_i is the constant individual-specific residual and v_{it} is the standard residual. The Hausman test of exogeneity confirms the existence of constant unobserved variables correlated with the independent variables in all specifications. To account for country-level heterogeneity, the constant

[15] See Parker (2009) for a survey of the literature.

Table 1 Variable description and source

Variables	Description	Source	Stat. Des.
Start-up incentives (SUI)	Public expenditure of LMP in start-up incentives (% GDP)	OECD stats	0.020 [0.030]
Social security contribution	Social security contributions (%GDP)	OECD indicator (indicator) (doi: 10.1787/3ebfe901)	9.761 [4.420]
Corporate tax	Tax on corporate profits (% GDP)	OECD stats (doi: 10.1787/d30cc412)	2.999 [1.524]
Income tax	Tax on personal income (% GDP)	OECD stats (doi: 10.1787/94af18d7)	8.665 [2.866]
Payroll tax	Tax on payroll (% GDP)	OECD stats 0.401 (doi: 10.1787/2787e067)	0.401 [0.782]
Technological progress	Research and development expenditure (% of GDP)	World Bank Indicator	2.130 [0.910]
Globalization (trade)	Sum of Exports and Imports of goods and services (% of GDP)	World Bank Indicator	83.734 [43.125]
GDP per capita	gross domestic product by midyear population (current U.S. dollars.)	World Development Indicators	35,400.450 [12,622.610]
GDP growth	Annual percentage growth rate of GDP (constant 2005 U.S. dollars)	World Development Indicators	2.150 [2.677]
Unemployment rate	Unemployment, total (% of total labor force)	World Development Indicators	7.358 [3.100]
Short-term replacement rate	Proportion of net income in work that is maintained after job loss the first 12 months	OECD Benefits and Wage Statistics	63.063 [16.016]
Long-term replacement rate	Proportion of net income in work that is maintained after job loss up to 60 months	OECD Benefits and Wage Statistics	46.069 [22.994]

Note: The descriptive statistics provide the mean of each variable in our sample. Standard deviations are reported under brackets

individual-specific residual u_i is differenced out, and within-country equation estimates are provided, as suggested in Eq. (1).

BMA parameter estimates rely on the specification of prior distributions that are assumed to be normal with a prior mean of zero and a variance which takes the standard from $\sigma^2\left(\frac{1}{g}X_i^TX_i\right)^{-1}$ with g a constant scalar for each model M_i. Evidence has shown that the results can be very sensitive to the choice of g. We thus perform robustness tests by modeling g with alternative specifications. The first approach is proposed by Kass and Wasserman (1995) and fixes $g = n$ with n the number of observations, which is known as the unit of information prior (UIP). The second approach, proposed by Foster and George (1994), defines $g = k^2$ with k the number of explanatory variables in X, which is known as the risk inflation criterion (RIC). Finally, we perform BMA using a third approach known as the hyper-g prior, developed by Liang et al. (2008). The virtue of the hyper-g prior is that it adapts to the data. Liang et al. (2008) defines the hyper-prior for g that relies on the following prior: $g\ p(g) = \frac{a-2}{2}(1+g)^{-\frac{a}{2}}$. The elicitation of g is supplanted by the choice of the hyperparameter $a \in [2;4]$. Setting a = 4 corresponds to a uniform prior distribution of g, while $a \to 2$ corresponds to $g \to \infty$. The effect sizes and posterior mean coefficients are quantitatively and qualitatively similar across the prior distributions; we therefore decided to report the results based on Fernandez et al. (2001), which corresponds to $g = \max(n,k^2)$.

Within the BMA approach, we can compute the posterior inclusion probability (PIP) for a given variable. The PIP is calculated as the sum of the posterior model probabilities for all models including that variable. The larger the PIP, the more the variable is important in predicting the outcome variable Y. This is a very important advantage as it allows identifying the most relevant determinant of aggregate entrepreneurship rates in one country, which is of particular importance in our analysis.

Some variables may be subject to some potential endogeneity because of a reverse causality bias. In particular, the country-year aggregate entrepreneurship rate is likely to affect some of the macro variables such as the GDP growth rate and the unemployment rate. We get around this issue by including the 1-year lagged macroeconomic variables. In addition, we verify potential multicollinearity problems by calculating variance inflation factors (VIF). The VIFs corresponding to our variables are below the value of 10; we thus conclude that collinearity problems do not alter the variance of our estimators.

5 Estimation results

In this section, we detail the results derived from BMA analysis on the determinants of aggregate rates of entrepreneurship. We then analyze whether ALMPs are conducive to unemployment reduction. We run robustness tests by (i) running fixed effect model, (ii) providing different measures of social security contributions, and (iii) including entrepreneurs' individual characteristics in a multilevel model.

5.1 Determining rates of entrepreneurship through Bayesian model averaging

In this section, we are interested in identifying the variables that are key determinants of aggregate entrepreneurial activity by performing BMA. We report in Table 2 standardized estimates of the posterior mean coefficients as well as the associated posterior standard deviations (in brackets) in the left-hand side of each column. Posterior inclusion probabilities (PIP) are reported in the right-hand side of each column. PIPs represent the sum of posterior model probability $P(M_i|y,X)$ for all models wherein a covariate was included. Hence, PIP increases if models featuring covariate X are more likely than others. A PIP of 0.6 for a given covariate X implies that 60% of posterior model mass rests on models that include that variable. The numbers in parenthesis below the PIP values in Table 2 represent the importance of the variable in the model space, i.e., the increasing order of PIPs associated with each variable. Masanjala and Papageorgiou (2008) suggest that a PIP above 0.5 corresponds to a robust regressor. Accordingly, we detail and comment on the coefficients for which the PIP is higher or close to 50% (reported in bold).

We first describe the results associated with necessity entrepreneurship rate in column (2). We observe that the unemployment rate in t-1 is the main driver of aggregate necessity entrepreneurship rates. The PIP associated with the unemployment rate is equal to 0.873, which suggests that roughly 90% of posterior model mass rests on models that include unemployment rates.

Turning to the results in columns (1) and (3), we find that GDP growth in t-1 is the main determinant of both aggregate entrepreneurship and opportunity entrepreneurship rates (PIPs of 0.928 and 0.951, respectively). As opportunity entrepreneurs are motivated by the desire to increase their income and improve their living standards, in addition to gaining personal growth and satisfaction (Benzing and Chu 2009), they are more likely to pursue attractive opportunities in periods of prosperity and favorable economic climates (Barlevy 2007; Rampini 2004), during which the risk of business failure is lower (Buchmann et al. 2009; Dawson et al. 2009) and the prospect of obtaining necessary bank credit is higher (Parker 2009).

Turning to our variable of interest, we observe that ALMP spending targeted at entrepreneurship is the second most important determinant of necessity entrepreneurship (after unemployment). The PIP associated with start-up incentives in column (2), i.e., the probability that the variable is relevant in explaining the dependent variable, is very high (≅0.70), which indicates that start-up incentive spending must be included in the "true" model of necessity entrepreneurship. On the contrary, start-up incentives do not contribute much to explaining differences in aggregate rates of opportunity entrepreneurs (column (3)). The likelihood that the variable is relevant in explaining the rate of opportunity entrepreneurship is quite low (0.14), suggesting that opportunity entrepreneurs would have started their business even in the absence of the program. These results corroborate our first hypothesis, according to which start-up incentives stemming from ALMPs are a more important driver of the rate of necessity entrepreneurship than of the rate of opportunity entrepreneurship.

Next, we are concerned with identifying whether labor market institutions hinder the positive effect of ALMPs on self-employment. As discussed earlier, generous unemployment benefits may create disincentives to enter self-employment and in turn may reduce the expected outcome of ALMPs. In order to explore this issue, we report the results by integrating an interaction term[16] between start-up incentives (ALMP) and short-term net replacement rates (NRR).[17] The coefficients associated with start-up incentives and NRR become a

[16] The coefficient of the interaction term is unbiased only when the two parents are estimated simultaneously, otherwise not only is the interpretation difficult but ignoring parent variables may create biased estimates. This is due to multicolinearity problems that would raise standard errors and could create an endogeneity problem in which the interaction term is affected by the parent variable. We therefore estimate PIP and weighted means for equations that include the interaction term in a model when all of its base variables are also included.

[17] We also interact social security contributions with start-up incentives. The coefficient of the interaction variable is negative but not significant. The other results remain similar. For clarity reasons, we only discuss and report the results based on the interaction term between NRR and start-up incentives.

Table 2 Determinants of aggregate entrepreneurship rates

	Entrepreneurship rate		Necessity rate		Opportunity rate	
	Coeff.	PIP	Coeff.	PIP	Coeff.	PIP
Interest variables						
Start-up incentives SUI	3.896	0.294	*4.065*	*0.699*	0.983	0.138
	[7.156]	(3)	*[3.242]*	*(2)*	[3.241]	(4)
Short-term replacement rate (NRR)	0.001	0.082	0.001	0.104	0.001	0.080
	[0.010]	(10)	[0.004]	(10)	[0.008]	(11)
Interaction term SUI*NRR	-0.051	0.106	*−0.167*	*0.483*	−0.023	0.085
	[0.228]	(5)	*[0.203]*	*(3)*	[0.142]	(8)
Control variables						
GDP growth	*0.137*	*0.928*	0.005	0.205	*0.116*	*0.951*
	[0.058]	*(1)*	[0.012]	(5)	*[0.043]*	*(1)*
GDP per capita	0.000	0.069	0.000	0.083	0.000	0.069
	[0.000]	(13)	[0.000]	(11)	[0.000]	(13)
Long-term replacement rate	−0.003	0.092	−0.003	0.180	−0.001	0.076
	[0.015]	(8)	[0.009]	(6)	[0.010]	(12)
Research and development	−0.362	0.309	−0.017	0.106	−0.143	0.188
	[0.659]	(2)	[0.079]	(9)	[0.381]	(3)
Payroll tax	0.045	0.104	0.004	0.078	0.042	0.112
	[0.199]	(6)	[0.044]	(12)	[0.174]	(7)
Trade	0.005	0.219	0.000	0.115	0.003	0.193
	[0.012]	(4)	[0.002]	(7)	[0.008]	(2)
Social security	0.009	0.079	−0.008	0.108	0.030	0.130
	[0.077]	(11)	[0.036]	(8)	[0.105]	(5)
Corporate tax	−0.013	0.093	−0.042	0.377	0.007	0.081
	[0.070]	(7)	[0.064]	(4)	[0.048]	(9)
Income tax	0.008	0.083	0.001	0.075	0.006	0.080
	[0.057]	(9)	[0.015]	(13)	[0.043]	(10)
Unemployment rate	0.001	0.075	*0.047*	*0.873*	−0.006	0.114
	[0.017]	(12)	*[0.024]*	*(1)*	[0.024]	(6)
Number of countries	25		25		25	
Number of observations	193		193		193	

Source: GEM Adult Population Survey, OECD Statistics, World Bank Statistics; period: 2002–2013. Bayesian model averaging with country fixed effects. Variable importance in parenthesis

PIP posterior inclusion probability, *GDP* gross domestic product

Corporate tax and income tax are derived from OECD Stats. Standard deviations under brackets. Increasing order of the PIP among all variables under parenthesis

conditional relationship, i.e., they reflect the change of one coefficient when the other is set to zero. Setting to zero the variable of start-up incentives has an economic signification as some countries have a zero value associated with ALMPs targeted at entrepreneurship. On the contrary, a zero coefficient associated with NRR is not economically relevant nor observed in the data. Therefore, we center the variable of NRR to zero in order to make the results easier to interpret. Consequently, the coefficient associated with start-up

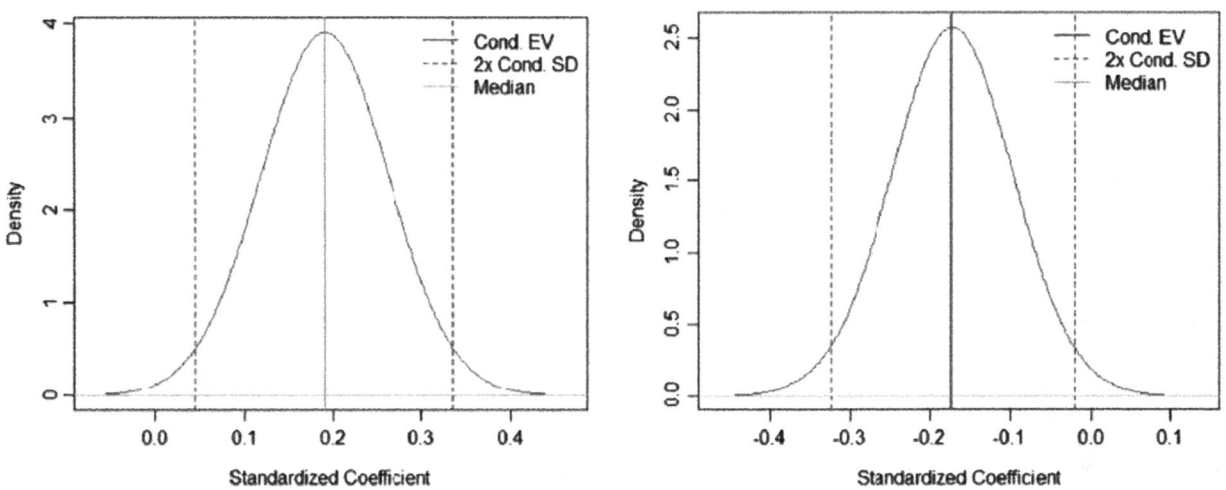
incentives corresponds to the impact of increasing ALMP spending on self-employment in countries with average levels of NRR contributions (countries having an NRR value set to zero). The coefficient associated with the interaction term measures the impact of start-up incentives on self-employment conditional on a country's unemployment benefits. The results in column (2) indicate that the variable has about a 48% chance of being relevant in explaining the rate of necessity entrepreneurship, obtaining the third biggest PIP (after unemployment and start-up incentives). The PIP associated with the interaction term is low in columns (1) and (3), showing that it is not a relevant variable in explaining the rate of opportunity entrepreneurship.

The PIPs have identified the quality of a variable to explain the data measured with respect to all other possible variables. Another important element regarding the influence of the variable is the sign of the coefficient associated with our dependent variable and hence its deviation. The posterior mean in the first sub-columns provide further information on the influence of the regressor on our variable of interest by averaging over all models, including models wherein the variable was omitted. We also display how much dispersion the variable has by reporting the marginal distribution density associated with an ALMP (Fig. 1a) and its interaction with unemployment benefits (Fig. 1b) associated with the rate of necessity entrepreneurship. We observe that the coefficient associated with ALMPs is positive (see Fig. 1a), indicating that it does incite unemployed workers to start a business out of necessity, thus giving full support to hypothesis 1.

The coefficient associated with the interaction term is negative in Fig. 1b. The negative and significant coefficient associated with the interaction term suggests that the positive effect of ALMPs on necessity entrepreneurship is reduced the more a country has protective labor market institutions. Generous unemployment benefits discourage necessity entrepreneurs. They may prefer to remain unemployed even in the presence of ALMPs in order to find another option other than self-employment. This provides support to hypothesis 2, stating that unemployment benefits have a negative moderation effect on the relationship between start-up incentives and entrepreneurship rates.

5.2 Linking self-employment to unemployment reduction

This section aims to analyze whether self-employment created with ALMPs contributes to reducing unemployment. Unfortunately, we do not have any information on the aggregate number of businesses created out of ALMPs across different countries. We overcome this limitation by building an interaction variable between entrepreneurship rates and ALMPs. The interaction term aims to capture whether an employment response of an increase in the entrepreneurship rate is higher in countries with generous start-up incentive programs. We control for the level of long-term and short-term replacement rates, social security contributions, GDP per



(a) Start-up incentives (PIP 69.9%) (b) Interaction term (PIP 48.3%)

Fig. 1 Marginal density: necessity entrepreneurs

capita, and GDP growth. We estimate the level of unemployment in t + 1 and t + 2 in a country-year fixed effect BMA model (see Table 3, columns 1 and 2 for unemployment in t + 1 and t + 2, respectively).

Results reported in Table 3 show that GDP growth is the main driver of unemployment rates in t + 1 and t + 2. GDP growth is the only factor with a PIP higher than 0.5 in column (1). In column (2), there is another important determinant of unemployment that is the aggregate rate of opportunity entrepreneurship, whose PIP is equal to 0.525, suggesting that the rate of opportunity entrepreneurs in one country is an important driver of unemployment reduction. However, the low PIPs associated with necessity entrepreneurship rates suggest that necessity entrepreneurship rates are not an important determinant of unemployment either in t + 1 or in t + 2. The fact that the PIP associated with opportunity entrepreneurship is higher in column (2) than in column (1) suggests that the positive effect of opportunity-driven business creation on employment is not immediate and is only observable 2 years later. This result gives partial support to hypothesis 3 stating that only the rate of opportunity entrepreneurship is a driver of unemployment reduction.

Results reported in Table 3 also allow us to investigate direct and indirect effects of ALMPs on

Table 3 Determinants of the unemployment rate

	Unemployment rate (t + 1)		Unemployment rate (t + 2)	
	Coeff.	PIP	Coeff.	PIP
Opportunity entrepreneurship	−0.044	0.250	−0.145	0.525
	[0.096]	(2)	[0.169]	(2)
Necessity entrepreneurship	0.044	0.122	−0.008	0.124
	[0.215]	(8)	[0.201]	(10)
Start up incentives (SUI)	4.480	0.164	4.738	0.198
	[15.447]	(4)	[14.181]	(5)
Opportunity*SUI	−0.283	0.123	0.209	0.159
	[1.636]	(7)	[1.725]	(7)
Necessity*SUI	−1.051	0.124	0.500	0.141
	[5.701]	(6)	[5.033]	(9)
Social security	−0.003	0.099	0.076	0.168
	[0.140]	(10)	[0.275]	(6)
Short term replacement rate	0.022	0.229	0.059	0.452
	[0.053]	(3)	[0.079]	(3)
Long term replacement rate	0.010	0.141	0.009	0.149
	[0.038]	(5)	[0.041]	(8)
GDP growth	−0.791	1.000	−0.809	1.000
	[0.116]	(1)	[0.120]	(1)
GDP per capita	0.000	0.101	0.000	0.204
	[0.000]	(9)	[0.000]	(4)
Observation	159		154	
Countries	25		25	

Source: GEM Adult Population Survey, OECD Statistics, World Bank Statistics; period: 2002–2013. BMA Country fixed-effect model. Robust standard error in brackets. Standard deviations in brackets

Corporate tax and income tax are derived from OECD Stats.

Increasing order of the PIP among all variables in parenthesis.

PIP posterior inclusion probability, *GDP* gross domestic product, *TEA* aggregate rate of entrepreneurship

unemployment. The low PIPs associated with ALMPs (0.164 for t + 1 and 0.198 for t + 2) show that the latter are not an important determinant of unemployment reduction. Moreover, the low PIPs associated with the interaction terms (all below 0.16) reveal that the effect of business creation on unemployment reduction is not higher in countries with generous ALMPs. This leads to the conclusion that the impact of ALMPs targeted at entrepreneurship on unemployment is very limited.

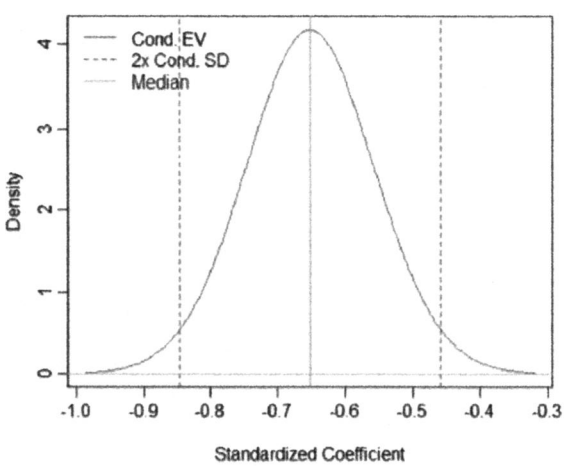
We now move on to analyze the sign and magnitude of the coefficient associated with the variables linked to high PIP, i.e., GDP growth in column (1) and opportunity entrepreneurship in column (2), by reporting marginal density distribution of the coefficients (Fig. 2). We observe a negative correlation between unemployment and opportunity entrepreneurship rates (Fig. 2b) showing that the rate of opportunity entrepreneurs significantly reduces unemployment in t + 2. Finally, we observe a negative coefficient associated with GDP growth (Fig. 2a). The negative weighted mean underscores that periods of prosperous economic climate are associated with low unemployment. This is consistent with previous findings from Elmeskov et al. (1998), Howell and Rehm (2009), Layard et al. (2005), and Nickell et al. (2005).

5.3 Robustness tests

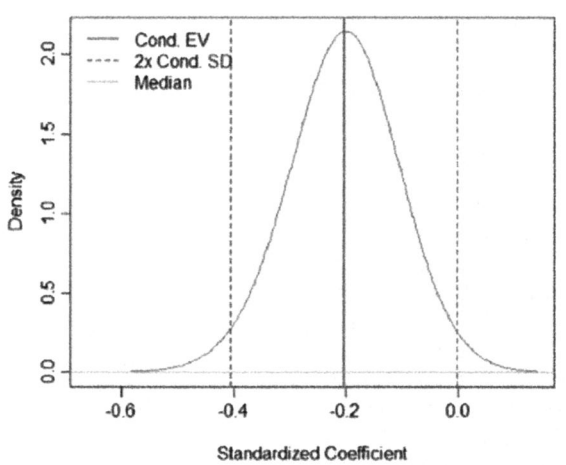
We perform several robustness tests to control for the validity of our conclusions. We first test the robustness of the results described in Sect. 5.1 by considering entrepreneurship rates as the dependent variable. Then, we investigate the robustness of the results in Sect. 5.2. by considering unemployment as the dependent variable.

5.3.1 Robustness tests: effect of ALMPs on entrepreneurship rates

We first perform a fixed effect model without controlling for model uncertainty. Second, we perform a fixed effect model (Table 5) by including different proxies of social security contributions (Tables 6 and 7). Thirdly, we perform an estimation based on individuals by including microeconomic variables of interest (Table 8). We use multilevel modeling to address unobserved heterogeneity within the context of a cross-country, cross-time and cross-individual dataset. We control for clustering of the data within a country and country-year subsample. We cannot compare the results from the fixed-effect model with the results derived from the multilevel model because the dependent variable is not identical. The fixed-effects model estimates the aggregate level of entrepreneurship in one country whereas the multilevel model is interested in the choice of one individual whether to become self-employed or not. The purpose of performing multilevel modeling is not to compare the results but rather to test whether start-up incentives are an important determinant of entrepreneurship at the individual level.



(a) GDP growth (PIP 99.9%)



(b) Opportunity entrepreneurship rate (PIP 52.5%)

Fig. 2 Marginal density: unemployment (t + 2)

We find similar results arising from multilevel modeling and the BMA model. ALMPs are an important determinant of necessity entrepreneurship but there is a moderating effect from unemployment benefits on the rate of necessity entrepreneurs. The results from the fixed-effect model are similar to BMA results on the sample of necessity entrepreneurs but the fixed-effect model also reveals the positive effect of start-up incentive programs on the rate of opportunity entrepreneurs. This result suggests that there is a possible mediation effect of ALMPs on unemployment reduction through opportunity entrepreneurship rates.[18] We are however cautious on the interpretation of this result as it is not supported by the BMA and multilevel models. Finally, we observe that the results associated with our variables of interest are robust in sign whatever the proxy of social security system retained.

5.3.2 Robustness tests: Effect of ALMPs on unemployment

Considering unemployment as the dependent variable, we perform a first robustness test by estimating the same equation as in Section 5.2 in a country-fixed effect model (Table 9). As with BMA estimates, we find evidence that GDP growth reduces unemployment rate in t + 1 and t + 2 and that only the rate of opportunity entrepreneurship has a significant negative impact on unemployment rates, whereas necessity entrepreneurs do not contribute to unemployment reduction. With linear regression techniques we also find that generous unemployment benefits are associated with persistent high unemployment rates. This is consistent with previous findings from Elmeskov et al. (1998), Howell and Rehm (2009), Layard et al. (2005), and Nickell et al. (2005).

We perform a second robustness test by estimating the unemployment rate with an estimated measure of entrepreneurship (Table 10). The robustness test is performed using a two-stage procedure. We first measure the linear prediction of country-specific entrepreneurship rates, derived from the fixed-effect model of Table 5. Our estimated measure of entrepreneurship rates gives the rate of entrepreneurship that would prevail in one country for different levels of social contribution, ALMPs and other macroeconomic variables. In the second step we estimate a country fixed-effect model with unemployment rate in t + 2 and the variation of unemployment between t + 2 and t + 1 as the dependent variable. The independent variable of interest is the linear prediction of the entrepreneurship rate measured in the first step. We add two control variables: GDP growth and GDP per capita. The results of the robustness tests in Table 10 corroborate the results obtained in the fixed effect model and underscore that only opportunity entrepreneurship is responsible for unemployment reduction.

[18] We have tested for mediation effects with linear regression models, but did not find significant effects. The results are reported in an online appendix available on the first author's website.

6 Discussion

Public policies to promote entrepreneurship have been deemed highly questionable by entrepreneurship scholars (Acs et al. 2016; Åstebro 2017; Blanchflower 2004; Hurst and Pugsley 2011; Lerner 2009; Parker 2007; Shane 2008, 2009). Yet, empirical research on the effectiveness of such policies in terms of entrepreneurship generation and unemployment reduction has produced mixed and inconclusive results. From a microeconomic perspective, many studies have found that start-up incentives have a positive effect in terms of the creation, performance and longevity of new businesses (e.g., Baumgartner and Caliendo 2008; Caliendo and Kritikos 2010; European Employment Policy Observatory Review 2014; Røed and Skogstrøm 2014). However, many other studies have also found disappointing results in terms of job creation, innovation and, ultimately, value creation (e.g., Acs et al. 2016; Åstebro and Tåg 2015; Henrekson and Sanandaji 2014; Hurst and Pugsley 2011; Shane 2008). No clear conclusion has emerged from studies using macroeconomic data either, as some studies found no significant relationship between self-employment and unemployment rates (Acs et al. 1994; Koellinger and Minniti 2009; Staber and Bögenhold 1993) whereas others found a negative relationship (Blanchflower 2000; Parker and Robson 2004) that can be attributed to both a "refugee" effect (unemployment drives self-employment) and an "entrepreneurial" effect (self-employment reduces unemployment) as demonstrated by Thurik et al. (2008). Since most studies do not focus on ALMPs per se and overlook important aspects of labor market institutions, we specifically explore how heterogeneity

in government start-up incentive spending affects entrepreneurial activity and unemployment rates.

We reason that it is important to consider the impact of ALMPs at the macroeconomic level in order to test whether they (i) contribute to increasing entrepreneurship rates and (ii) contribute to reducing unemployment rates. We build our analysis on the idea that there might be counteracting forces reducing the positive expected outcome of start-up incentives on self-employment. Namely, we argue that generous unemployment benefits harm unemployed workers' motivation to enter self-employment. In addition, we distinguish between opportunity and necessity entrepreneurs, hypothesizing that start-up incentives targeting the unemployed will have a more significant effect on the rate of necessity entrepreneurship. However, as necessity entrepreneurs do not primarily seek business growth and job creation, we show that the overall effect of ALMPs on unemployment is very limited.

6.1 Summary of findings

The results derived from BMA estimates give a very clear picture of the main determinants of entrepreneurship rates. We find that start-up incentives positively affect the rate of necessity entrepreneurship in one country but not the rate of opportunity entrepreneurship. As a result, start-up incentives stemming from ALMPs have a limited effect on the aggregate rate of entrepreneurship. Furthermore, we find that the positive effect of ALMPs on the necessity entrepreneurship rate is limited by generous unemployment benefits. Labor market institutions providing high unemployment benefits actually increase the reservation wage and raise the opportunity cost for unemployed workers to leave unemployment. Individuals whose first choice is not self-employment are thereby provided with an incentive to continue their search efforts to find a paid job, while still benefiting from unemployment benefits. As such, individuals seldom qualify as opportunity-driven entrepreneurs and unemployment benefits have a moderating effect only on the rate of necessity entrepreneurship.

Start-ups created out of unemployment are expected to face disadvantages in terms of capital constraints, shortages in start-up-specific human capital, missing networks and restricted access to information about business opportunities (Baptista et al. 2014; Block et al. 2015a, b; Caliendo et al. 2015; Nakara and Fayolle 2012). The main objective of ALMPs is therefore to provide support for unemployed workers who face a comparative disadvantage compared to employed entrepreneurs. These programs can be seen as a way out of unemployment for self-employed people themselves but also as leverage to create future employment. All in all, the main objective of ALMPs is to significantly reduce the aggregate rate of unemployment in the long run.

However, our results show that because ALMPs are a main driver of necessity entrepreneurs, their employment impact is likely to be very small. Despite empirical evidence showing relatively similar longevity and survival rates between necessity- and opportunity-based entrepreneurs (Poschke 2013), some scholars sustain that necessity entrepreneurs have a high risk of failure (Caliendo and Kritikos 2010) and may even stop their own businesses as soon as they can get a job after they become self-employed (Masuda 2006). In any case, even if their businesses survive in the long run, they are unlikely to create jobs for others (Poschke 2013; Valliere and Peterson 2009), to pursue differentiation strategies (Block et al. 2015a, b) and to create innovation (Cheung 2014). They also tend to take advantage of opportunities that are generally less profitable than those exploited by opportunity-driven entrepreneurs (Block and Wagner 2010). All these factors contribute to limiting the economic impact of start-up incentive programs targeting the unemployed.

We find that the opportunity entrepreneurship rate is negatively associated with the unemployment rate in $t+2$, thereby corroborating previous findings on the beneficial economic impact of opportunity-driven entrepreneurs (Acs and Varga 2005; Acs and Laszlo 2007; Wong et al. 2005). However, we find no evidence that opportunity entrepreneurs in countries with generous ALMPs have a stronger negative impact on unemployment than in countries that do not invest in start-up incentive programs. We conclude that although ALMPs provide start-up incentives aimed at reducing unemployment by helping the unemployed to become self-employed, the type of entrepreneurship fostered by such incentives is not strongly associated with unemployment reduction at the macro-level. Hence, ALMPs impact on aggregate unemployment appears to be very limited.

6.2 Policy implications

These results point towards some important implications. Most countries with a generous welfare state have

large funds dedicated to start-up incentive programs, whereas countries with a flexible labor market allocate very limited public financial resources to start-up incentives. For example, France and Spain have the highest ALMP spending and also generous labor market institutions. In contrast, the United-Kingdom and the United-States are the two countries with the least protective labor-market institutions and the smallest amount of resources allocated to the promotion of entrepreneurship. When interpreting our results, one could well suggest that countries with flexible market institutions should devote resources to promoting entrepreneurship as they present favorable economic conditions for obtaining the highest economic output of ALMPs on the aggregate entrepreneurship rate. This recommendation seems especially important in a post-crisis high-unemployment context. Countries with rigid labor market institutions, by contrast, could rethink the configuration of unemployment benefits by creating incentives to leave unemployment when promoting self-employment. This would help to avoid creating counteracting forces that reduce the expected outcome of start-up incentives on the entrepreneurship rate.

In addition, governments should be aware that ALMPs are a main driver of necessity-based entrepreneurs but not opportunity-driven entrepreneurs. Countries could benefit from extending start-up incentives to employed individuals who are more likely to become opportunity entrepreneurs and thus create more jobs in the future. At the same time, extending start-up incentives for both employed and unemployed individuals could improve the sorting of employed and self-employed individuals in the labor market, thereby maximizing the impact on employment rates at the aggregate level.

However, by extending start-up incentives to employed individuals, governments could face deadweight loss effects in which the outcome in terms of job creation with and without the policy would be the same because opportunity-driven entrepreneurs would have started their company even in the absence of the program (Caliendo and Kritikos 2010; Lenihan 2004; Tokila et al. 2008). These considerations therefore suggest the need of further inquiry into the effects of different types of start-up incentives allocated to different populations.

6.3 Implications for research

Our study also offers important insights for researchers. In terms of methodology, studies should carefully consider model uncertainty and measurement errors in identifying the determinants of entrepreneurship as the relative importance and significance of variables may change depending on the model specification. Using the BMA approach can be a step towards increased methodological rigor and validity of inferences. Robustness tests using other analytical methods can then provide further evidence and help to explain potential differences in results compared to previous studies.

At the theoretical level, our study informs research on the macroeconomic determinants of entrepreneurship, suggesting a few directions for further research. There has been considerable interest shown in the literature in examining macro-level determinants of entrepreneurial activity, such as the influence of formal education (Sobel and King 2008), financial development (Klapper et al. 2010), and institutions (Parker 2009). Nevertheless, a lot of control variables are needed to identify the real coefficient of any macro-level variable associated with entrepreneurial activity. Our results suggest that, when using cross-country data, researchers should not only control for differences in unemployment rates, unemployment benefits, and GDP, but should also more systematically include differences in ALMPs, as well as interactions among these key determinants of entrepreneurial activity, because ALMPs are an important determinant of necessity entrepreneurship. Maybe even more importantly, our results show the importance of taking into account entrepreneurs' motivations and distinguishing between opportunity-driven and necessity-based entrepreneurship, as they clearly have different determinants and different consequences in terms of economic development (Block and Wagner 2010; Valliere and Peterson 2009).

Future research might do well to delve deeper into the distinctions among ALMPs, as some of them aim to target and support specific profiles of entrepreneurs. For instance, start-up incentive programs that are connected with university and technological incubators are more likely to support opportunity-driven entrepreneurs with high-growth potential. Research able to distinguish between different types of start-up incentives by adopting more finely-tuned measures will be of great value in terms of guiding policy makers in their efforts to better allocate resources towards more productive entrepreneurship. At a micro-level, longitudinal studies of necessity entrepreneurs might help to shed light on the remaining mixed findings that permeate micro- and macro-level research on the topic. Specifically, it might

be particularly relevant to understand under which conditions necessity entrepreneurs do indeed adopt cost leadership versus differentiation strategies (Block et al. 2015a, b), exploit more or less profitable opportunities (Block and Wagner 2010), innovate (Koellinger 2008), and eventually decide to employ others. Such studies might eventually lead scholars to move beyond the necessity/opportunity dichotomy (as suggested by Williams and Williams 2012), and provide new directions for practical intervention.

6.4 Limitations

The variety of start-up programs makes comparisons between countries difficult. Indeed, evaluation studies are generally based on longitudinal data on one particular country. This overcomes the difficulty of comparison of ALMP effects across countries, but disables analysis of the macroeconomic impact of ALMPs on entrepreneurship rates. While our results include country fixed-effects enabling control for heterogeneity of ALMPs across countries, we do not want to overly stress the results from these estimations. Much of the emphasis is on the predicted relationship between ALMPs and entrepreneurship rates on the one hand and unemployment reduction on the other. We largely interpret this relationship as an informative correlation for further causal empirical work (for instance, using Difference-in-Difference approach to compare the outcome before and after the program on unemployment and entrepreneurship rates).

Finally, our analysis of the role of ALMPs on unemployment reduction is based on an estimation of the coefficient associated with the interaction term between entrepreneurship rate and ALMPs. A better method would be to measure the number and the economic outcome of businesses created from start-up incentives. Unfortunately, such information is not available at the macroeconomic level but we believe this empirical question to be a promising area for further research.

Appendix A: Descriptive Statistics

Start-up incentive schemes vary considerably from one country to another. Lending programs at preferential rates are in place in almost all countries. However, other ALMPs are specific to some countries and can take different forms.

For example, in Finland, start-up incentives appear as a one-off grant of €32.66 per day for entrepreneurs with a feasible business plan. The aim of the start-up grants paid on a monthly basis is to replace unemployment benefits for unemployed people. Italy provides free grants and loans with reduced interest rates for investment and management expenditure, as well as training and technical assistance for the realization of investments in the first year of business activity. The programs are targeted at unemployed and young people between 18 and 35 years old. In the UK, income support is provided during the launch phase by means of a weekly allowance in addition to the amount of the minimum contribution. The Spanish government offers grants to cover specific set-up costs such as general operating costs and training costs to those planning to start a new venture. The German government launched two different non-cumulative schemes: (i) the bridging allowance which provides the same amount of unemployment benefits recipients would have received for a period of six months and (ii) a start-up subsidy which is a declining grant of €600/month in the first year, €360/month in the second year and €240/month in the third and last year. Finally, French unemployed workers have the option to accumulate unemployment benefits, business revenue and tax exemption from social security contributions for a year.

Some other countries have very low funds dedicated to business creation (close to zero). It is especially the case of countries with less protective labor market institutions such as Great-Britain (UK) and the United-States (US). Start-up incentive programs in the UK and US take the form of training and grants without being directly targeted towards unemployed individuals.

Figure 3 reports change in ALMP spending targeted at entrepreneurship over the period 1999–2013 for six European economies: Denmark, Finland, France, Germany, Spain and the United Kingdom. We decided to report descriptive statistics for those specific six countries because they present very different labor market outcomes, social security systems and start-up incentive spending, which allows us to show entrepreneurship trends in countries with different labor market institutions.

Figure 3a reports changes in the average replacement rate received in the first 12 months of unemployment over the period of observation. Spain and France are the two most generous countries, whereas the United-Kingdom is the country with the lowest net replacement

rate. Figure 3d illustrates differences in social security contributions for different countries. The figure exhibits less protective labor market institutions in the United Kingdom as illustrated by the low rate of social security contributions compared to the other 5 countries which have social security contributions rate above 10%. Before the 2007 economic crisis, countries with the highest unemployment benefits and social security contributions were also those with the highest unemployment rates (see Fig. 3b). The conventional wisdom has been that there exists a positive relationship between high unemployment benefits and high unemployment. More specifically, persistent high unemployment is caused by the rigidity imposed by protective labor-market institutions. The economic crisis has changed the belief that unemployment benefits are the only culprit of persistent unemployment, as illustrated by the dramatic increase of unemployment rate trends observed in most countries reviewed after 2007. Across different countries, the economic recession and the increase in unemployment did not have a major impact in terms of start-up incentive spending as illustrated by Fig. 3c.

Among the countries reviewed, Spain and France increased ALMP expenditure in 2004 and 2006 respectively. In contrast, Germany has continuously reduced revenue allocation to ALMPs targeted at start-up incentives since 2005 but this was still very high until 2010. In stark contrast, the UK government decided to allocate only a very small amount of resources to the promotion of entrepreneurship.

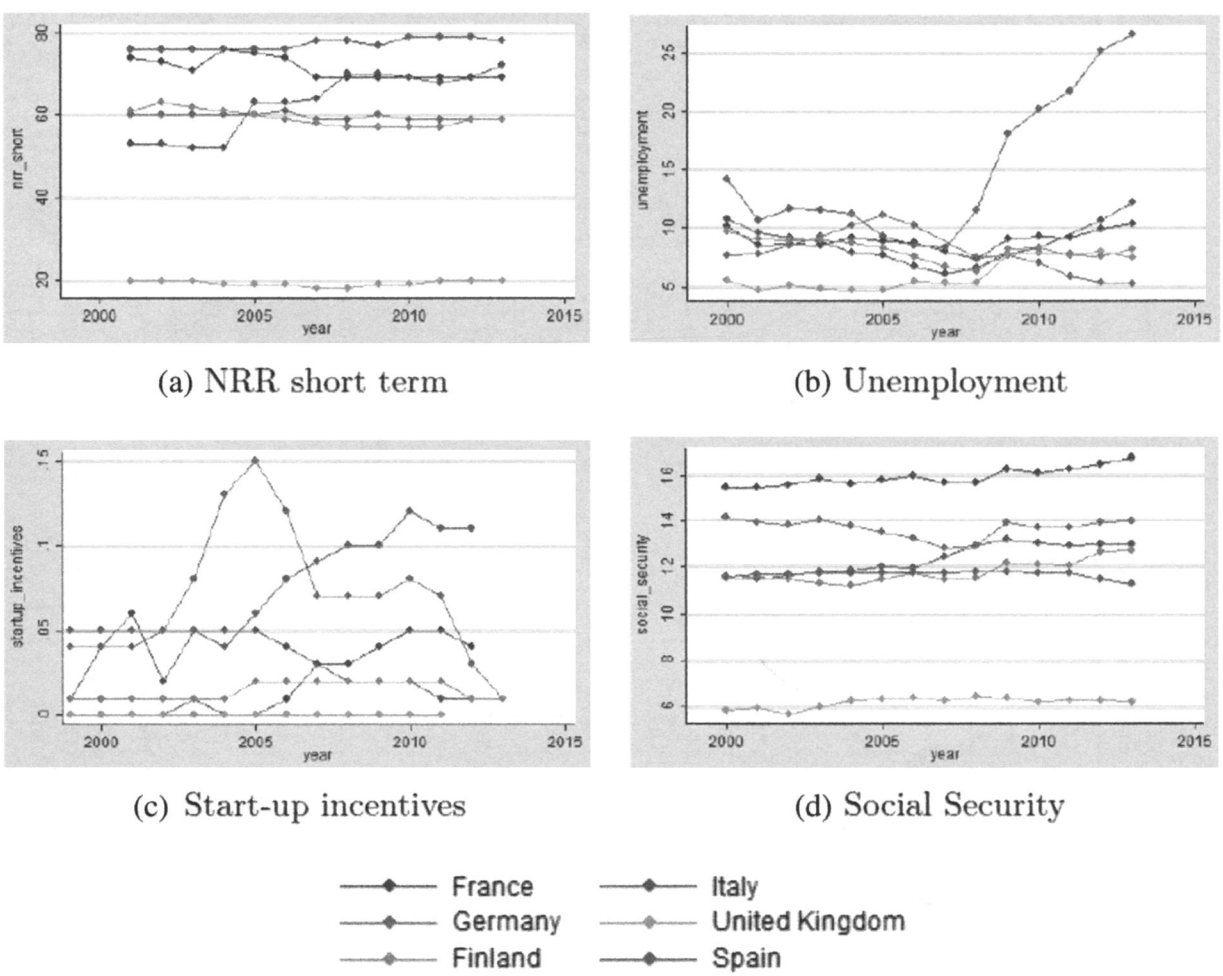


Fig. 3 Descriptive statistics for six economies

Table 4 Descriptive statistics of the main variables at the country level

	Start-up incentives	Employee contributions	Employer contributions	Corporate tax	Income tax	R&D	Trade	GDP per capita	GDP growth	Unemployment rate	Replacement rate (short)	Replacement rate (long)
Australia	0.010	NA	NA	5.559	10.731	2.210	40.997	42,896.14	2.954	5.233	34.222	42.555
	[0.000]			[0.708]	[0.861]	[0.254]	[2.357]	[13,506.37]	[0.763]	[0.383]	[2.635]	[3.046]
Belgium	0.000	13.070	34.653	2.992	12.636	1.989	146.414	38,765.870	1.695	7.608	80.667	65.833
	[0.000]	[0.000]	[0.105]	[0.320]	[0.837]	[0.141]	[11.049]	[8691.062]	[1.656]	[0.749]	[4.499]	[3.129]
Canada	0.010	3.819	5.035	3.298	11.645	2.046	72.340	30,616.100	2.973	7.200	63.500	33.667
	[0.000]	[1.236]	[0.295]	[0.276]	[0.605]	[0.028]	[4.182]	[6687.219]	[1.222]	[0.405]	[0.548]	[0.816]
Denmark	0.000	NA	NA	3.184	24.263	2.774	95.343	56,056.87	0.785	5.322	83.666	80.000
	[0.000]			[0.619]	[0.586]	[0.274]	[7.402]	[5788.439]	[2.573]	[1.530]	[1.414]	[0.866]
Germany	0.082	17.308	16.274	1.447	8.612	2.650	71.908	35,751.260	0.895	8.300	59.800	52.700
	[0.040]	[1.841]	[0.717]	[0.436]	[0.590]	[0.184]	[9.496]	[7689.078]	[2.763]	[1.554]	[0.632]	[4.762]
Spain	0.080	7.663	27.888	2.904	6.667	1.200	54.940	27,175.340	2.261	13.083	77.167	32.583
	[0.029]	[4.547]	[8.473]	[0.912]	[0.406]	[0.168]	[3.368]	[6389.617]	[2.541]	[4.514]	[1.337]	[0.669]
Finland	0.016	3.099	23.598	3.112	12.790	3.573	76.107	41,291.230	2.154	8.250	59.250	63.250
	[0.005]	[0.781]	[0.797]	[0.698]	[0.453]	[0.209]	[6.225]	[9288.964]	[3.573]	[0.997]	[2.137]	[4.003]
France	0.022	8.385	32.833	2.546	7.384	2.185	54.115	36,318.790	1.516	8.833	71.417	52.167
	[0.020]	[2.290]	[0.758]	[0.473]	[0.259]	[0.068]	[3.019]	[7520.250]	[1.695]	[0.695]	[2.778]	[1.403]
Great Britain	0.000	6.818	12.718	3.016	9.844	1.750	55.835	37,931.380	1.938	5.636	19.182	57.273
	[0.000]	[1.601]	[0.523]	[0.367]	[0.350]	[0.043]	[3.649]	[6810.524]	[2.378]	[1.138]	[0.751]	[1.902]
Greece	0.025	16.000	28.060	2.787	4.483	0.585	52.935	24,277.410	4.574	9.725	31.250	0.000
	[0.021]	[0.000]	[0.000]	[0.345]	[0.155]	[0.020]	[3.198]	[3103.135]	[2.550]	[0.655]	[2.754]	[0.000]
Hungary	0.008	8.213	23.583	1.996	6.644	1.088	150.708	12,342.120	1.576	8.200	67.222	30.556
	[0.004]	[0.788]	[7.287]	[0.601]	[0.987]	[0.126]	[17.229]	[2535.588]	[3.468]	[2.015]	[8.363]	[2.404]
Ireland	0.005	2.967	9.688	3.134	8.625	1.319	158.923	47,577.660	4.674	6.300	45.000	73.100
	[0.016]	[0.670]	[0.198]	[0.535]	[0.505]	[0.221]	[17.056]	[11,016.170]	[2.538]	[4.201]	[4.497]	[3.107]
Israel	0.000	6.361	7.300	2.734	6.226	4.179	70.019	29,134.350	3.891	6.967	79.000	24.333
	[0.000]	[1.676]	[0.000]	[0.347]	[0.758]	[0.219]	[7.076]	[1488.522]	[2.208]	[0.757]	[7.000]	[0.577]
Italy	0.036	9.504	32.580	3.059	10.515	1.151	50.257	31,785.180	0.537	8.150	60.900	0.000
	[0.016]	[0.627]	[0.527]	[0.382]	[0.534]	[0.071]	[3.459]	[6677.768]	[2.469]	[1.465]	[7.695]	[0.000]
Japan	0.000	6.570	5.761	3.716	5.271	3.315	28.232	37,127.110	0.916	4.544	66.889	61.444
	[0.000]	[1.680]	[1.049]	[0.760]	[0.296]	[0.142]	[5.273]	[4950.222]	[2.870]	[0.453]	[1.054]	[1.944]
South Korea	0.004	4.416	8.089	3.165	3.220	3.243	84.026	17,738.060	4.678	3.780	54.600	24.200

Table 4 (continued)

	Start-up incentives	Employee contributions	Employer contributions	Corporate tax	Income tax	R&D	Trade	GDP per capita	GDP growth	Unemployment rate	Replacement rate (short)	Replacement rate (long)
	[0.005]	[1.368]	[0.601]	[0.433]	[0.291]	[0.754]	[21.361]	[5646.671]	[3.153]	[0.449]	[0.548]	[1.789]
New Zealand	0.007	NA	NA	4.697	13.362	1.214	59.079	26,647.37	3.953	4.2	39.111	52.555
	[0.005]			[0.886]	[1.277]	[0.074]	[2.568]	[1677.585]	[0.621]	[0.529]	[1.900]	[3.127]
Netherlands	0.000	28.645	10.780	2.640	7.026	1.904	130.028	45,567.720	1.409	3.618	73.545	74.091
	[0.000]	[8.993]	[1.731]	[0.613]	[0.743]	[0.109]	[12.854]	[8578.638]	[2.018]	[0.885]	[2.770]	[1.640]
Norway	0.000	7.800	19.175	9.869	10.077	1.586	69.964	55,030.460	2.372	4.017	65.500	65.500
	[0.000]	[0.000]	[2.878]	[1.954]	[0.653]	[0.088]	[2.653]	[13,767.210]	[1.126]	[0.531]	[0.837]	[0.837]
Poland	0.030	7.795	15.453	2.072	4.405	0.729	75.617	9116.637	2.987	13.900	51.000	39.000
	[0.028]	[0.884]	[7.039]	[0.045]	[0.160]	[0.241]	[20.779]	[5543.353]	[2.520]	[6.081]	[0.000]	[9.899]
Portugal	0.000	11.000	23.750	2.936	5.867	1.509	74.396	21,886.080	0.036	11.750	75.000	24.500
	[0.000]	[0.000]	[0.000]	[0.293]	[0.137]	[0.020]	[2.167]	[1850.732]	[2.634]	[1.344]	[0.000]	[0.707]
Slovenia	0.034	19.838	14.294	2.227	5.605	1.917	130.066	23,092.920	2.286	6.163	76.875	47.125
	[0.022]	[6.399]	[5.109]	[0.686]	[0.117]	[0.504]	[9.993]	[2974.313]	[4.581]	[1.220]	[5.643]	[2.696]
Slovak Rep.	0.052	4.726	7.528	2.641	2.502	0.561	158.833	17,608.52	2.704	13.500	61.222	27.888
	[0.018]	[0.777]	[2.532]	[0.248]	[0.131]	[0.124]	[14.759]	[646.503]	[0.000]	[0.000]	[0.666]	[0.928]
Sweden	0.025	7.000	28.465	3.003	13.854	3.622	84.500	45,720.860	3.709	6.888	77.000	67.000
	[0.011]	[0.000]	[11.187]	[0.466]	[1.300]	[0.250]	[5.053]	[10,868.460]	[1.409]	[1.168]	[7.709]	[4.375]
United States	0.000	4.383	7.644	2.310	9.208	2.649	26.373	45,071.690	1.859	6.258	61.333	9.083
	[0.000]	[0.389]	[0.019]	[0.533]	[1.025]	[0.120]	[3.179]	[4744.115]	[1.904]	[1.970]	[0.985]	[0.669]

Robustness Tests

First, we report the results with a fixed effect model without controlling for model uncertainty. The results are reported in Table 5.

Secondly, we perform a fixed effect model by including different proxies for social security contributions. Table 6 below describes the robustness variables used.

Table 7 reports the results with different proxies for social security contributions as detailed in Table 6. The first set of proxies are the employer and employee social security contribution rates derived from the OECD tax database (columns (2) and (3) in Table 7). In some countries flat rate structures are applied whereas in other countries progressive tax rates are in practice. In countries where the rate is progressive (i.e. different rates are applied for given threshold levels of revenue defined by the government) we assign a unique value defined as the average of the different rates. These indicators are not the ones retained in our baseline specification because they might suffer from an aggregation bias. We further provide two other proxies for social security contributions derived from the World Bank. The first variable measures the tax on income as a percentage of GDP defined as compulsory transfers for the central government for public purposes (columns (1) and (2)). Certain compulsory transfers such as fines, penalties and most social security contributions are excluded, which is why we include other social security variables in the regression. The second is a measure of tax on profit as a percentage of commercial profit. It includes the amount of taxes and mandatory contributions payable by businesses after accounting for allowable deductions and exemptions as a share of commercial profits. Taxes withheld (such as

Table 5 Impact of ALMPs on aggregate entrepreneurship rates: fixed effect model

	Entrepreneurship		Necessity		Opportunity	
	Rate		Rate		Rate	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Interest Variables						
Start-up incentives (SUI)	*16.012***	5.463	*4.591**	2.623	*11.681***	4.642
Short-Term replacement rate (NRR)	0.022	0.066	0.014	0.016	0.008	0.049
Interaction term SUI*NRR	0.0376	0.532	*−0.332**	0.182	0.450	0.456
Control variables						
GDP growth	0.027	0.092	−0.002	0.030	0.048	0.064
GDP per capita	−0.000	0.000	−0.000	0.000	−0.000	0.000
Long-term replacement rate	0.021	0.034	−0.012	0.018	0.020	0.026
Research and development	*−3.654***	1.410	−0.566	0.350	*−2.771****	0.946
Payroll tax	−0.339	0.787	−0.265	0.282	0.149	0.637
Trade	0.020	0.032	−0.005	0.008	0.028	0.027
Social security	−0.0657	0.322	−0.110	0.130	0.174	0.275
Corporate tax	0.0137	0.276	−0.0447	0.101	0.130	0.181
Income tax	−0.0253	0.224	−0.0149	0.0659	0.00327	0.214
Unemployment rate	*−0.217***	0.089	0.008	0.035	*−0.208****	0.073
Constant	15.26*	8.174	5.262*	2.580	7.350	5.741
Number of countries	25		25		25	
Year fixed effects	Yes		Yes		Yes	
Country fixed effects	Yes		Yes		Yes	
Observations	193	193	193	193	193	193
R-squared	0.374	0.374	0.320	0.320	0.331	0.331

Source: GEM Adult Population Survey, OECD Statistics, World Bank Statistics; period: 2002–2013. Country fixed effect model. Robust standard error on the left-hand side of each column, ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. Note: GDP: Gross Domestic Product, Corporate Tax and Income Tax are derived from OECD Stats. TEA = aggregate rate of entrepreneurship

Table 6 Robustness variables of social security contributions

Employee Contributions	Employee social security contribution rate	OECD Tax Database	9.667 [7.283]
Employer contribution	Employer social security contribution rate	OECD Tax Database	19.271 [10.668]
Tax on profits	Total tax rate (% of commercial profits)	World Bank Indicator	44.953 [18.939]
Tax on income	Tax on revenue (% of GDP)	World Bank Indicator	17.971 [6.396]

Table 7 Robustness test: different proxies of social security contributions

Variables	(1) TEA	(2) TEA	(3) TEA	(4) TEA
Start-up incentives (SUI)	26.30***	24.62**	17.34**	16.47***
	(9.014)	(8.810)	(6.320)	(5.593)
Social Security	−0.312	-	-	0.0235
	(0.448)	-	-	(0.301)
Employee contribution	-	−0.0228	−0.0225	-
	-	(0.0190)	(0.0169)	-
Employer contribution	-	0.00731	0.0524	-
	-	(0.0279)	(0.0415)	-
Payroll tax	0.427	0.644	−0.211	−0.293
	(0.770)	(0.871)	(0.776)	(0.784)
Tax on profit (WB)	0.00171	0.0130	-	-
	(0.0425)	(0.0514)	-	-
Tax on income (WB)	0.241*	0.318**	-	-
	(0.140)	(0.133)	-	-
Corporate tax	-	-	0.117	0.178
	-	-	(0.248)	(0.232)
Income tax	-	-	−0.0728	0.0224
	-	-	(0.244)	(0.214)
Research and development	−2.386**	−1.850*	−3.434**	−3.434**
	(0.942)	(1.066)	(1.429)	(1.373)
Trade	0.0438	0.0363	0.0128	0.00713
	(0.0408)	(0.0439)	(0.0355)	(0.0332)
GDP per capita	−3.09e-06	3.31e-05	1.68e-05	6.38e-06
	(7.04e-05)	(8.75e-05)	(6.84e-05)	(5.64e-05)
GDP growth	−0.0792	−0.0866	−0.0301	−0.0446
	(0.0951)	(0.111)	(0.100)	(0.0914)
Unemployment rate	−0.337***	−0.248*	−0.193**	−0.226***
	(0.0776)	(0.129)	(0.0866)	(0.0746)
Short-term replacement rate	0.0927	0.0775	0.0308	0.0243
	(0.0755)	(0.0766)	(0.0723)	(0.0717)
Long-term replacement rate	−0.0863	−0.0946	0.00233	0.00229
	(0.0787)	(0.0769)	(0.0645)	(0.0579)
Constant	7.510	0.594	12.12	13.59
	(7.523)	(9.925)	(8.230)	(8.225)
Number of countries	23	23	21	25
Observations	128	118	175	192
R-squared	0.415	0.418	0.409	0.377

Source: GEM Adult Population Survey, OECD statistics. World Bank Statistics; period: 2002–2013. Country fixed-effect model. Robust standard error in parenthesis, ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. Note: GDP: Gross Domestic Product, Corporate Tax and Income Tax are derived from OECD Stats and World Bank Indicator (WB). TEA = aggregate rate of entrepreneurship

Table 8 Impact of ALMPs on aggregate entrepreneurship rates: multilevel modeling

	Entrepreneurship		Necessity		Opportunity	
	Rate		Rate		rate	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Interest variables						
Start-up incentives (SUI)	0.804	0.521	0.561***	0.119	−0.105	0.456
Short-term replacement rate (STRR)	−0.000	0.000	−0.000*	0.000	−0.001	0.001
Interaction term (SUI*STRR)	−0.012	0.008	−0.008***	0.003	−0.000	0.007
Individual characteristics						
Occupation:						
Unemployed workers			-	-	-	-
Full-time/part-time workers	0.033***	0.001	0.005***	0.001	0.025***	0.002
Education:						
Master/PhD degree (ref.)	-	-	-	-	-	-
Post-secondary degree	−0.005***	0.001	0.001**	0.001	0.003	0.003
Secondary degree	−0.006***	0.001	0.003***	0.000	−0.007***	0.001
Some secondary	−0.005**	0.001	0.003***	0.000	−0.008***	0.001
None	0.006*	0.003	0.004***	0.000	−0.005**	0.001
Age	−0.001***	0.000	−0.000***	0.000	−0.001***	0.001
Gender (male)	0.012***	0.001	0.002***	0.000	0.010***	0.001
Income:						
High-income (ref.)	-	-	-	-	-	-
Middle-income	0.002	0.001	0.005***	0.001	−0.004***	0.001
Low-income	0.000	0.001	0.009***	0.001	−0.007***	0.001
Entrepreneurial characteristics						
Knowing an entrepreneur	0.052***	0.001	0.008***	0.001	0.042***	0.001
Opportunities to start a business	0.043***	0.001	0.002***	0.000	0.039***	0.001
Sufficient skills	0.097***	0.001	0.017***	0.000	0.075***	0.001
Fear of failure	−0.033***	0.001	−0.003***	0.000	−0.028***	0.001
Economic factors						
GDP growth	−0.000	0.001	−0.000	0.000	−0.001	0.001
GDP per capita	−0.000	0.000	−0.000***	0.000	−0.000	0.000
Long-term replacement rate	−0.000	0.000	−0.001***	0.000	−0.000	0.000
Research and development	−0.000	0.003	0.001	0.001	−0.002	0.002
Payroll tax	−0.009***	0.002	−0.001	0.001	−0.006***	0.002
Trade	−0.000	0.001	0.000**	0.000	−0.000	0.000
Social security	−0.003***	0.001	−0.001*	0.001	−0.002***	0.001
Corporate tax	0.001	0.001	0.001**	−0.000	0.001	0.001
Income tax	−0.003***	0.001	−0.001**	0.000	−0.002***	0.001
Unemployment	−0.001	0.000	0.001	0.001	−0.002**	0.001
Constant	0.167***	0.024	0.041***	0.009	0.139***	0.019
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observation	345,780	345,780	345,780	345,780	345,780	345,780
Number of country groups	25	25	25	5	25	25
Akaike Information Criterion	10,578.884	10,578.884	−530,687.276	−530,687.276	−66,836.516	−66,836.516

Source: GEM Adult Population Survey, OECD Statistics, World Bank Statistics; period: 2002–2013. Multi-level modeling. Robust standard error on the left-hand side of each column, ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$

Note: GDP: Gross Domestic Product, Corporate Tax and Income Tax are derived from OECD Stats and World Bank Indicator (WB). TEA = aggregate rate of entrepreneurship

personal income tax) or collected and remitted to tax authorities (such as value added taxes, sales taxes or goods and service taxes) are excluded, which is why we include the regression income and corporate taxes. Column (4) reports the results of the baseline specification (fixed-effects model from Table 5).

Table 9 Determinants of unemployment rates

	Unemployment rate (t + 1)	Unemployment rate (t + 2)
Opportunity entrepreneurship rate	−0.437***	−0.349***
	[0.147]	[0.113]
Necessity entrepreneurship rate	0.456	−0.437
	[0.333]	[0.450]
Start-up incentives (SUI)	52.875	30.696
	[36.524]	[47.148]
Interaction term		
Opportunity*SUI	−6.359	−1.139
	[5.745]	[5.635]
Necessity*SUI	7.845	22.163
	[20.932]	[14.252]
Variation of entrepreneurship rate (Et + 2-Et + 1)		
Opportunity	-	-
	-	-
Necessity	-	-
	-	-
Social security	−0.632	−0.610
	[0.504]	[0.513]
Short-term replacement rate	0.013	0.034
	[0.054]	[0.048]
Long-term replacement rate	0.255**	0.247**
	[0.110]	[0.114]
GDP growth	−0.502***	−0.615***
	[0.122]	[0.114]
GDP per capita	−0.000	−0.000
	[0.000]	[0.000]
Year fixed effects	Yes	Yes
R-squared within	0.615	0.670
R-squared between	0.118	0.063
R-squared overall	0.023	0.012
Observation	220	196

Source: GEM Adult Population Survey, OECD Statistics, World Bank Statistics; period: 2002–2013. Country fixed effect model. Robust standard error in brackets, ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$

Note: GDP: Gross Domestic Product, Corporate Tax and Income Tax are derived from OECD Stats and World Bank Indicator (WB). TEA = aggregate rate of entrepreneurship

Whatever the proxy retained, the coefficients of interest do not change either in sign or in significance.

Next, we report results from multilevel modeling, which includes individual characteristics stemming from the GEM surveys. Results for our variables of interest are substantively consistent with the results of our main analysis with the BMA model.

Turning to the analysis of the determinants of unemployment in t + 1 and t + 2, we report the results of the country fixed-effect model in Table 9.

Finally, we report results from a robustness test using entrepreneurship rates estimated through the fixed-effect model of Table 5 to predict the unemployment rate in t + 1 and t + 2. Results are again consistent with our main analysis and show that opportunity entrepreneurship contributes to reduce unemployment rates whereas necessity entrepreneurship does not have a significant effect, especially in t + 2. We interpret the positive coefficient of necessity entrepreneurship rate in column (1) as a positive correlation between unemployment and the pool of

Table 10 Robustness test: unemployment rate

	(1) Unemployment in t + 1	(2) Unemployment in t + 2
Estimated entrepreneurship rate ($\hat{E}_t$):		
Opportunity	−2.057***	−1.731**
	(0.616)	(0.769)
Necessity	4.999*	1.428
	(2.673)	(3.029)
GDP growth	−0.442***	−0.358**
	(0.142)	(0.158)
GDP per capita	3.30e-05	−1.40e-05
	(5.71e-05)	(6.26e-05)
Constant	9.456***	17.61***
	(3.057)	(2.753)
Year fixed effect	Yes	Yes
Observations	154	139
R-squared	0.645	0.508
Number of countries	23	22

Sources: GEM Adult Population Survey, OECD Statistics, World Bank Statistics; period: 2002–2013, Country fixed effect model. Robust standard error in brackets, ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$

Note: GDP: Gross Domestic Product. Estimated $\hat{E}_t$ is the predicted value of entrepreneurship derived from the fixed effect model in column (1) of Table 4

available necessity entrepreneurs in one country Table 10.

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