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Abstract:
We examine the impact of ambitious entrepreneurship (entrepreneurs *expecting* to grow their firm) and high-growth firms (firms that have actually *realized* high growth rates) on subsequent macroeconomic growth in a sample of high and low-income countries, in the period 2002-2005. Our empirical evidence shows that once we control for the share of ambitious entrepreneurs the overall positive effect of entrepreneurship on macroeconomic growth disappears. Growth-oriented entrepreneurship seems to contribute heavily to macroeconomic growth in both low- and high-income countries. In low-income countries, the overall positive effect of entrepreneurship on macroeconomic growth does not disappear after introducing the share of ambitious entrepreneurs into the statistical model. In contrast to ambitious entrepreneurship in nascent and young businesses, established high-growth firms do not seem to contribute to macroeconomic growth. These established high-growth firms seem to flourish in countries with high levels of entrepreneurship in general, while there appears to be no connection between the rate of high-growth firms and the share of ambitious entrepreneurs.

Keywords: entrepreneurship, ambitious entrepreneurship, high-growth firms, macroeconomic growth, economic development

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1. Introduction

Although entrepreneurship has long been considered a crucial mechanism of economic development (Schumpeter 1934; Landes 1998; Baumol 2002; Audretsch et al. 2006), empirical studies on the role of entrepreneurship in economic growth show mixed evidence (Stam 2008; Parker 2009). This is not remarkable, because there is much heterogeneity both in the kinds of entrepreneurship and economic context in which economic growth takes place. Moreover, there are the issues of the measurement of entrepreneurship (Wennekers and Thurik, 1999) and of reversed causality (Thurik et al. 2008; Parker 2009). The heterogeneity, both at the micro and the macro level has thus far rarely been taken into account, which may limit our insight into the contingent role of entrepreneurship for economic growth. Important questions in this respect are: "How does the role of entrepreneurship differ between high-income and low-income countries?" and "What kinds of entrepreneurship are most crucial for economic growth?" The objective of this paper is to provide insight into the role of different types of entrepreneurship for economic growth and into the differences between low-income and high-income countries.

We investigate four research questions. First of all, we examine whether the relationship between entrepreneurship and macroeconomic growth is different for high-income and low-income countries. Secondly, we look at whether ambitious entrepreneurship plays a different role in achieving economic growth compared to entrepreneurship in general. Thirdly, we investigate the relationship between the rate of high-growth firms and macroeconomic growth. Finally, we examine the relationship between the rate of ambitious entrepreneurs (entrepreneurs expecting to grow their firm) and the rate of high-growth firms (firms that have actually realized high growth rates). To investigate these issues, we use data from the Global Entrepreneurship Monitor (GEM: ambitious entrepreneurship) and from EIM's International Benchmark Entrepreneurship database (rate of

high-growth firms). The analyses presented in this chapter are more comprehensive than previous studies in this field (Van Stel et al. 2005; Wong et al. 2005; Stam et al. 2009; Valliere and Peterson 2009), because we take into account the relationship between (ambitious) entrepreneurship and macroeconomic growth in four subsequent data waves. In addition, we also take into account realized firm growth measures, in order to perform a robustness check over intended entrepreneurial (growth) activities.

Our evidence shows that once we control for the share of ambitious entrepreneurs the overall positive effect of entrepreneurship on macroeconomic growth disappears. Growth-oriented entrepreneurship seems to contribute heavily to macroeconomic growth in both low- and high-income countries. In low-income countries, the overall positive effect of entrepreneurship on macroeconomic growth does not disappear after introducing the share of ambitious entrepreneurs into the statistical model. In contrast to ambitious entrepreneurship in nascent and young businesses, established high-growth firms do not seem to contribute to macroeconomic growth. These established high-growth firms seem to flourish in countries with high levels of entrepreneurship in general, while there appears to be no connection between the rate of high-growth firms and the share of ambitious entrepreneurs. In the final section of this paper, we summarize and discuss our findings.

2. Related literature and hypotheses

Entrepreneurship has been qualified as one of the four production factors in the aggregate production function (Audretsch and Keilbach 2004; Audretsch et al. 2006). It is the factor that creates wealth by combining other production factors in new ways (Audretsch 2007). Entrepreneurs ex-

periment with new combinations, the outcomes of which are uncertain, but in order to make progress, many new variations have to be considered and tried to find out which ones will improve (economic) life (Rosenberg and Birdzell 1986). Central processes in this regard are the creation and introduction of new products and processes on the one hand, and a selection process used to test their value in a way that assures their rapid adoption or rejection. Ambitious entrepreneurs whose aim it is to create, introduce and/or diffuse these innovations on a large scale are important players in this game.

Entrepreneurship only unlocks economic development if a proper institutional setting is in place (Baumol 1990; Powell 2008; Boettke and Coyne 2003), which comprises of both formal and informal institutions (North 1990; Boettke and Coyne 2009). An essential formal institution with regard to welfare-enhancing entrepreneurship is property rights. Insecure property rights have been an even more important constraint on investments in transition countries than capital market constraints (Johnson et al. 2000). The absence of property rights is an even more severe problem in developing low-income countries (De Soto 1989). To give a specific example, private firms with more than seven workers were not even allowed to operate legally in China until 1988 (Dorn 2008: 301). It may be argued that the production factors capital, labor, technology and entrepreneurship are the proximate causes of economic development, while institutions are a fundamental cause of economic development (Acemoglu et al. 2004). Without the proper institutions in place, it would be hard for entrepreneurs to invest in promising new combinations. Encouraging entrepreneurs to invest in their domestic economy is said to be one of the best ways to stimulate growth in poor countries (Rodrik 2007: 44-50). In this context, investments refer to innovation (e.g. employing new technology, producing new products, searching for new markets, etc.) and expanding capacity. These investments trigger a combination of capital investment and technological change. Many low-income countries are faced with a situation in which, although local investments by entrepreneurs could be a way out of misery and into prosperity, due to an insuffi-

ciently developed institutional infrastructure, individuals will either not start investing in promising new combinations or, when they start doing so, face too many hurdles because of the insufficiently developed institutional framework. Without these promising start-ups, the only way out may then be via foreign direct investments, which is no guarantee for success (Blomstrom and Kokko 1996). In advanced capitalist economies, innovation and structural change take place through the combined efforts of small (independent inventors) and large innovative (organized R&D) firms, which complement each other in changing the economy (Nooteboom 1994; Baumol 2002) and which play different roles throughout the business cycle (Koellinger and Thurik, 2009). In developing countries, there are no large firms, which means that small firms will have to be the prime movers in the process of structural change.

In contrast to rich countries, entrepreneurship in low-income countries is driven mainly by necessity (Reynolds et al. 2001; Bosma et al. 2008; Naudé 2010). Most entrepreneurs in these economies do not start a firm because they want to be independent or increase their income as compared to being an employee, which are the dominant motives in rich countries. In fact, most businesses in low-income countries are started out of necessity, in contrast to high-income countries, where entrepreneurship is usually opportunity-driven. This is reflected in the fact that in poor countries self-employed are less happy than employees, while the opposite is true in high-income countries (Blanchflower and Oswald 1998; Graham 2005). In most cases, entrepreneurs in low-income countries most often start a business because they have no other way of earning a living. These entrepreneurs are not likely to be involved in a process of opportunity discovery and their actions are not likely to have an effect on the restructuring and diversification of poor economies (Rodrik 2007: 110).

Hypothesis 1: Entrepreneurship in general is a more important determinant of macroeconomic growth in rich countries than it is in poor countries.

We expect that the level of ambitious entrepreneurship in a country is a more relevant driver of economic growth than the most frequently used indicators of entrepreneurship like self-employment and new firm formation. Entrepreneurs aspiring to produce new products, make their company grow or engage in export-related activities are expected to contribute more to economic growth than their less ambitious counterparts (Bellu and Sherman, 1995; Kolvereid and Bullvag, 1996; Wiklund and Shepherd, 2003).

Hypothesis 2: Ambitious entrepreneurship is a more important determinant of macroeconomic growth than entrepreneurship in general.

A skeptic may say that looking at nascent entrepreneurship and young businesses (as is done in studies based on GEM data) will reveal more about *stated* preferences regarding entrepreneurial behavior and employment growth than about surviving in a competitive environment and creating substantial growth, i.e. a *revealed* preference for growth. In response to this argument, we also analyze the effect of realized firm growth on economic growth.

Hypothesis 3: The rate of high-growth firms is positively related to macroeconomic growth.

In addition, we expect that high-growth firms are related to nascent entrepreneurship and young businesses, with the latter providing a pool of potential high-growth firms and serving as an indicator of competitive pressure, which forces less efficient incumbents to vacate the market and other incumbents to step up their performance (Thurik and Wennekers 2004; Bosma et al. 2010). As a result, the quality of the firm population in the industry improves, which in turn leads to an improved aggregate performance (Fritsch and Mueller 2004). These effects may be stronger with ambitious entrepreneurship than with entrepreneurship in general.

Hypothesis 4: Entrepreneurship in general is positively related to the rate of high-growth firms.

Hypothesis 5: Ambitious entrepreneurship is more positively related to the rate of high-growth firms, compared to entrepreneurship in general.

3. Data and sources

We use data from a sample of countries participating in GEM between 2002-2005. The sources and definitions of the variables used are listed below.

Growth of GDP (ΔGDP)

We use a four-year average of real GDP growth. Real GDP growth rates are taken from the IMF World Economic Outlook database of the International Monetary Fund, version April 2008. The lag structures imply that the estimation sample of GDP growth is 2005-2008 (as the sample for TEA is 2002-2005).

To limit the potential impact of reversed causality, we include lagged GDP growth as an additional explanatory variable. The lagged GDP growth variable refers to the four years prior to the measurement period of the dependent variable. When growth expectations for a national economy are good, more entrepreneurs may expect to watch their business grow in years to come. Hence, there may also be a (reversed) effect of economic growth on (ambitious) entrepreneurship.

Total early-stage Entrepreneurial Activity (TEA)

TEA is defined as the percentage of the adult population that is either actively involved in starting a new venture or is the owner/manager of a business that is less than 42 months old. Data on the total early-stage entrepreneurial activity are taken from the GEM Adult Population Survey. See Reynolds et al. (2005).

Ambitious entrepreneurship

The share of ambitious entrepreneurs is defined as the share of entrepreneurs within TEA who state that they expect their firm to grow with at least six employees within five years.[1] These data are also taken from GEM.

High-growth firms

EIM Business and Policy Research (EIM) has constructed harmonized data for the rate of high-growth firms across several (developed) countries. The rate of high-growth firms is defined as the share of incumbent firms realizing 60% growth or more over a period of three years (from t-3 to t). We use two variants: growth in terms of turnover and growth in terms of employment. Firms that realize fast turnover growth may not realize fast employment growth and vice versa. Importantly, when we computed the rate of high-growth firms, we only included firms with between 50 and 1000 employees at the start of the observation period, which means that small firms growing with 60% or more while employing just a few employees are not included. The source of these data is EIM's International Benchmark Entrepreneurship data base[2], which excludes NACE sectors A, B and J (agriculture, fishery and financial and other services). For more details about this variable, see EIM (2008, 2009a and 2009b).

[1] Multicollinearity problems prevent us from dividing ambitious entrepreneurship into entrepreneurs who expect a growth between 6 and 19 people and entrepreneurs who expect a growth of at least 20 people.

[2] The data base can be downloaded at www.entrepreneurship-sme.eu.

Per capita income (GDPC)

Most studies on GDP growth include the initial level of income in their analysis and find it to be significant (the conditional convergence effect; Abramovitz 1986). GDP per capita is expressed in (thousands of) purchasing power parities per international dollar. These data are taken from the IMF World Economic Outlook database, version April 2008.

Growth Competitiveness Index (GCI)

Data on the GCI are taken from various versions of *The Global Competitiveness Report*. The GCI consists of the following three main factors assessing a country's potential for economic growth: the quality of the macroeconomic environment, the state of the public institutions and the level of technology. For further details about this index, see McArthur and Sachs (2002).

As an illustration of the data at hand, we report various entrepreneurship variables for the most recent year in our sample (2005) in Table 1.[3]

Table 1: Entrepreneurship rates in 2005

			Share ambitious	Rate of high-growth firms based on	
Country		TEA	entrepreneurs	Turnover	Employment
High-income	Australia	10.9	0.45	.	.
	Belgium	3.9	0.41	11.7	5.6
	Canada	9.3	0.55	.	.
	Denmark	4.8	0.30	16.9	11.6
	Finland	5.0	0.35	17.3	8.8
	France	5.4	0.32	12.3	6.8
	Germany	5.4	0.50	10.6	7.8
	Hungary	1.9	0.16		
	Iceland	10.7	0.74	.	.
	Ireland	9.8	0.31	24.3	.
	Italy	4.9	0.20	16.3	13.2
	Japan	2.2	0.51	6.8	2.0
	Netherlands	4.4	0.40	11.0	7.5
	New Zealand	17.6	0.43	.	.
	Norway	9.2	0.26	.	.
	Singapore	7.2	0.42	.	.

[3] Due to the unbalanced nature of our panel data set, Table 1 does not contain all countries included in the sample. The additional countries (for which we do not have data for all years) are: Hong Kong, India, Israel, Poland, Korea, Russia and Taiwan.

	Slovenia	4.4	0.56	.	.
	Spain	5.7	0.25	23.5	23.5
	Sweden	4.0	0.31	17.7	17.7
	Switzerland	6.1	0.28	.	.
	United Kingdom	6.2	0.52	19.8	10.9
	United States	12.4	0.49	38.4	20.1
Low-income	Argentina	9.5	0.59	.	.
	Brazil	11.3	0.55	.	.
	Chile	11.1	0.64	.	.
	China	13.7	0.89	.	.
	Croatia	6.1	0.43	.	.
	Mexico	5.9	0.19	.	.
	South Africa	5.1	0.45	.	.
	Thailand	20.7	0.31	.	.
	Mean	7.8	0.43	17.4	11.3
	Standard deviation	4.4	0.16	8.1	6.3

Note: Data regarding TEA and ambitious entrepreneurial activity refer to 2005, while data regarding the rate of high-growth firms refer to the period 2002-2005.
Source: GEM and EIM.

4. Models

It is generally accepted that there are differences in the way entrepreneurship is distributed across countries (Blanchflower et al. 2001; Djankov et al. 2002; Grilo and Thurik 2008; Wennekers 2006). Studies exploring differences in entrepreneurship across countries often focus on the incidence of new firm registration or self-employment, which may not be reliable indicators when applied to transition countries and developing countries with significant informal economies (which are excluded in any formal census data). For these reasons we have used the Total early-stage Entrepreneurial Activity (TEA) indicator.

As mentioned earlier, in this chapter, we investigate four topics. To begin with, we look at whether the relationship between entrepreneurship and macroeconomic growth is different for high-income and low-income countries. Secondly, we examine whether ambitious entrepreneurship plays a different role in achieving economic growth compared to entrepreneurship in gen-

eral. Thirdly, we investigate the relationship between the rate of high-growth firms and macroeconomic growth. Finally, we examine the relationship between the rate of ambitious entrepreneurship and the rate of high-growth firms.

The *first* part of our empirical analysis deals with the first two research questions, building on Van Stel et al. (2005), who investigate whether TEA influences GDP growth in a cross-section of 36 countries participating in GEM in 2002 and find that, although that is the case, the influence depends on the level of per capita income. In particular, the contribution to economic growth is found to be stronger in high-income countries than in low-income countries. The authors argue that this may be related to higher human capital levels of entrepreneurs in high income countries. In this chapter, we perform a similar regression analysis but, instead of using a cross-section of countries for one year, we use an unbalanced panel data set for 37 countries over the years 2002-2005 (see Table 1).[4] In addition, besides the general TEA index, we also use the share of ambitious entrepreneurs within TEA as an independent variable, to test whether the impact of ambitious entrepreneurs is higher than that of non-ambitious entrepreneurs. We also investigate whether these effects are different for high-income as compared to low-income countries.[5] In the *second* part of our analysis, we investigate the relationship between the rate of high-growth firms and subsequent macroeconomic growth, which may allow us to perform a robustness check over intended entrepreneurial (growth) activities. In the *third* part, we investigate the link between the rate of high-growth firms and the rate of ambitious entrepreneurship. The models used in this study are described below.

[4] The distinction between rich and poor countries is based on the World Bank 2002 classification: the lower-income ('poor') category includes "low-income economies," "lower-middle-income economies," and "upper-middle-income economies," while the higher-income ('rich') category includes "high-income economies."

[5] This first part of our analysis is an update of Stam et al. (2009), who use GEM data for 2002 only. Similar analyses focusing on the importance of entrepreneurs' export orientation and of entrepreneurial diversity (in terms of age, education and gender) can be found in Hessels and Van Stel (2008) and Verheul and Van Stel (2007), respectively.

Model 1

In our first model, we investigate whether (ambitious) entrepreneurship may be considered a determinant of economic growth, alongside other well-known determinants that are captured in the *Growth Competitiveness Index* (GCI) published by the World Economic Forum. As both entrepreneurship and the factors underlying the GCI are assumed to be structural characteristics of an economy, we want to explain economic growth in the medium term rather than short-term economic growth. As a dependent variable, we therefore use average annual growth over a period of four years following the year for which we measure TEA. In line with Van Stel et al. (2005), we use (the log of) initial income level of countries to correct for catch-up effects, and lagged growth of GDP to correct for reversed causality effects, as additional control variables.[6]

We allow for different effects in rich compared to poor countries (including transition countries). TEA rates may reflect different types of entrepreneurs in countries with different development levels, implying a different impact on growth. This is tested using separate TEA variables for different groups of countries (rich versus poor). Our first model is represented by Equation 1:

$$\Delta GDP_{i,(t-t\text{-}3)} = a + b_1\, TEA^{\,rich}_{i,t\text{-}3} + c_1\, TEA^{\,poor}_{i,t\text{-}3} + b_2\, Ambitious^{\,rich}_{i,t\text{-}3} + c_2\, Ambitious^{\,poor}_{i,t\text{-}3} + d \log(GDPC_{i,t\text{-}3}) + e\, GCI_{i,t\text{-}3} + f\, \Delta GDP_{i,(t\text{-}4-t\text{-}7)} + \varepsilon_{it} \quad (1)$$

where ΔGDP is the annual real growth rate of GDP (this variable is averaged over a four year period), *TEA* the total early-stage entrepreneurial activity index, *Ambitious* the share of ambitious

[6] When growth expectations for the national economy are good, more entrepreneurs may expect to see their business grow in years to come. Hence, there may also be a (reversed) effect of economic growth on (ambitious) entrepreneurship. To limit the potential impact of reversed causality, we include lagged GDP growth as an additional explanatory variable. We also measure

entrepreneurs (those expecting to employ 6 or more people within five years), *GDPC* per capita income and *GCI* the growth competitiveness index.

Hypothesis 1, which states a more positive effect of entrepreneurship in general for rich countries is supported if coefficient b_1 would be larger than coefficient c_1. Furthermore, Hypothesis 2, which states that ambitious entrepreneurs contribute more to national economic growth than entrepreneurs in general, is supported if b_2 and c_2 would be in excess of zero.

Model 2

In our second model, we test whether the rate of high-growth firms has a positive effects subsequent macroeconomic growth. The data involved relate only to rich countries. We use data on two rates of high-growth firms variables, one referring to turnover growth and the other to employment growth. We use the same control variables as in Equation 1. Model 2 reads as follows:

$$\Delta GDP_{i,(t-t\text{-}3)} = a + b\ High\text{-}growth_{i,(t\text{-}3-t\text{-}6)} + c\ \log(GDPC_{i,t\text{-}3}) + d\ GCI_{i,t\text{-}3} + e\ \Delta GDP_{i,(t\text{-}4-t\text{-}7)} + \varepsilon_{it} \quad (2)$$

where *High-growth* is the rate of high-growth firms (firms growing by at least 60% in a three year period).

Hypothesis 3, which states that the rate of high-growth firms is positively related to macroeconomic growth, is supported if coefficient b would be in excess of zero.

Model 3

TEA rates in the year (t) preceding the period over which the dependent variable is measured (t – t+3). Having said that, we realize that the possibility of reversed effects cannot be ruled out completely.

As mentioned above, in our third model we test whether there is a relationship between the number of (ambitious) entrepreneurs and the number of high-growth firms in a given country. This is tested with Model 3:

$$High\text{-}growth_{i,(t-t\text{-}3)} = a + b\ TEA_{i,t} + c\ Ambitious_{i,t} + d \log(GDPC_{i,t\text{-}3}) + e\ GCI_{i,t\text{-}3} + \varepsilon_{it} \quad (3)$$

Hypotheses 4 and 5, which state that (ambitious) entrepreneurship is positively related to the rate of high-growth firms, are supported if coefficients b and c would be in excess of zero, respectively. Note that we measure TEA in period t. Although this is not ideal in terms of establishing a causal relationship, when using t-3 we would lose too many observations to estimate the model. Hence, we are unable to establish a causal relationship, but merely a conditional correlation.

5. Results

Table 2 shows the results for the first two research questions. Is the relationship between entrepreneurship and macroeconomic growth different for high-income compared to low-income countries? Does ambitious entrepreneurship play a different role in achieving economic growth compared to entrepreneurship in general? The estimation results for Model 1 (Equation 1) are presented in Table 2. Our estimation sample is 2005-2008. This corresponds to an unbalanced panel of 119 observations of countries participating in GEM in the years 2002-2005 (note the three year lag in Equation 1). Because the aim of our model is to explain *country* variations in economic growth rates, we do not include country dummies in our model. On the other hand, we do include year dummies to correct for worldwide cyclical variations in economic growth rates.

Model variant 1 in Table 2 presents the estimation results when only the control variables are included. Per capita income has an expected negative effect that is consistent with the conditional convergence effect (Abramovitz 1986). Remarkably, the Growth Competitiveness Index (GCI) is not significant. The impact of lagged growth is significantly positive, suggesting a considerable degree of path dependency. In the second model variant, TEA is added and its effect is significantly positive at the 10% level. Next, we add the share of ambitious entrepreneurship to the model. Here, its effect is strongly positive. In the fourth model variant, the effects of TEA and the share of ambitious entrepreneurs are allowed to be different for rich and poor countries. Likelihood ratio tests reveal that, when comparing model variant 4 to either model variant 2 or 3, model variant 4 significantly outperforms models 2 and 3 at the 5% level.[7] Hence, we conclude that the relationship between entrepreneurship and macroeconomic growth is indeed different for high-income and low-income countries. In particular, we see that entrepreneurship in general (TEA) has no significant impact in rich countries, while it has a significantly positive impact in poor countries. This is remarkable, since Van Stel et al. (2005) and Stam et al. (2009) found an opposite pattern. They use a cross-section of countries for a single year, while we use data regarding four years. One explanation is that the effect was different in the period 2003-2005 when compared to 2002. Another explanation is that the estimated effect of TEA on subsequent economic growth is robust enough to examine different time periods. Hypothesis 1 is not supported.

With regard to Hypothesis 2, we see that, both for rich and for poor countries the share of ambitious entrepreneurship significantly contributes to economic growth, over and beyond the effect of entrepreneurship in general. Hypothesis 2 is supported. To a certain extent, this is at odds with Vailliere and Peterson (2009), who identified a positive effect of ambitious entrepreneurship in

[7] Comparing model variants 2 and 4 requires using three degrees of freedom for the critical value of the null distribution while comparing model variants 3 and 4 requires using two degrees of freedom.

high-income countries, but no effect in low-income countries. The absence of an effect in the latter group of countries may be explained by the fact that they did not include India and China in their sample, two low-income countries that seem to drive the relationship between ambitious entrepreneurship and economic growth in low-income countries in the study of Stam et al. (2009).

Table 2: Explaining economic growth from TEA rate and share of ambitious entrepreneurs

	Model 1	Model 2	Model 3	Model 4
Constant	20.3 ***	17.3 ***	15.5 ***	4.8
	(8.6)	(9.8)	(9.2)	(1.1)
TEA		0.073 *	0.064	
		(1.7)	(1.6)	
TEA rich countries				0.01
				(0.1)
TEA poor countries				0.13 **
				(2.3)
Share ambitious entrepreneurs			2.2 ***	
			(3.3)	
Share ambitious entrepreneurs, rich countries				2.1 ***
				(3.3)
Share ambitious entrepreneurs, poor countries				3.2 ***
				(2.8)
log (GDPC)	-1.7 ***	-1.4 ***	-1.3 ***	-0.3
	(6.0)	(5.1)	(4.7)	(0.6)
GCI	-0.075	-0.23	-0.28	-0.2
	(0.2)	(0.7)	(0.8)	(0.5)
lagged GDP growth	0.29 **	0.30 ***	0.28 **	0.35 ***
	(2.3)	(2.8)	(2.6)	(3.4)
R^2	0.426	0.445	0.469	0.495
adjusted R^2	0.395	0.410	0.430	0.448
loglikelihood	-218.7	-216.7	-214.1	-211.1
N	119	119	119	119

Absolute heteroskedasticity-consistent *t*-values are between brackets. Year dummies included but not reported.
* Significant at 0.10 level.
** Significant at 0.05 level
*** Significant at 0.01 level

Table 3 shows the results of the estimations of Model 2 (Equation 2) about the effect of the growth of established firms on macroeconomic growth. Model variants 1 and 2 refer to *turnover* growth, while variants 3 and 4 refer to *employment* growth. As the data we use refers high-growth firms in rich countries only, the results presented in Tables 3 and 4 also relate to rich countries only.

Although the effect of the rate of high-growth firms (turnover) is not significant in model variant 1, it turns out to correlate strongly with lagged GDP growth. When we remove the latter variable,

there is a strong positive relationship between the rate of high-growth firms and subsequent macroeconomic growth. The different outcomes in Model 1 and 2 can be interpreted in at least two ways. On the one hand, although it does not provide evidence of a causal effect (in a Granger sense), there is a strong conditional correlation between the rate of high-growth firms (in terms of turnover) and GDP growth in the subsequent period. This suggests that high-growth firms play an important role in achieving macroeconomic growth. On the other hand, a reverse causality in which GDP growth drives the growth of established firms may be more relevant. Interestingly, we find no effect of high-growth firms in terms of employment, even after removing the lagged growth variable. Perhaps fast growers in terms of employment have smaller productivity growth compared to fast growers in terms of turnover, which means that their impact on macroeconomic growth is smaller (or even zero, according to Table 3). Table 3 provides hardly any support for Hypothesis 3.

Table 3: Explaining economic growth from rates of high (realized) growth firms

	Model 1	Model 2	Model 3	Model 4
Constant	17.1 ***	8.2	19.0 ***	22.0 ***
	(4.8)	(0.8)	(5.1)	(2.9)
Rate of high-growth firms, in terms of turnover	-0.003	0.077 ***		
	(0.2)	(3.1)		
Rate of high-growth firms, in terms of employment			-0.001	0.009
			(0.1)	(0.3)
log (GDPC)	-2.0 ***	-0.85	-2.2 ***	-2.5 ***
	(5.1)	(0.8)	(5.4)	(2.8)
GCI	0.88 ***	0.36	0.96 ***	1.2 ***
	(6.2)	(0.9)	(5.9)	(3.6)
lagged GDP growth	0.66 ***		0.59 ***	
	(13.7)		(7.0)	
R^2	0.830	0.273	0.771	0.299
adjusted R^2	0.803	0.176	0.732	0.199
loglikelihood	-33.0	-70.8	-30.8	-58.2
N	52	52	49	49

Absolute heteroskedasticity-consistent *t*-values are between brackets. Year dummies included but not reported.
* Significant at 0.10 level.
** Significant at 0.05 level
*** Significant at 0.01 level

Finally, Table 4 presents the results of Model 3 (Equation 3), where we investigate whether (ambitious) entrepreneurship is related to the share of high-growth firms among incumbents (note again that realized high growth is measured among firms between 50-1000 employees). Because

we only find a positive relationship with GDP growth for the rate of high-growth firms in terms of turnover, Table 4 focuses on this group of firms. The main result is that there is a strong statistical association between TEA and the rate of high-growth firms, with a t-value of no less than 8. By contrast, we do not find an additional effect for the share of ambitious entrepreneurs. These results support Hypothesis 4 but not Hypothesis 5.

Table 4: Explaining rates of high (realized) turnover growth firms from TEA

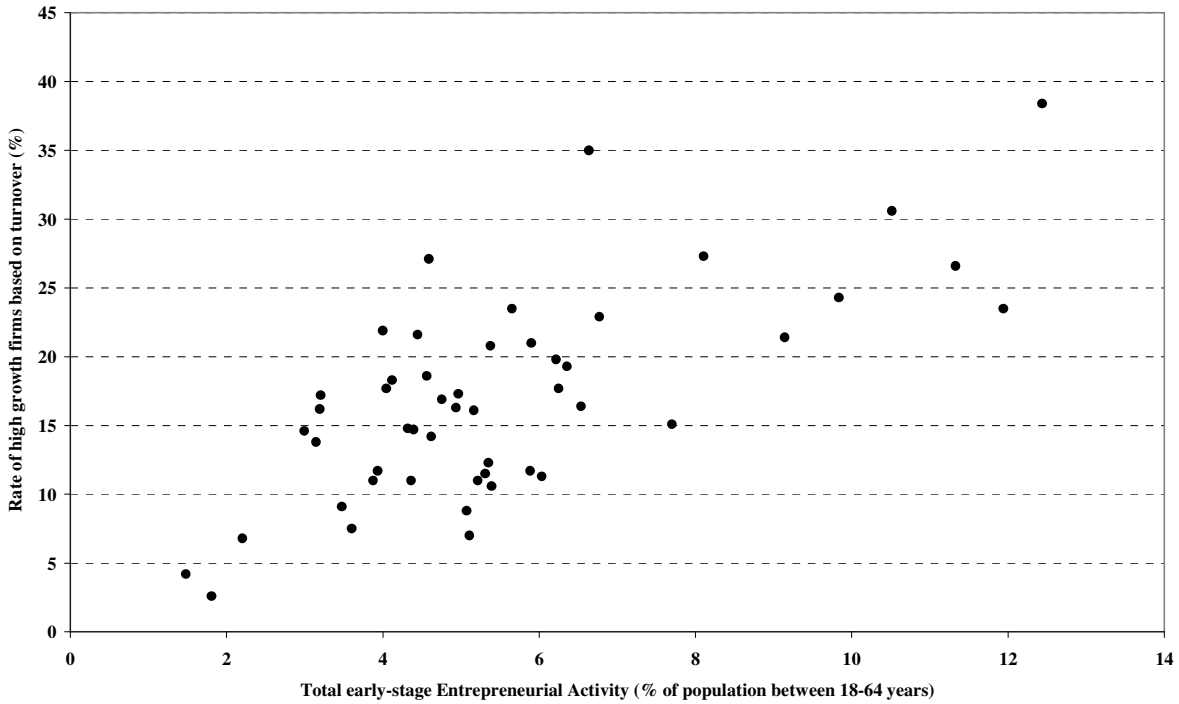
	Model 1	Model 2
Constant	132.2 *** (3.2)	135.3 *** (3.1)
TEA	2.5 *** (8.1)	2.6 *** (8.0)
Share ambitious entrepreneurs		-5.8 (0.9)
log (GDPC)	-13.1 *** (3.2)	-13.3 *** (3.0)
GCI	1.3 (1.1)	1.5 (1.3)
R^2	0.714	0.718
adjusted R^2	0.674	0.671
loglikelihood	-139.2	-138.8
N	50	50

Absolute heteroskedasticity-consistent *t*-values are between brackets. Year dummies included but not reported.
* Significant at 0.10 level.
** Significant at 0.05 level
*** Significant at 0.01 level

These results indicate that it is entrepreneurship in general, rather than specifically ambitious entrepreneurship, which is positively associated with the rate of high-growth firms, suggesting that all different types of new firms contribute to a process of variety and selection, from which a number of high-growth firms eventually emerges.

The strong positive relationship between TEA and the rate of high-growth firms is illustrated by Figure 1, which plots the 52 observations used in Table 4.

Figure 1: Relationship between TEA and rate of high-growth firms (turnover)



Source: GEM and EIM.

6. Discussion

In this chapter, we have investigated four research questions. First, we examined whether the relationship between entrepreneurship and macroeconomic growth is different for high-income and low-income countries. Secondly, we looked at whether ambitious entrepreneurship plays a different role in achieving economic growth compared to entrepreneurship in general. Thirdly, we investigated the relationship between the rate of high-growth firms and macroeconomic growth. Finally, we examined the relationship between the rate of ambitious entrepreneurs (entrepreneurs expecting to grow their firm) and the rate of high-growth firms (firms that have actually realized high growth rates).

In contrast to expectations, our findings suggest that the relationship between (ambitious) entrepreneurship and macroeconomic growth is stronger in low-income countries than it is in high-

income countries. In general, ambitious entrepreneurship has a stronger impact on economic growth than overall entrepreneurial activity in a given country, as was expected. Established firms with considerable growth (either in turnover or employment) do not seem to be connected to economic growth. These established high-growth firms seem to flourish in countries with high levels of entrepreneurship in general, while there appears to be no relationship between the share of ambitious entrepreneurs and the rate of high-growth firms.

The ambiguous findings on the relationship between entrepreneurship and economic growth in low-income countries may reflect the complexity involved in the underlying institutional dimension, which affects the prevalence (Hessels et al. 2008) as well as the effects of the different types of entrepreneurship in different ways. We expected that, in low-income countries, an insufficiently developed institutional framework would reduce growth intentions and curtail entrepreneurial growth. Possibly, the selection of low-income countries in the GEM dataset only contains relatively well-developed economies, which makes it harder to analyze the effects of insufficiently developed institutional frameworks. This calls for more research that takes into account specific types of institutions and their dynamics over time in order to uncover the role of different types of entrepreneurship in economic growth in low-income countries (Naudé 2010).

One finding that largely confirms prior findings (Wong et al. 2005; Stam et al. 2009; Vailliere and Peterson 2009) is that ambitious entrepreneurship has a positive effect on subsequent macroeconomic growth. Ambitious entrepreneurship seems to be an important vehicle when it comes to creating new value in society and it is likely to stimulate the creation of genuinely new jobs and national income. An interesting issue for further research would be to examine in which industries most of these ambitious entrepreneurs can be found. It is often implied that young and small high-growth firms are most likely to be found in young and growing industries (Davidsson and Delmar 2006; Acs et al. 2008), but this needs to be investigated in large-scale empirical research.

The positive effect of established high-growth firms on macroeconomic growth that is often assumed is not confirmed in this study. At first sight, this goes against the intuition that these firms are important drivers of employment growth, innovation, productivity growth and, ultimately, economic growth (OECD 2006; EIM 2006). However, when we reflect on the nature of firm growth, this outcome is less surprising. Most studies on firm growth do not draw a distinction between organic and acquired growth, while the latter type of growth is less important in terms of macroeconomic growth than the former. Acquired growth may involve a reallocation or even an overall decline of employment (when acquired firms and/or the acquiring firm are restructured). The few studies that have made a distinction between organic and acquired growth (Davidsson and Delmar 2006; Deschryvere 2008) indicate that young and small firms predominantly grow organically, while old and large firms most often grow through acquisition. Davidsson and Delmar (2006) argue that this implies that young and small firms create the lion's share of *genuinely* new jobs. Given that established high-growth firms are relatively large and old, this means that most of their growth is probably realized through acquisitions, with hardly any effect on the overall growth of the economy. In addition, mergers and acquisitions are pro-cyclical in nature, i.e. they are driven by GDP growth (Maksimovic and Philips 2001; Bhattacharjee et al. 2009), and most of them erode the value of the acquiring firm (Haleblian et al. 2009).

Finally, we investigated a new question concerning the relationship between the rate of ambitious entrepreneurs (entrepreneurs expecting to grow their firm) and the rate of high-growth firms (firms that have actually realized high growth rates). We find that it is entrepreneurship in general, rather than specifically ambitious entrepreneurship, which is positively associated with the rate of high-growth firms. More research is needed to identify the mechanism underlying this relationship.

The aim of this chapter was to test the relationships between ambitious entrepreneurship, high-growth firms and macroeconomic growth, and thus to provide insight into the links between the microeconomic phenomena of entrepreneurial activities and firm growth and macroeconomic growth. Our study can be seen in the light of other studies that link the effect of microeconomic dynamics to macroeconomic dynamics (Baumol 2002; Metcalfe 2004; Eliasson et al. 2004). Parker (2009: chapter 11) provides a survey of various theories of venture growth and their link to industry dynamics (the intermediate level between the micro and the macro economy). To explain aggregate income growth, we need to understand entry, innovation and growth at the micro level and gain insight into how competition and learning provide the link between the micro level and the macro level. It has often been too easily assumed - especially in policy documents and debates - that firm entry and growth are driven by innovation. However, empirical research has shown that only a minority of all entrants introduces new processes or products into the economy (Stam and Wennberg 2009) and that firm growth is often a statistical artifact of merging prior separated legal entities (i.e. acquired growth): most entrants and large growing firms do not create new value in society. Our study suggests that high levels of overall entry and firm growth do not automatically lead to macroeconomic growth.

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