

Constraints, internationalization and performance: A cross-country analysis of European SMEs

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Abstract: This study investigates the relationships between constraints, internationalization and performance using a large data set of European SMEs. We argue that it is important to take account of correlated error terms in investigating the proposed relationships and apply a recursive three equation multivariate probit model. Our results confirm the value of this approach. We find that firms that are growing in terms of employment have (unobserved) attributes that make them less likely to internationalize, despite the fact that internationalizing SMEs more often achieve actual employment growth. Furthermore, we find support that purchasing power constraints hinder observed turnover growth, while firms that actually grow in turnover have (unobserved) attributes which make them more likely to encounter such constraints in the first place. We also find that firms that encounter skilled labor constraints are still more likely to grow employment than firms that do not bump into such constraints.

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1 Introduction

The internationalization and growth of small and medium-sized enterprises (SMEs) has attracted substantial attention in the past decades from entrepreneurship and international business researchers. SMEs are able to grow such as in terms of sales and employment through opportunities in national as well as international markets. SMEs have traditionally mainly been active in national markets. However, in the past decades the participation of SMEs in international markets has increased e.g. as a result of liberalization of international trade and investment and advances in technology and communications. Nowadays in many countries SMEs contribute at least 20 per cent to total exports and in some countries their contribution is even over 50 per cent of total exports (OECD, 2008a). Nevertheless, even today many SMEs still abstain from competing internationally (OECD, 2008a, 2008b). One of the reasons why SMEs often do not undertake international activities is that SMEs are less likely to benefit from economies of scale than larger firms which makes it difficult to achieve a competitive advantage in international markets. Also, to be able to enter (new) foreign markets firms have to take entry costs such as costs for market research, product modification and compliance (Greenaway, Girma and Kneller, 2004). Such costs may be particularly cumbersome for SMEs as they are typically more constrained in their resources than larger firms lacking e.g. the power, knowledge and human and financial capital resources required to operate viably in foreign markets (Jarillo, 1989; Fujita, 1995; Coviello McAuley, 1999; Liesch and Knight, 1999; Knight, 2000). SMEs are also more vulnerable than larger firms to adverse changes in the external environment such as declining customer demand, shortages of skilled labor and more onerous regulations (Zhuo, Wu and Luo, 2007).

Thus, a major concern is that SMEs' ability to internationalize and grow may be hampered by both internal and external constraints. However, while constraints may specifically matter for SMEs, research explaining internationalization and growth of SMEs has generally failed to take direct account of constraints. Only few empirical studies analyze constraints in relation to internationalization and growth of SMEs (e.g. Westhead, Wright and

Ucbasaran, 2002; Beck, Demirg-Kunt and Maksimovic, 2005). A more common empirical strategy used in studies explaining internationalization and growth of SMEs is not to measure constraints explicitly, but instead to argue that constraints lead to limited access to resources (Bonnacorsi, 1992). These studies include among the set of explanatory variables various internal resource proxies and network relationships as proxies for access to internal resources (Lu and Beamish, 2001; Zhou et al., 2007). Therefore, it remains largely unclear whether and how constraints matter for internationalization and growth. This has motivated us to take a direct approach by measuring constraints explicitly in explaining internationalization and growth of SMEs. In doing so we complement existing research that has a strong focus on resources.

Furthermore, in analyzing the relationship between constraints on the one hand and internationalization and growth on the other hand we also consider the relationship between internationalization and growth. Internationalization can be an important strategy for firms to achieve growth. However, so far research has paid limited attention to growth implications of SMEs' internationalization strategies. Most work has focused on exports and did not include other internationalization strategies that may also have the potential to contribute to firm growth. For example, foreign purchases may contribute to firm growth since purchasing inputs from a foreign supplier can be an important strategy for reducing costs and upgrading a firm's products through the import of innovative intermediates, new machinery or advanced technology (Ethier, 1982; Luostarinen and Welch, 1990; Welch and Luostarinen, 1993). Therefore, in our study, in addition to exporting, we also include foreign purchasing, in analyzing the relationship between internationalization and growth.

At present, the literature lacks a framework for exploring linkages and interrelationships between constraints, internationalization activities and growth. We also lack robust empirical evidence about these linkages and interrelationships. The problem is compounded when SMEs are taken as the focus of analysis, because previous research has been based on relatively small samples of these firms (varying from less than one hundred to at most a few

hundred cases) (e.g. Lu and Beamish, 2001; Majocchi and Zuchella, 2003; McDougall and Oviatt, 1996; Westhead, Wright and Ucbasaran, 2004). Unfortunately, small sample sizes make reliable inferences about the underlying relationships difficult to obtain (Greene, 2003). Another empirical drawback is that most studies have a single country focus. Comparative studies drawing on multiple-country samples are still limited in internationalization research (Dhanaraj and Beamish, 2003).¹ This is unfortunate as cross-country data relating to SMEs can reduce the risk of obtaining results which are overly specific to one particular country. We are interested in obtaining conclusions which can claim some degree of generality, which requires a large data set spanning more than one country.

This paper attempts to push forward the literature in the following way. First, we develop a set of testable hypotheses about how several constraints are linked directly with internationalization and growth, as well as indirectly via a relationship between internationalization and growth. We focus on three constraints which are not only prominent in our data set but which have also been analyzed in previous research on SMEs. These are: limited customer purchasing power; shortages of skilled labor; and costly government regulations. Growth is measured in terms of venture growth, measured both in terms of turnover and employment. And in the interests of comprehensiveness, we study not one but two different aspects of internationalization. Previous studies on SME internationalization have predominantly focused on exporting (Bloodgood, Sapienza and Almeida, 1996; McDougall and Oviatt, 1996). While exporting represents one important aspect of international trade transactions, relating to foreign sales, there is of course another, namely foreign purchasing (e.g. having a foreign supplier).

Second, we seek to overcome some of the limitations of previous empirical research by utilizing a large data set of 7,673 SMEs from 18 European countries. More than 2,000 SMEs in our sample are involved in exporting activities and even more than 3,200 SMEs in our sample have a foreign supplier.

Third, we propose and implement what we believe to be a novel method-

¹Exceptions include Dichtl, Koeglmayr and Mueller (1990) and Adams and Hall (1993).

ological approach in the internationalization literature. This approach recognizes that, despite the best efforts of researchers to control for observable factors which are associated with internationalization and performance, data limitations and measurement problems mean that some important factors are bound to remain unobserved. These unobserved factors do not simply disappear, but instead enter the error terms of the equations of interest. If these error terms are correlated together — a situation which we argue is theoretically plausible, and which we connote by ‘correlated unobservables’ — then the researcher must take this into account explicitly in order to obtain accurate estimates of the observable relationships (Shaver, 2005). In this study we consider the possibility that unobserved as well as observed influences on constraints, internationalization and performance are correlated. We do so within the framework of a three equation recursive multivariate probit model. We claim that this reduces the risk of mis-specification which could lead to unwarranted conclusions being drawn from the data.

The paper is structured in the following way. Section 2 briefly reviews the relevant background literature and develops several hypotheses about relationships (both in terms of observable and unobservable effects) between constraints, internationalization and performance. Section 3 describes the data while section 4 outlines the statistical methodology in detail. Section 5 presents the results. These are discussed in section 6, which closes the paper.

2 Background Literature and Hypothesis Generation

Drawing on existing literature, this section develops a new framework for analyzing the relationships between constraints, internationalization and performance. It is common practice in the established literature to relate one of more of these dependent variables to a set of observed control variables and go on to interpret the observed relationships in terms of hypotheses. In contrast, our approach (outlined in the first part of this section) broadens the analysis to deal not just with correlations between observed variables,

but also with correlations among the *unobserved* determinants of the three variables of interest. Once the distinction between unobserved and observed correlations is explained, the relationship between internationalization and performance is examined (in the second part of this section). The third part then analyses the relationships between constraints, internationalization and performance, in terms of both observed and unobserved effects.

2.1 Observed and unobserved effects

It is widely recognized that in practice, empirical models rarely incorporate all of the factors that actually affect dependent variables (Greene, 2003). A typical parametric model will try to explain observed outcomes of a dependent variable (growth, say), by relating these outcomes to observed values of a set of independent variables. It is well known that variables excluded from this set, perhaps as a result of data limitations, have effects which show up in the error term. These effects are collectively known as *unobserved effects*. Unobserved effects are known to lead to low explanatory power and biased parameter estimates in general.

Now consider a set of equations, one for each of growth, internationalization and constraints, say. Unobservable effects are generally present in these equations. Furthermore, if the error terms of each equation are correlated (a situation known as *correlated unobservables*), researchers must estimate the correlations in order to obtain accurate estimates of the relationship between the observed variables (Shaver, 2005). Without taking into account correlated unobservables, the researcher will generally obtain biased estimates of the relationships of interest. Unfortunately, recognition of this point and practical implementation has yet to make it into the internationalization literature.

To understand the role of unobserved variables, and how they can be interpreted relative to observed variables, consider the following illustrative thought experiment. A researcher hypothesizes that a particular constraint reduces growth. He/she is therefore surprised to find that a regression of growth on a set of explanatory variables reveals a strong positive relationship:

the most constrained firms grow faster on average. After puzzling over this situation for some time, the researcher is then somehow made privy to new (previously unobserved) data which shows that the fastest growing firms all have a (previously unobserved) characteristic in common. They have all been growing for a while, and have as a result *all run up against the constraint of interest*. The researcher then realizes that this is what has caused the positive relationship seen in the data.

Of course, this is purely a hypothetical example, since in reality truly unobserved data cannot (by definition) be observed. Nevertheless, it turns out that the real-world researcher can actually get a handle on correlated unobservables if he/she is estimating more one equation of interest. By using system estimation methods, not only can relationships between observed values of growth and constraints be estimated, but also the correlation between unobserved effects in both equations (i.e. error terms) can be estimated as well.

This insight will turn out to be central to our theorizing, and also to the empirical estimation strategy we will adopt. Without it, cannot identify the true role of each, and just like the hypothetical researcher, are vulnerable to obtaining puzzling empirical findings. So far we have given only a simple verbal explanation of what unobserved effects are and how they differ from observed effects. Later on, a multiple equation model will be outlined which expresses these ideas more formally in mathematical form.

2.2 Internationalization and Performance

Firms looking to internationalize can choose between various market entry modes. These include ‘outward’ and ‘inward’ oriented modes. Examples of the former include exporting and foreign direct investment. Examples of the latter include importing and being a joint venture partner of a foreign firm (Fletcher, 2001).

Entry modes may vary considerably with respect to the benefits and costs they entail (Anderson and Gatignon, 1986; Sharma and Erramilli, 2004). Hitherto, research on internationalization by small and medium enterprises

(SMEs) has usually taken an outward-orientation perspective, mainly focusing on exporting (Bloodgood, Sapienza and Almeida, 1996; McDougall and Oviatt, 1996). Exports make a direct positive contribution to a country's balance of payment position and governments around the world have developed a wide variety of measures for facilitating exports (Welch and Luostarinen, 1993; Korhonen, Luostarinen and Welch, 1996; OECD, 2008b).

Of course, international trade transactions involve not only foreign sales (exports) but also foreign purchases. Foreign purchasing activities have gained somewhat more attention in internationalization research in the past two decades (Luostarinen and Welch, 1990; Korhonen, Luostarinen and Welch, 1996; Liang and Parkhe, 1997; Fletcher, 2001). One reason for this is that foreign purchasing may contribute to improved competitiveness. For example, firms may be able to access cheap or domestically unavailable products and services from abroad, which are needed to secure competitive advantage, drive growth and possibly also spearhead exports (Welch and Luostarinen, 1993).

Many empirical studies have investigated determinants of SME internationalization, especially exports. However, most of these studies have analyzed large firms. Unfortunately, findings for large firms are not necessarily valid for SMEs (Lu and Beamish, 2001, 2006b) — an observation which motivates our analysis of SMEs in the present paper. Likewise, most of the analyses of the internationalization–performance relationship have been conducted for large firms. We briefly consider some of the arguments underlying this relationship, before considering SME studies and then the theoretical contribution we propose relating to this topic.

Conceptually, one may expect both foreign purchases and foreign sales to impact venture performance positively. Exports are a means of expanding the customer base and boosting growth (Lu and Beamish, 2006b). And purchasing inputs from a foreign supplier can be an important strategy for reducing costs and upgrading a firm's products through the import of innovative intermediates, new machinery or advanced technology (Ethier, 1982; Luostarinen and Welch, 1990; Welch and Luostarinen, 1993). In addition, both types of internationalization can be associated with learning in terms

of acquisition of new knowledge and technology (Chuang, 1998; Blalock and Gertler, 2004; Branstetter, 2006; Lu and Beamish, 2006b; OECD, 2006), which may also contribute to improved performance.

Yet relatively limited attention has hitherto been paid to performance implications of SME internationalization strategies, especially across countries. Moreover, work of this kind which has looked at SMEs have tended to focus on single countries (e.g. Majocchi and Zuchella, 2003, for Italy; Lu and Beamish, 2001, 2006a, 2006b, for Japan; and Westhead, Wright and Ucbasaran, 2004, for the UK). These studies have generated mixed results. One reason might be that findings are country-specific. Previous studies have also focused on internationally active firms. Consequently, we cannot know whether the performance of internationally active SMEs differs from the performance of SMEs that do not operate internationally (Westhead, Wright and Ucbasaran, 2001).

In this study we hope to address some of these issues by using a research design which both analyzes cross-country data and analyzes both SMEs which do and do not internationalize. Furthermore, for maximum comprehensiveness we will analyze both sides of international trade transactions by focusing on SME export involvement as well as involvement in foreign supplier relationships. Our focus will be on the following two measures of SME performance: sales growth and employment growth (McDougall and Oviatt, 1996; Wynarczyk and Watson, 2005). Both of these performance measures are well established in the empirical and conceptual literature. We will explore the implications of distinguishing between observed and unobserved relationships as discussed above. In particular, we complement the theoretical prediction, noted above, of a positive *observed* relationship between internationalization and growth *with a negative relationship between their unobserved determinants*.

To see why equations explaining internationalization and growth might have negatively correlated errors, it is first necessary to acknowledge that internationalization is a costly way of achieving growth (Greenaway et al., 2004; Requena-Silvente, 2005). As a result, SMEs with unobserved attributes making them more likely to grow (in employment or sales) have fewer (unob-

served) incentives to internationalize. Yet as noted above, those firms which do actually choose to incur these costs and internationalize are well placed to enjoy growth, for the reasons stated above. This logic is summarized in our first hypothesis:

Hypothesis 1. *The unobserved correlation between internationalization and venture growth is negative, while the observed correlation between internationalization and venture growth is positive.*

Note that Hypothesis 1 relates to growth whether measured in terms of turnover or employment. It is also expected to apply irrespective of the existence of constraints. We turn to a discussion of prominent constraints next.

2.3 Constraints, Internationalization and Performance

If SMEs are constrained in their operation, this may affect both their performance and their probability of being involved in internationalization activities. In this section we will discuss several constraints that SMEs may encounter and speculate about how they may impact internationalization and performance.

Conceptually, one might expect that firms perceiving themselves to be constrained in their operation, either by internal or external problems, would be less likely to grow than firms which are not constrained. However, some studies argue that firms with fewer resources are likely to be more efficient in leveraging them (Starr and MacMillan, 1990; Baker and Nelson, 2005; Katila and Shane, 2005). Hence constraints can in principle be associated with superior performance (George, 2005).

In a similar way, a case can be made for both positive and negative associations between constraints and internationalization. On the one hand, entering international markets is associated with sunk costs (Bernard and Jensen, 1999; Roberts and Tybout, 1997) and it may be particularly challenging for SMEs to overcome such costs (Alvarez, 2004). The ability to internationalize usually requires substantial investments in money and other resources e.g. to

acquire foreign-market information, which may be more difficult and costly to organize for constrained SMEs. Hence it is often proposed that constraints will hinder SMEs in their potential to undertake international activities (McDougall and Oviatt, 1996; Reuber and Fischer, 1997; Coviello and McAuley, 1999; Hollenstein, 2005; Knight and Cavusgil, 2004; Leonidou, 2004) e.g. because constraints inflate liabilities of foreignness (Lu and Beamish, 2001; Mathews and Zander, 2007).

On the other hand, internationalization can be a means for SMEs to access valuable resources (Kuemmerle, 2002); to reduce costs; to deal with a fall in demand in the home market; and to seek growth opportunities (Fan and Phan, 2007). Consequently, SMEs might use internationalization as a strategy to deal with internal or external constraints (Chen and Martin, 2002; Gassmann and Keupp, 2007; Keupp and Gassmann, 2009).

Hence theory does not give clear-cut predictions about the relationship between constraints and internationalization and growth. Unfortunately, only relatively few empirical studies analyze constraints in relation to internationalization and performance (e.g. Westhead, Wright and Ucbasaran, 2002; Beck, Demirg-Kunt and Maksimovic, 2005). Those that have done so usually take as given the intrinsic constrainedness of SMEs as well as the vulnerability of these firms to the external environment (Zacharakis, 1997; Lu and Beamish, 2001; Zhou et al., 2007). The typical empirical strategy used in these studies is not to measure constraints explicitly, but instead to argue that constraints lead to limited access to resources (Bonnacorsi, 1992). These studies therefore include among the set of explanatory variables various internal resource proxies and network relationships as proxies for access to external resources in explaining internationalization and performance of SMEs (Lu and Beamish, 2001; Zhou et al., 2007).

In contrast, our study will adopt a direct approach by measuring SMEs' constraints explicitly. Unlike previous empirical studies which have explored specific export barriers that firms encounter during the internationalization process (see Leonidou, 2004, for an overview), we focus on general constraints confronting SMEs, whether they internationalize or not. It is important to note in this respect that the exact relationship between internationalization

and constraints may depend on the type of constraint and its nature (internal or external). To take account of this point, we will therefore consider not one but three specific types of constraint. One is *internal*, i.e. lack of skilled labor, and the other two are *external*: limited purchasing power of customers, and compliance with regulation. The first two of these constraints are market-induced while the third is government-induced.

Specific hypotheses regarding constraints and performance will be developed in what follows. As with the relationship between internationalization and performance, these hypotheses will be framed in terms of the distinction between observed and unobserved characteristics. Along the way, we will also analyze the determinants of SME constraints.

2.3.1 Purchasing Power Constraints

According to resource dependency theory, firms depend on actors in the external environment, such as suppliers, customers and investors to access and secure resources which are needed to prosper and survive (Pfeffer and Salancik, 1978; Sherer and Lee, 2002). Perhaps most importantly, firms depend on their customers having the funds to purchase their goods and services. SMEs observed to face purchasing power constraints are therefore less likely to grow their *turnover*; but SMEs which possess (unobserved) sales growth opportunities are more likely to be the ones which run into these constraints in the first place. Hence we expect a negative association between purchasing power constraints and observed turnover growth, while this association is positive when framed in terms of unobserved effects.

The impact of purchasing power constraints on *employment* growth is less clear-cut, however. While it is true that purchasing power constraints which reduce turnover growth may also reduce the incentive to hire more workers, SMEs might respond to these constraints in other ways which cancel out this effect. For example, SMEs facing purchasing power constraints may respond by investing in new product development, which requires hiring new workers. As a result, we do not expect a clear-cut relationship between purchasing power constraints and employment growth. Also, there is no a priori reason

to assume that SMEs with high unobserved propensities for employment growth are more or less likely to run into purchasing power constraints.

Hypothesis 2. *The correlation between SMEs' purchasing power constraints and observed turnover growth is negative, whereas the association is positive for unobserved determinants of turnover growth.*

There is also conceptual ambiguity about the direction of the relationship between purchasing power constraints and internationalization. In terms of observed effects, SMEs facing these constraints may lack the means to pursue foreign purchasing possibilities and exporting opportunities. At the same time, however, these constraints could encourage SMEs to internationalize in an effort to overcome them. Hence we do not expect a clear-cut observable relationship between purchasing power constraints and internationalization. Likewise, in terms of unobserved effects, SMEs with (unobserved) attributes making them more likely to face purchasing power constraints could be either more or less likely to internationalize. Hence we lack a firm theoretical basis to propose a testable hypothesis between internationalization and purchasing power constraints.

2.3.2 Skilled Labor Constraints

The resource-based view (Penrose, 1959; Wernerfelt, 1984; Barney, 1991) argues that tangible and intangible resources are key to firms' competitive advantage and performance. One of the most valuable resources is skilled personnel (Covin and Slevin, 1991). However, many SMEs find it hard to attract skilled employees, in part because they tend to offer lower wages and less attractive working conditions than large firms do (Storey, 1994; Brown *et al.*, 1990). A shortage of skilled labor is one of the most pressing constraints cited by SMEs over the world.

To understand the effects of skilled labor shortages on growth, it is helpful as before to distinguish between turnover and employment growth, as well as observed and unobserved relationships between constraints and growth. The first point to note is that skilled labor constraints do not necessarily affect firms' turnover growth, since firms can often substitute labor with other

factors of production, such as capital, to meet consumer demand and grow turnover when labor markets are tight (Varian, 1992). Furthermore, there is no *a priori* reason to assume why firms with (unobserved) opportunities to grow turnover would be more or less likely to encounter skilled labor constraints.

The relationship between labor constraints and employment growth is more clear-cut. SMEs observed to grow their employment are more likely to be labor-intensive and to bump up against skilled labor constraints, implying a positive association between these observable variables. At the same time, SMEs with *unobserved* attributes which make them more likely to face labor constraints are less likely to be able to grow their employment. Hence we have the following hypothesis:

Hypothesis 3. *The correlation between SMEs' unobserved skilled labor constraints and employment growth is negative, whereas there is a positive association between actual skilled labor constraints and SMEs' observed employment growth.*

For similar reasons to those registered earlier, the association between labor shortages and internationalization is theoretically ambiguous. On the one hand, one might expect SMEs actually facing tight skilled labor constraints to seek internationalization as an escape route. On the other hand, such SMEs may (almost by definition) lack the skills and expertise needed to execute this strategy. Consequently, we do not postulate a hypothesis between skilled labor constraints and internationalization. A similar ambiguity attaches to correlated unobservables between skilled labor constraints and internationalization.

2.3.3 Regulatory Constraints

It has long been recognized that institutions, rules and regulations affect organizational behavior (North, 1990; Scott, 1995). In particular, regulatory constraints make operations more costly for firms, reducing production and hence sales turnover. As a result, one would expect SMEs citing regulations as a major constraint to be less likely to exhibit positive turnover growth, all

else equal. This suggests a negative correlation between observed turnover growth and regulatory constraints. On the other hand, SMEs with attributes making them growth-oriented are more likely to bump into these constraints (Brock and Evans, 1986), suggesting a positive unobserved correlation between these variables.

Employment growth on the other hand may be somewhat less sensitive to the existence of regulatory constraints. Many environmental and health-and-safety regulations, of the kind studied in this article, impose fixed compliance costs on firms. Hence firms which grow can reap scale economies in dealing with compliance costs, thereby attenuating the impact of regulations on employment growth (Gurley-Calvez and Bruce, 2008):

Hypothesis 4. *The correlation between SMEs' regulatory constraints and unobserved turnover growth is positive, whereas there is a negative association between regulatory constraints and SMEs' observed turnover growth.*

Regulatory constraints are also likely to be associated with internationalization. SMEs observed to face strict regulatory constraints are less likely to internationalize, all else equal, because compliance with regulations diverts time and monetary resources away from resource-intensive internationalization efforts and into compliance. This suggests a negative correlation between observed internationalization and regulatory constraints. At the same time, SMEs with unobserved attributes predisposing them to seek broader opportunities via internationalization are more likely to bump into these constraints in the first place, since internationalization exposes a company to regulations in more than one country. This suggests a positive unobserved correlation between these variables. These predictions are summarized in our final hypothesis:

Hypothesis 5. *The correlation between SMEs' regulatory constraints and unobserved internationalization propensities is positive, whereas there is a negative association between regulatory constraints and SMEs' observed internationalization propensities.*

3 The data

3.1 The data set

Our empirical investigation exploits a sample of 7,673 SMEs distributed across 18 European countries. Telephone interviews were conducted with managers of these SMEs (ENSR Enterprise Survey 2003). These interviews were held in 2003 by the Dutch market research firm IntomartGfK as part of the Observatory of European SMEs, a research project conducted on behalf of the European Commission. SMEs are defined as firms with up to 250 employees. The total sample contains data on SMEs located in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. The survey used a disproportionate stratified sample by country, sector and size class. To let the data reflect the structure of the European SME sector, i.e. to make them representative, they are weighted using the stratification dimensions.

3.2 Variables

3.2.1 Dependent variables

In the following, three distinct sets of variables are analyzed: performance, P ; internationalization, I ; and constraints, C . Each is considered in turn.

Firm performance is measured in two ways: whether ventures grew in sales turnover or in employment. That these measures capture different dimensions of the growth process is evident from the fact that 38% of the firms in our sample reported an increase in turnover in 2002, while only 18% experienced an increase in employment growth. Because of different definitions of full- and part-time workers across countries, and the possibility that turnover data were not accurately reported, binary indicator variables were used to record whether employment and turnover growth was registered in the previous year:

- P_1 : Whether turnover of the enterprise grew between 2001 and 2002

- P_2 : Whether employment of the enterprise grew between 2001 and 2002

As noted earlier, exporting and having a foreign supplier are two prominent internationalization strategies used by SMEs. 18% of the SMEs in our sample exported in 2002 while 30% had a foreign supplier. The fact that our data reveal foreign purchasing to be a more common internationalization strategy for SMEs than exporting demonstrates the practical importance of using this measure in our study. We specify the following binary variables of internationalization, which are widely used in the literature (Bonaccorsi, 1992; Westhead, Wright and Ucbasaran, 2001):

- I_1 : Whether the enterprise had any exports in 2002
- I_2 : Whether the enterprise had a foreign supplier in 2002

In terms of constraints, respondents had to declare what had been the major constraint on their business performance over the previous two years. Purchasing power of customers is the modal constraint cited by survey respondents, with 37% of SME respondents declaring it to be the most important constraint, compared with the next highest responses of 15% for lack of skilled labor, and 9% for complying with administrative regulations. Thus we have the following binary dependent variables:

- C_1 : Whether the purchasing power of customers was the most binding constraint facing the enterprise over 2001–02
- C_2 : Whether lack of skilled labor was the most binding constraint facing the enterprise over 2001–02
- C_3 : Whether administrative regulations (on environment, health and safety) were the most binding constraint facing the enterprise over 2001–02

3.2.2 Independent variables

We utilize a range of controls as independent variables, including the two most commonly used in previous work on internationalization: firm age and

firm size. Age may be considered as a proxy for accumulated experience (Basile, Giunta and Nugent, 2003) while size is often used as a proxy for a firm’s resources (Westhead, Wright and Ucbasaran, 2001; Coeurderoy and Murray, 2008). Age is measured as the number of years the enterprise was in operation prior to 2003; size is measured as the logarithm of the number of employees in 2001. Previous research suggests that younger and smaller firms grow more rapidly on average than their older and larger counterparts (Steffens, Davidsson and Fitzsimmons, 2009). On the other hand, younger and smaller firms have been found to be less likely to internationalize, all else equal (Cavusgil and Nevin, 1981; Miesenbock, 1988; Bonaccorsi, 1992; Chetty and Hamilton, 1993; Lefebvre and Lefebvre, 2002). Furthermore, younger and smaller firms face liabilities of newness and smallness and may therefore be more susceptible to constraints than established and larger firms (Beck, Demirg-Kunt and Maksimovic, 2005).

We also control for the legal form of the companies in our sample. Previous studies have suggested that ownership and governance structures can influence internationalization efforts (George, Wiklund and Zahra, 2005; Zahra, Neubaum and Naldi, 2007) and firm performance (Fernandez and Nieto, 2006), e.g. because they affect firm objectives and willingness to take risks (Fischer and Reuber, 2008). Consequently ownership structures may also affect whether firms encounter constraints or not. Legal form is measured using two dummy variables: whether the SME is a private limited company (51% of the SMEs in our sample were) or a publicly-traded limited company (10% of the SMEs in our sample were). All other organizational forms, which are chiefly sole proprietorship or partnership, are treated as base categories.

A prominent theme in the internationalization literature is the exploitation of opportunities. We might expect opportunities to be more abundant when trading conditions are favorable. To capture this, we also control for the state of general trading conditions. Respondents were asked about how they would consider the current economic situation in the market for their products or services. A dummy variable records whether economic conditions were felt to be favorable (‘good’ or ‘very good’) or not. 28% of the SMEs in our sample reported facing favorable economic conditions.

Some SMEs engage in formal and/or informal co-operation with other SMEs. Cooperation with other firms can be an important strategy for SMEs to access, combine and create resources and to enhance knowledge and hence can contribute to improved competitiveness and performance (Madhok, 1997; Gassmann and Keupp, 2007; Street and Cameron, 2007). Participation in networks can also facilitate and accelerate internationalization of SMEs (Coviello and Munro, 1994; Zacharakis, 1997; Johanson en Vahlne, 2003; Jones en Coviello, 2005; Zhou, Wu and Luo, 2007; Fernhaber, Gilbert and McDougall, 2008). Previous studies which investigated SME internationalization have mainly emphasized formal ties (Zhou, Wu and Luo, 2007). However, informal ties may be of great importance for SMEs since they may limit the loss of independence while still offering benefits of accessing partner resources (Wright, Westhead and Ucbasaran, 2007). Overall, cooperation strategies may be of great relevance for SMEs as they are more dependent on others for their resources as compared to larger firms. Networks can help SMEs to overcome constraints such as lack of resources (Tolstoy, 2009). Two dummy variables were coded to take values of one if respondents engaged in formal or informal collaboration with other SMEs, respectively, and zero otherwise. In our sample, informal cooperation was more common (reported by 38% of cases) than formal cooperation (reported by 25% of cases).

Finally, we also control for exogenous variation across industries and countries. Industry dummies were coded for manufacturing, construction, wholesale trade, retail trade, business services and personal services. The base category was transport and communications. The country dummies measure the effects of SMEs being located in particular countries, over and above the effects of the other endogenous and exogenous variables. Italy is used as the reference category. They can be thought of as capturing hard-to-measure country-specific, institutional and/or cultural factors.

The next table presents the descriptive statistics of our variables.

Correlation coefficients for the endogenous variables are presented in Table 2. The two measures for internationalization are significantly positively correlated, as are the two measures for performance. The constraint variables are also correlated. However, as our empirical strategy is to use only

Table 1: Descriptive statistics

Variables	mean	s.d.	N
C_1	0.37	0.48	7610
C_2	0.13	0.34	7610
C_3	0.09	0.29	7610
I_1	0.18	0.39	7641
I_2	0.30	0.46	7632
P_1	0.38	0.49	7484
P_2	0.18	0.39	7634
Privately-owned	0.51	0.50	7673
Publicly-owned	0.10	0.30	7673
Age	20.66	22.60	7647
Size	1.68	0.67	7637
Good environment	0.28	0.45	7673
Formal collaboration	0.25	0.43	7604
Informal collaboration	0.38	0.49	7574
Manufacturing	0.11	0.31	7673
Construction	0.13	0.34	7673
Wholesale trade	0.08	0.26	7673
Retail trade	0.20	0.40	7673
Business services	0.22	0.41	7673
Personal services	0.21	0.41	7673
Transport	0.06	0.23	7673
Austria	0.01	0.10	7673
Belgium	0.03	0.16	7673
Denmark	0.009	0.09	7673
Finland	0.01	0.10	7673
France	0.12	0.33	7673
Germany	0.17	0.38	7673
Greece	0.04	0.19	7673
Iceland	0.001	0.04	7673
Ireland	0.005	0.07	7673
Italy	0.20	0.40	7673
Luxembourg	0.001	0.03	7673
Netherlands	0.03	0.16	7673
Norway	0.009	0.09	7673
Portugal	0.03	0.18	7673
Spain	0.13	0.34	7673
Sweden	0.01	0.11	7673
Switzerland	0.02	0.12	7673
UK	0.17	0.38	7673

Notes: Mean and standard deviations are based on weighted data.

Table 2: Correlation matrix (tetrachoric correlation coefficients)

	C_1	C_2	C_3	I_1	I_2	P_1	P_2
C_1	1.000						
C_2	-	1.000					
C_3	-	-	1.000				
I_1	0.054**	-0.119***	0.090***	1.000			
I_2	0.114***	-0.136***	0.057**	0.562***	1.000		
P_1	-0.285***	0.166***	0.105***	-0.015	0.035*	1.000	
P_2	-0.103***	0.131***	0.140***	0.101***	0.122***	0.349***	1.000

Notes: ***: p -value less than 0.01; **: p -value less than 0.05; *: p -value less than 0.10. All correlations use weighted data.

one measure of C , I and P at a time, there can be no adverse statistical consequences. The less than unit correlations merely indicate the different information being captured by the various measures.

Although Table 2 contains only simple partial correlations, it is still useful to quickly check whether they offer any support for the hypotheses of interest. Of course, this can only be gauged for the ‘observable’ component of these hypotheses. Recall that Hypothesis 1 proposed a positive observed correlation between internationalization and performance. Two of the three correlations in Table 2 are positive and significant, bearing out the hypothesis; the other one is negative but statistically insignificant. Table 2 also reports a significant negative association between purchasing power constraints and turnover growth, as well as a significant positive association between skilled labor constraints and employment growth. These findings are in accordance with Hypotheses 2 and 3, respectively. However, the observable correlations in Table 2 between regulatory constraints and each of turnover growth and internationalization are inconsistent with Hypotheses 4 and 5. Of course, these are only partial correlations: multivariate analysis is needed to perform reliable tests of these hypotheses owing to the possible role played by correlated unobservables.

4 Empirical model and estimation

Our goal is to model the relationship between growth performance, internationalization and constraints. As noted above, all of these variables take binary values. The five hypotheses derived in Section 2 can all be tested by estimating the following three-equation recursive econometric model. In the first equation, the constraints are explained by a set of control variables. These constraints are then used in conjunction with the control variables in the second equation to explain internationalization and performance outcomes. Finally, the latter two endogenous variables are also related to each other as well as to the constraints and the control variables in the third equation. Formally, the model can be written as:

$$C = \mathbf{X}\alpha_C + u_1 \quad (1)$$

$$I = C\beta + \mathbf{X}\alpha_I + u_2 \quad (2)$$

$$P = C\gamma + I\delta + \mathbf{X}\alpha_P + u_3. \quad (3)$$

Here \mathbf{X} is a vector of control variables described in the previous section (including an intercept); the α s, β , γ and δ are parameters to be estimated. Following standard practice (e.g., Greene, 2003), $\mathbf{u} = (u_1, u_2, u_3)$ is taken to be a vector of mean-zero Gaussian disturbances with variance-covariance matrix

$$\Omega = \text{cov}(\mathbf{u}) = \begin{pmatrix} 1 & \rho_{CI} & \rho_{CP} \\ & 1 & \rho_{IP} \\ & & 1 \end{pmatrix} \quad (4)$$

This matrix specifies cross-equation correlations which capture unobserved attributes of firms that are related across equations (Shaver, 2005). For example, to fix ideas, Hypothesis 5 predicts a negative value of $\rho_{C_3, I}$. This implies that SMEs with unobserved attributes making them more prone to constraint C_3 also make them less likely to internationalize. As noted earlier, it is essential to take account of correlated unobservables if the relationships between constraints, internationalization and performance are to be

estimated accurately.

The specification (1) through (4) is a multivariate probit model. It has been identified by fixing the diagonal elements of (4) at unity. Index each equation (1) through (3) by m (where $m = 1, 2, 3$) and rename each dependent variable in these equations as y_{im} , where $\mathbf{y}_i = (y_{i1} \ y_{i2} \ y_{i3})$. Further, define the 3×3 data matrix \mathbf{W}_i as $\mathbf{W}_i := \text{diag}(2y_{im} - 1)$, and write $\Theta := (\alpha_C \ \alpha_I \ \alpha_P \ \beta \ \gamma \ \delta)$. Using hats to denote parameter estimates, and indexing sample observations by $i = 1, \dots, N$, the Full Information Maximum Likelihood, or FIML (Greene, 2003), estimator is defined as

$$\max_{\hat{\Theta}, \hat{\Omega}} \ln L(\mathbf{y}|\mathbf{X}; \hat{\Theta}, \hat{\Omega}) = \max_{\hat{\Theta}, \hat{\Omega}} \sum_{i=1}^N \Phi_3 \left(\mathbf{W}_i \mathbf{X}_i \hat{\beta}_C, \mathbf{W}_i (\mathbf{X}_i \hat{\beta}_I + C_i \hat{\gamma}_I), \right. \\ \left. \mathbf{W}_i (\mathbf{X}_i \hat{\beta}_P + C_i \hat{\gamma}_P + I_i \hat{\delta}), \mathbf{W}_i \hat{\Omega} \mathbf{W}_i \right), \quad (5)$$

where

$$\Phi_3 \left(a_i, b_i, c_i, \mathbf{W}_i \hat{\Omega} \mathbf{W}_i \right) = \frac{1}{2\pi |\mathbf{W}_i \hat{\Omega} \mathbf{W}_i|^{1/2}} \int_{-\infty}^{a_i} \int_{-\infty}^{b_i} \int_{-\infty}^{c_i} \exp \left\{ -\frac{1}{2} \mathbf{u} (\mathbf{W}_i \hat{\Omega} \mathbf{W}_i)^{-1} \mathbf{u}' \right\} d\mathbf{u}$$

is the trivariate normal cumulative distribution function. All estimations (i.e., numerical optimizations of (5)) were performed using LIMDEP 9.0. No serious problems of collinearity were identified by the estimation procedure.

5 Results

This section presents a series of results for each of the three constraints described above, for each measure of internationalization and performance. The first subsection analyzes customer purchasing power constraints: this is followed by discussion of the lack of skilled labor and regulatory compliance constraints. Each subsection summarizes estimates of the model parameters Θ and Ω in a set of tables. For ease of reference, the estimates are partitioned into two subvectors: the ‘Main effects’ comprising β , γ , δ and ρ estimates; and the ‘Control variable effects’, comprising the α estimates attached to the control variables [see (1) through (3)].

5.1 Customer purchasing power constraints

Tables 3 and 4 summarize the results of estimating the model using the customer purchasing power constraint $C = C_1$. Table 3 presents estimates of the model for the export measure of internationalization, I_1 , while Table 4 presents estimates for the foreign supplier measure of internationalization, I_2 .

Hypothesis 1 predicted $\delta > 0$ and $\rho_{I_1, P} < 0$ for both measures of P . In broad accordance with Hypothesis 1, each of the δ estimates in the two tables are positive and all but one of them (the case of export and turnover growth) is statistically significant, while each of the $\rho_{I_1, P} < 0$ estimates is negative and all but one of them are significant. This is consistent with a situation where ventures with favorable unobserved growth prospects have weaker incentives to follow a costly internationalization strategy; but those ventures which do actually internationalize (perhaps because they would otherwise possess poor organic growth prospects) end up realizing strong employment and turnover growth.

Hypothesis 2 predicted $\gamma < 0$ and $\rho_{C_1, P_1} > 0$ (recall that this prediction applies only to turnover growth). Hypothesis 2 receives strong support when internationalization is measured as export propensities (Table 3). It receives slightly weaker support when it is measured as having a foreign supplier (Table 4) since ρ_{C_1, P_1} , while ‘correctly’ signed, is not statistically significant. Overall, though, the results imply that SMEs with favorable unobserved growth prospects are more likely to exhaust them (and so run into the constraint of limited customer purchasing power); but the ventures for which this constraint binds end up realizing lower rates of turnover growth.

Turning next to the influence of the control variables, the estimates of the two C_1 constraint equations are very similar in all four of the specifications reported in Tables 3 and 4. Larger SMEs are significantly less likely to face customer purchasing power constraints, possibly because they are established in thicker and more lucrative markets compared with smaller ventures. Bearing out this logic, SMEs facing more favorable economic conditions are also significantly less likely to face purchasing power constraints. Perhaps surpris-

Table 3: Results for customer purchasing power constraints, C_1 , and exporting, I_1

	Turnover growth			Employment growth		
Variables	C_1	I_1	P_1	C_1	I_1	P_2
<i>Main effects</i>						
$(\beta \quad \gamma)$		−0.07 (0.30)	−1.36*** (0.15)		−0.56 (0.37)	0.34 (0.32)
δ			0.26 (0.20)			0.68*** (0.21)
$(\rho_{C_1, I_1} \quad \rho_{C_1, P})$		0.06 (0.19)	0.66*** (0.11)		0.37 (0.23)	−0.27 (0.19)
$\rho_{I_1, P}$			−0.11 (0.15)			−0.34*** (0.12)
<i>Control variable effects</i>						
Constant	−0.43*** (0.09)	−1.65*** (0.16)	−0.09 (0.12)	−0.46*** (0.09)	−1.40*** (0.23)	0.82*** (0.12)
Privately-owned	0.02 (0.04)	0.35*** (0.04)	−0.03 (0.04)	0.05 (0.04)	0.37*** (0.04)	0.11** (0.04)
Publicly-owned	−0.03 (0.07)	0.52*** (0.08)	−0.06 (0.07)	−0.03 (0.07)	0.51*** (0.08)	0.11 (0.08)
Age	0.12* (0.07)	0.06 (0.08)	−0.41*** (0.08)	0.13* (0.07)	0.08 (0.08)	−0.66*** (0.07)
Size	−0.10*** (0.03)	0.19*** (0.03)	0.04 (0.03)	−0.11*** (0.03)	0.16*** (0.04)	−0.12*** (0.03)
Good environment	−0.46*** (0.04)	0.08 (0.07)	0.27*** (0.06)	−0.45*** (0.04)	−0.01 (0.08)	0.28*** (0.05)
Formal collaboration	0.07** (0.04)	0.11** (0.04)	0.08** (0.03)	0.07** (0.04)	0.11*** (0.04)	0.07 (0.04)
Informal collaboration	0.01 (0.03)	0.34*** (0.04)	0.03 (0.03)	0.00 (0.03)	0.32*** (0.04)	0.07* (0.04)
Industry dummies	Yes			Yes		
Country dummies	Yes			Yes		
N	7266			7418		
$-LL$	11951.40			10966.82		

Notes: Standard errors are in parentheses. ***: p -value less than 0.01; **: p -value less than 0.05; *: p -value less than 0.10. All specifications use weighted data. LL is the maximized value of the log likelihood function (5). Estimation method: FIML.

Table 4: Results for customer purchasing power constraints, C_1 , and having a foreign supplier, I_2

	Turnover growth			Employment growth		
Variables	C_1	I_2	P_1	C_1	I_2	P_2
<i>Main effects</i>						
$(\beta \quad \gamma)$		0.12 (0.37)	−0.65** (0.33)		−0.59** (0.27)	0.75*** (0.19)
δ			0.69*** (0.24)			0.49** (0.24)
$(\rho_{C_1, I_2} \quad \rho_{C_1, P})$		0.02 (0.23)	0.17 (0.20)		0.46*** (0.16)	−0.52*** (0.11)
$\rho_{I_2, P}$			−0.35** (0.15)			−0.31** (0.15)
<i>Control variable effects</i>						
Constant	−0.43*** (0.09)	−1.48*** (0.16)	−0.41*** (0.15)	−0.45*** (0.09)	−1.13*** (0.18)	0.93*** (0.10)
Privately-owned	0.03 (0.04)	0.23*** (0.04)	−0.06 (0.04)	0.06 (0.04)	0.23*** (0.04)	0.12*** (0.04)
Publicly-owned	−0.02 (0.07)	0.48*** (0.07)	−0.14* (0.07)	0.01 (0.07)	0.43*** (0.07)	0.11 (0.08)
Age	0.14** (0.07)	−0.01 (0.08)	−0.48*** (0.07)	0.13* (0.07)	0.01 (0.08)	−0.76*** (0.07)
Size	−0.11*** (0.03)	0.08*** (0.03)	0.07** (0.03)	−0.11*** (0.03)	0.04 (0.03)	−0.07*** (0.03)
Good environment	−0.46*** (0.04)	0.11 (0.07)	0.42*** (0.07)	−0.44*** (0.04)	−0.02 (0.06)	0.32*** (0.04)
Formal collaboration	0.07* (0.04)	0.17*** (0.04)	0.03 (0.04)	0.06* (0.04)	0.17*** (0.04)	0.04 (0.04)
Informal collaboration	0.01 (0.03)	0.29*** (0.04)	−0.00 (0.04)	0.01 (0.03)	0.27*** (0.04)	0.07* (0.04)
Industry dummies	Yes			Yes		
Country dummies	Yes			Yes		
N	7258			7409		
$-LL$	12915.65			11979.52		

Notes: See Table 1.

ingly, though, SMEs with formal collaborations with other SMEs are *more* likely than average to face purchasing power constraints. It is unclear why this is so, but one possibility is that formal linkages are a creative response to being demand-constrained.²

The determinants of export-oriented internationalization in Table 3 do not depend on which measure of growth is used. In both I_1 equations, larger and privately- or publicly-owned SMEs (as opposed to sole proprietorships or partnerships) are significantly more likely to be engaged in export activity. Interestingly, both formal and informal collaborations promote internationalization via exporting, but informal linkages are some three times more effective in this respect than formal ones. This finding raises intriguing questions about the role of informality in internationalization. It turns out to be robust to the use of alternative constraints, as can be seen by scanning Tables 5 through 8 below.

Turning to the (unreported) industry and country dummies, SMEs within manufacturing and wholesaling are significantly more likely to export than the average. Perhaps unsurprisingly, given the pronounced ‘non-tradable’ element of their businesses, SMEs in construction, retail and personal service sectors are significantly less likely to export. Regarding location, SMEs which are most likely to export (in terms of statistical significance and effect size) are disproportionately found in the ‘northern European’ countries of Austria, Denmark and Germany. The SMEs which are least likely to export are disproportionately found in the ‘southern European’ countries of Greece, France and Spain.

Table 4 shows that the significant determinants of internationalization when measured in terms of having a foreign supplier are very similar to those obtained for export-oriented internationalization. In particular, we note that how internationalization is measured makes comparatively little

²In terms of industry and country differences (not reported in the tables for the sake of space), SMEs operating in the wholesale and retail trade sectors face the steepest customer purchasing power constraints, followed by manufacturing. In terms of country effects, the states in which purchasing power constraints bind the most are Switzerland, Germany and Portugal, in that order. The states where purchasing power constraints bind the least are Spain and the Netherlands.

difference for understanding how it is related to demand constraints and growth performance.

Finally, columns P_1 of Tables 3 and 4 identify determinants of turnover growth performance. SMEs exhibiting turnover growth tend to be young and trade in favorable economic conditions. Enterprises operating within the wholesale, retail or personal service sectors are also more likely to grow their turnover. Greece, followed by France and then the UK, are the countries with the SMEs which are most likely to grow their turnover, all else equal. Interestingly, the determinants of P_2 (in Tables 3 and 4) differ in several ways from those of P_1 . For example, younger, smaller and privately-owned SMEs are especially likely to exhibit growth in employment (but not turnover). In addition, *informal* collaborations with other SMEs promote employment growth (whereas *formal* collaborations sometimes promote turnover growth). Industry effects are less pronounced for P_2 than P_1 while the country effects are similar for both performance measures (not reported for brevity).

5.2 Skilled labor constraints

Tables 5 and 6 summarize the results of estimating the model using the skilled labor constraint $C = C_2$.

Hypothesis 3 predicted $\gamma > 0$ and $\rho_{C_2, P_2} < 0$ (recall that this prediction applies only to employment growth). Hypothesis 3 receives strong support when internationalization is measured as export propensities (Table 5). It receives slightly weaker support when it is measured as having a foreign supplier since ρ_{C_2, P_2} , while ‘correctly’ signed, is not statistically significant in Table 6. Overall, it appears that SMEs with unobserved attributes making them less likely to face skilled labor shortages are more likely to experience employment growth, while SMEs which actually grow employment are more likely to bump up against this constraint. In contrast, skilled labor constraints are not significantly associated with turnover growth.

Estimates of the other main effects reveal that internationalization is significantly positively associated with observed employment (but not turnover) growth. This set of results provides weaker support for Hypothesis 1, com-

Table 5: Results for skilled labor constraints, C_2 , and exporting, I_1

	Turnover growth			Employment growth		
Variables	C_2	I_1	P_1	C_2	I_1	P_2
<i>Main effects</i>						
$(\beta \quad \gamma)$		−0.05 (0.29)	−0.31 (0.27)		−0.45 (0.29)	0.78*** (0.24)
δ			−0.09 (0.24)			0.65*** (0.22)
$(\rho_{C_2, I_1} \quad \rho_{C_2, P})$		−0.08 (0.15)	0.26 (0.15)		0.14 (0.16)	−0.28** (0.12)
$\rho_{I_1, P}$			0.05 (0.14)			−0.28** (0.12)
<i>Control variable effects</i>						
Constant	−2.02*** (0.13)	−1.67*** (0.10)	−0.64*** (0.09)	−2.01*** (0.13)	−1.66*** (0.10)	−0.69*** (0.09)
Privately-owned	−0.12** (0.05)	0.34*** (0.05)	−0.03 (0.04)	−0.12** (0.05)	0.36*** (0.05)	0.15** (0.04)
Publicly-owned	−0.29*** (0.08)	0.51*** (0.08)	−0.04 (0.08)	−0.31*** (0.08)	0.50*** (0.08)	0.17** (0.08)
Age	−0.35*** (0.10)	0.04 (0.08)	−0.58*** (0.07)	−0.37*** (0.10)	0.02 (0.09)	−0.60*** (0.07)
Size	0.30*** (0.03)	0.19*** (0.03)	0.14*** (0.03)	0.31*** (0.03)	0.22*** (0.03)	−0.18*** (0.03)
Good environment	0.32*** (0.04)	0.10** (0.05)	0.57*** (0.04)	0.32*** (0.04)	0.12** (0.05)	0.18*** (0.04)
Formal collaboration	−0.02 (0.05)	0.11** (0.04)	0.06* (0.04)	−0.02 (0.05)	0.10*** (0.04)	0.08** (0.04)
Informal collaboration	0.07* (0.04)	0.34*** (0.04)	0.07* (0.04)	0.08* (0.04)	0.34*** (0.04)	0.06 (0.04)
Industry dummies	Yes			Yes		
Country dummies	Yes			Yes		
N	7266			7418		
$-LL$	10091.42			8982.38		

Notes: See notes to Table 3.

Table 6: Results for skilled labor constraints, C_2 , and having a foreign supplier, I_2

	Turnover growth			Employment growth		
Variables	C_2	I_2	P_1	C_2	I_2	P_2
<i>Main effects</i>						
$(\beta \quad \gamma)$		0.51** (0.25)	−0.06 (0.25)		0.19 (0.26)	0.60** (0.26)
δ			0.18 (0.30)			0.54* (0.29)
$(\rho_{C_2, I_2} \quad \rho_{C_2, P})$		−0.38*** (0.12)	0.13 (0.14)		−0.21 (0.13)	−0.18 (0.14)
$\rho_{I_2, P}$			−0.07 (0.18)			−0.19 (0.17)
<i>Control variable effects</i>						
Constant	−2.01*** (0.13)	−1.39*** (0.10)	−0.64*** (0.09)	−2.02*** (0.13)	−1.40*** (0.09)	−0.72*** (0.10)
Privately-owned	−0.13*** (0.05)	0.24*** (0.04)	−0.04 (0.04)	−0.13*** (0.05)	0.24*** (0.04)	0.16*** (0.05)
Publicly-owned	−0.30*** (0.08)	0.49*** (0.07)	−0.06 (0.08)	−0.31*** (0.08)	0.47*** (0.07)	0.16* (0.09)
Age	−0.33*** (0.10)	0.03 (0.07)	−0.54*** (0.07)	−0.35*** (0.10)	−0.01 (0.08)	−0.63*** (0.08)
Size	0.31*** (0.03)	0.05 (0.03)	0.12*** (0.03)	0.32*** (0.03)	0.06** (0.03)	−0.15*** (0.03)
Good environment	0.32*** (0.04)	0.06 (0.04)	0.55*** (0.04)	0.32*** (0.04)	0.07* (0.04)	0.19*** (0.04)
Formal collaboration	−0.03 (0.05)	0.17*** (0.04)	0.05 (0.04)	−0.02 (0.05)	0.17*** (0.04)	0.07 (0.04)
Informal collaboration	0.08* (0.04)	0.28*** (0.04)	0.04 (0.04)	0.08** (0.04)	0.28*** (0.04)	0.06 (0.05)
Industry dummies	Yes			Yes		
Country dummies	Yes			Yes		
N	7258			7409		
$-LL$	11049.52			9998.01		

Notes: See notes to Table 3.

pared with those reported in Tables 3 and 4, where a different constraint was analyzed.

Turning next to the influence of the control variables, the determinants of labor constraints in Tables 5 and 6 appear to differ markedly from the determinants of customer purchasing power constraints in Tables 3 and 4. Labor constraints relate to a scarcity of factor input, while purchasing power constraints relate to a scarcity of output — so this difference should probably not be too surprising. Young firms, which are more likely to (aim for) grow(th), as well as large firms are significantly more likely to face skilled labor shortages than older and smaller ones. Furthermore firms operating in a benign trading environment also more often encounter such constraints, which may reflect the fact that skilled workers may have many alternative employment options when economic conditions are favorable. Also SMEs possessing networks of informal collaborations with other SMEs are significantly more likely to face skilled labor shortage constraints than the average. However, privately held or publicly traded SMEs are less likely to face these constraints than their sole proprietor or partnership counterparts.³

5.3 Regulatory constraints

Tables 7 and 8 summarize the results of estimating the model using the regulatory constraint $C = C_3$.

Hypothesis 4 predicted $\gamma < 0$ and $\rho_{C_3, P_1} > 0$ (recall that this prediction applies only to turnover growth). While the estimates of these parameters presented in the first columns of Tables 7 and 8 take the predicted signs, they usually fail to attain statistical significance. Hence overall Hypothesis 4 receives little support. In contrast to lobbying by established business interests, it is interesting that we cannot establish a strong link between regulatory constraints and growth in our sample.

³In terms of industry and country differences (not reported in the tables for the sake of space), SMEs operating in the construction and manufacturing most often encounter skilled labor constraints, followed by business services and personal services. In terms of country effects, the states in which skilled labor constraints bind the most are Belgium, France, Portugal and Spain, in that order. The states where skilled labor constraints bind the least are Germany and Greece.

Table 7: Results for regulatory constraints, C_3 , and exporting, I_1

	Turnover growth			Employment growth		
Variables	C_3	I_1	P_1	C_3	I_1	P_2
<i>Main effects</i>						
$(\beta \quad \gamma)$		-1.55^{***} (0.09)	-0.33 (0.25)		0.30 (0.35)	0.22 (0.32)
δ			-0.47^{**} (0.20)			0.67^{***} (0.23)
$(\rho_{C_3, I_1} \quad \rho_{C_3, P})$		0.81^{***} (0.06)	0.30^{**} (0.12)		-0.24 (0.17)	-0.05 (0.16)
$\rho_{I_1, P}$			0.33^{***} (0.13)			-0.28^{**} (0.12)
<i>Control variable effects</i>						
Constant	-1.49^{***} (0.12)	-1.35^{***} (0.10)	-0.58^{***} (0.09)	-1.54^{***} (0.13)	-1.65^{***} (0.10)	-0.74^{***} (0.09)
Privately-owned	-0.17^{***} (0.05)	0.19^{***} (0.05)	-0.01 (0.04)	-0.18^{***} (0.05)	0.37^{***} (0.04)	0.13^{***} (0.04)
Publicly-owned	-0.12 (0.10)	0.37^{***} (0.08)	0.02 (0.07)	-0.12 (0.11)	0.53^{***} (0.08)	0.12 (0.08)
Age	0.18^* (0.10)	0.13 (0.08)	-0.52^{***} (0.07)	0.23^{**} (0.09)	0.04 (0.09)	-0.67^{***} (0.07)
Size	0.13^{***} (0.04)	0.21^{***} (0.03)	0.15^{***} (0.03)	0.15^{***} (0.03)	0.18^{***} (0.03)	-0.13^{***} (0.03)
Good environment	0.02 (0.05)	0.09^{**} (0.04)	0.55^{***} (0.04)	0.02 (0.05)	0.09^{**} (0.04)	0.23^{***} (0.04)
Formal collaboration	0.04 (0.05)	0.11^{***} (0.04)	0.08^{**} (0.04)	0.04 (0.05)	0.10^{**} (0.04)	0.08^{**} (0.04)
Informal collaboration	0.10^{**} (0.04)	0.32^{***} (0.04)	0.10^{**} (0.04)	0.08^* (0.05)	0.32^{***} (0.04)	0.07^* (0.04)
Industry dummies	Yes			Yes		
Country dummies	Yes			Yes		
N	7266			7418		
$-LL$	9562.64			8483.15		

Notes: See notes to Table 3.

Table 8: Results for regulatory constraints, C_3 , and having a foreign supplier, I_2

	Turnover growth			Employment growth		
Variables	C_3	I_2	P_1	C_3	I_2	P_2
<i>Main effects</i>						
$(\beta \quad \gamma)$		−0.45 (0.29)	−0.07 (0.30)		−1.12*** (0.18)	0.14 (0.27)
δ			0.63** (0.25)			0.84*** (0.22)
$(\rho_{C_3, I_2} \quad \rho_{C_3, P})$		0.22 (0.15)	0.18 (0.16)		0.60*** (0.10)	−0.02 (0.14)
$\rho_{I_2, P}$			−0.31** (0.15)			−0.36*** (0.14)
<i>Control variable effects</i>						
Constant	−1.50*** (0.13)	−1.40*** (0.10)	−0.63*** (0.09)	−1.51*** (0.13)	−1.27*** (0.10)	−0.74*** (0.09)
Privately-owned	−0.16*** (0.05)	0.22*** (0.04)	−0.07* (0.04)	−0.19*** (0.05)	0.17*** (0.04)	0.12*** (0.04)
Publicly-owned	−0.11 (0.11)	0.46*** (0.07)	−0.13* (0.07)	−0.13 (0.10)	0.40*** (0.07)	0.07 (0.08)
Age	0.24** (0.10)	0.02 (0.08)	−0.52*** (0.07)	0.25** (0.10)	0.04 (0.08)	−0.65*** (0.07)
Size	0.14*** (0.04)	0.09*** (0.03)	0.10*** (0.03)	0.15*** (0.04)	0.10*** (0.03)	−0.12*** (0.03)
Good environment	0.03 (0.05)	0.10** (0.04)	0.52*** (0.04)	0.05 (0.05)	0.08** (0.04)	0.22*** (0.04)
Formal collaboration	0.04 (0.05)	0.18*** (0.04)	0.02 (0.04)	0.04 (0.05)	0.17*** (0.04)	0.05 (0.04)
Informal collaboration	0.10** (0.05)	0.30*** (0.04)	0.00 (0.04)	0.10** (0.05)	0.28*** (0.03)	0.04 (0.04)
Industry dummies	Yes			Yes		
Country dummies	Yes			Yes		
N	7258			7409		
$-LL$	10546.97			9509.89		

Notes: See notes to Table 3.

Regulatory constraints appear to have stronger associations with internationalization efforts. Recall in this regard that Hypothesis 5 predicted $\beta < 0$ and $\rho_{C_3,I} > 0$, for both measures of internationalization. The two statistically significant results in Tables 7 and 8 are in accordance with these predictions, supporting Hypothesis 5; the other two sets of parameter estimates are insignificant. Thus SMEs with unobserved attributes making them more likely to face regulatory constraints are more likely to internationalize, while these constraints in practice are associated with lower levels of internationalization. Thus against the backdrop of growing concern about over-regulation of business in the EU, this finding furnishes another reason for being concerned about business regulations: they may reduce the likelihood that European SMEs export their goods and services.

As before, the results in these tables provide partial rather than overwhelming support for Hypothesis 1, which predicted positive observed and negative unobserved correlations between internationalization and growth. In three of the four cases the estimates in Tables 7 and 8 carry the predicted signs and are statistically significant. Taking the results in Tables 3–8 as a whole, most of the parameter estimates are consistent with Hypothesis 1, i.e. implying a positive relationship between internationalization and growth in terms of observable correlations, and a negative relationship in terms of unobservable correlations.

Returning to Tables 7 and 8, the parameter estimates corresponding to the control variables suggest that younger SMEs which collaborate with other SMEs and operate in good trading environments are significantly more likely to grow in terms of employment and turnover. But whereas larger SMEs are more likely to grow in turnover terms, smaller SMEs are more likely to grow in employment terms. The SMEs which are the most likely to run into regulatory constraints in the first place are older and larger, and more likely to be engaged in informal collaborations with other SMEs. Privately-owned SMEs are significantly less likely to run into these constraints. The significant determinants of internationalization which appear in Tables 7 and 8 are similar to those reported in Tables 3 through 6 above.⁴

⁴In terms of industry and country differences (not reported in the tables for the sake

Finally, it is important to emphasize that in some instances completely different results would have been obtained for observed relationships if we would not have taken into account the unobservable error covariance structure but estimated instead equations (1), (2) and (??) separately as single, stand-alone equations. For example, in case of purchasing power constraints, conventional single-equation estimations would misleadingly indicate a significant negative association for this constraint with both turnover and employment growth, while using our method we find no significant association for this constraint with employment growth. As another example, single-equation estimations would suggest a consistent negative association for skilled labor constraints with exporting and significant positive associations with both employment and turnover growth. In contrast, we found no such results using our more general model.⁵ In short, seriously misleading conclusions could arise if single-equation estimation methods were used. A further drawback is that we would miss out on the informative distinction between observed and unobserved effects which can only be obtained using a multiple equation approach.

6 Conclusion

This study sought to enhance our understanding of the factors that encourage and discourage SMEs to internationalize and grow, including the role (and determinants) of constraints thought to afflict these types of firm in particular. For this purpose we proposed a novel framework for investigating relationships between constraints, internationalization and growth, which distinguished between observed and unobserved correlations. This enabled us to distinguish between SME attributes associated with opportu-

of space), SMEs operating in the wholesale, manufacturing and retail trade sectors least often encounter regulatory constraints. In terms of country effects, the states in which regulatory constraints bind the most are France, Belgium, the Netherlands and Germany, in that order. The state where regulatory constraints bind the least is Greece, followed by Portugal and Spain.

⁵Our model is more general because single-equation models arise as a special case of our model where the correlation coefficients in (4) are equal to zero — a restriction which is emphatically rejected by the data.

nities to internationalize and grow, and actual SME internationalization and growth outcomes. We built on prior research which posited a direct positive link between internationalization and performance, and explored claims that constraints may hinder both internationalization and performance of SMEs. The analysis focused on two measures of internationalization (exporting and having a foreign supplier), two measures of growth (both employment and turnover) and three types of constraints. Broad support for the hypotheses proposed in this article was obtained.

Rather than repeat the results obtained using our new framework, we will summarize only the main results here. First, controlling for constraints facing SMEs, we found a strong positive relationship between internationalization and employment growth. For example, SMEs with foreign supplier relationships (but not exports) were likelier to experience sales growth.

Second, some but not all constraints play an important part in the growth experience of European SMEs. In particular, limited purchasing power constraints were observed to have a negative observed (and positive unobserved) correlation with turnover growth, while skilled labor constraints had a positive observed (and negative unobserved) correlation with employment growth. In contrast, a measure of regulatory constraints was not statistically significantly correlated with growth outcomes, though in line with our theorizing regulatory constraints were negatively correlated with observed internationalization (and positively correlated with unobserved internationalization). Yet internationalization seems unrelated to either purchasing power constraints or skilled labor constraints.

Several important lessons emerge from the results. One is that different constraints affect internationalization and growth in different ways. It therefore seems essential to analyze them in a disaggregated way, rather than to manufacture a composite index of constraints, which would probably mask their disparate separate effects. Another is that turnover growth and employment growth capture different aspects of firm performance, being related differently to constraints and internationalization. This complements previous findings showing that the effects of internationalization on performance depend on the way performance is defined (Lu and Beamish 2006a, 2006b).

For example, in a study of Japanese SMEs, Lu and Beamish (2006b) report that exporting relates positively to an SME's sales growth but negatively to profitability.

The results might also carry implications for public policy. Having a foreign supplier seems to be a very common international activity among SMEs: it is certainly much more common than exporting activity. This is interesting given our findings that having foreign supplier relationships promotes employment and turnover growth. Previous researchers have argued that internationalization of the firm often starts with inward operations such as foreign purchasing (Korhonen, Luostarinen and Welch, 1996; Luostarinen and Welch, 1990). This may serve as a catalyst for other international activities like exports, by contributing for example to the acquisition of knowledge about foreign markets and to the creation of networks in foreign markets. For all these reasons, policy makers may wish to pay attention to foreign purchasing in their internationalization policies, which presently tend to concentrate on stimulating domestic firms' export activities (Korhonen, Luostarinen and Welch, 1996; OECD, 2008b; Welch and Luostarinen, 1993).

Despite the evidence that internationalization is linked with growth, while many barriers to internationalization have been reduced over recent years, only a minority of SMEs internationalize. It is not entirely clear why this is so, although some evidence points to a lack of inclination or ability among owner-managers (Westhead, Wright and Ucbasaran, 2001). Consequently many SMEs seeking to grow are likely to try to do so domestically rather than internationally. However, it is becoming increasingly difficult for SMEs to escape international competitive pressures as nowadays even SMEs that exclusively concentrate on serving domestic customers increasingly have to deal with foreign competition in the home market. Also SMEs focusing on domestic customers may still benefit from undertaking foreign purchasing strategies. Firms may miss opportunities when they are not internationalizing e.g. to access resources that increase competitiveness (George, Wiklund and Zahra, 2005). Policy makers might be able to play an important role in increasing awareness of the potential merits of internationalization and in helping SMEs overcoming barriers to internationalization.

This study is prone to several limitations. First, while our framework provides insight into correlates and interrelationships, the cross-sectional nature of our data makes it impossible to disentangle directions of causality and to unravel potentially ambiguous relationships (such as between constraints and internationalization). Second, although a range of constructs were deployed, in order to get a feel for the robustness of relationships, others were not explored in detail. For example, there might be other constraints which affect SME internationalization and growth strategies. We explored (but found no role for) financing constraints, although it is possible that the importance of these constraints could vary with the state of the business cycle.

The model and findings presented here would seem to offer ample opportunities for further research. One arising from the limitations of the cross-section data just mentioned is the Desirability of collecting longitudinal data. That might enable the researcher to control for unobserved heterogeneity and to say more about causality. A second suggestion for future research is to dig deeper into our suggestive finding that informal forms of collaboration have an association with internationalization which is some three times as great as for formal collaboration. Previous research has mainly explored formal ties, at the expense of analyzing informal ties (Zhuo, Wu and Luo, 2007). We believe future research should delve into the role of informal ties in greater depth.

Third, data and methodological extensions might also be fruitful. This study used binary dependent variables; future ones might usefully apply our approach utilizing continuous indicators for constraints, internationalization and growth. Also, additional measures for constraints, internationalization (e.g. foreign direct investments, international alliances) and performance measures could be studied. Also, we have analyzed a large sample of European SMEs active in multiple industries. Future research should test whether our approach and results are also useful and valid outside the scope of Europe.

Finally, we believe that this paper has drawn attention to a relatively neglected issue in internationalization research, namely the importance of distinguishing between observed and unobserved correlations between depen-

dent variables of interest. We believe that future research which investigates linkages between internationalization and firm performance should consider the possibility of correlations between unobserved effects to make sure that direct relationships are estimated accurately. Future research might also try to deepen theorizing about unobserved effects. This holds out the promise of enhancing our understanding of what the specific attributes are that make firms more likely to grow and internationalize.

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