Chapter 6 How Institutions of Liberty Promote Entrepreneurship and Growth

Christian Bjørnskov and Nicolai J. Foss

Introduction

Because of its aggregate nature, much of the economics of growth seems "individualless," growth being driven by the accumulation of capital along equilibrium growth paths and/or fuelled by investments in research and development with (probabilistically) known outcomes. Yet, individuals, and particularly entrepreneurs, are central to the growth process, a process propelled by individuals who exercise their judgment in the recognition, evaluation, and exploitation of opportunities for profit in the face of uncertainty (Knight, 1921; Mises, 1949; Foss and Klein, 2012). There are rather large differences in the supply and allocation of entrepreneurial activity across countries and time (Blau, 1987; Blanchflower, 2000). For example, France and Australia differ dramatically with respect to formation of new firms. Given such stylized facts, two highly pertinent questions are: 1) how do institutions affect the supply of entrepreneurship; and 2) how is entrepreneurship linked to growth? These are the two overall questions that we deal with in this chapter, starting from and summarizing our own work (Bjørnskov and Foss, 2008, 2012). We answer both questions by arguing that entrepreneurship is a main mediator between institutions and growth.

Although Baumol (1990) rightly points out that entrepreneurial creativity need not necessarily be socially beneficial, new products, processes, ways of organizing—all essential aspects of the growth process—are outcomes of entrepreneurship (Schumpeter, 1911; Rosenberg, 1992). Recognizing this, economists have over the last two decades or so increasingly tried to integrate entrepreneurship with the economics of growth (Aghion and Howitt, 1998; Baumol, 1993; Wennekers and

* Christian Bjørnskov is from the Department of Economics and Business, Aarhus University, Aarhus, Denmark; Nicolai J. Foss is from the Department for Strategic Management and Globalization, Copenhagen Business School, Frederiksberg, Denmark and the Department of Strategy and Management, Norwegian School of Economics and Business Administration, Bergen, Norway. This chapter draws on passages and sections in Bjørnskov and Foss, 2008 and 2012. Cite this chapter: Bjørnskov, Christian, and Nicolai J. Foss (2012). How Institutions of Liberty Promote Entrepreneurship and Growth. In James Gwartney, Robert Lawson, and Joshua Hall, *Economic Freedom of the World: 2012 Annual Report* (Fraser Institute): 247–270.

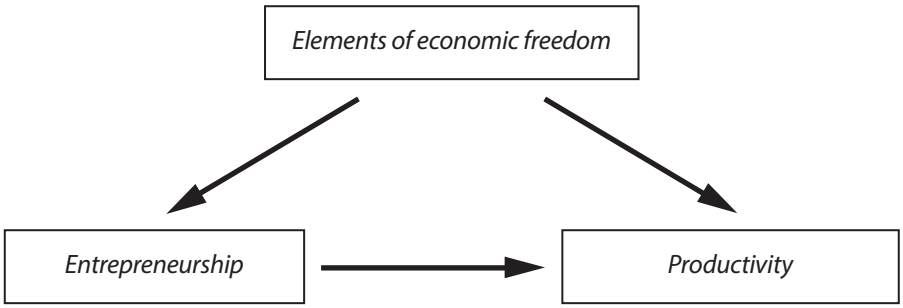
Thurik, 1999; Audretsch and Thurik, 2001). However, many gaps remain in our understanding of how entrepreneurship and economic growth are linked. For example, most research has focused on firms just starting up although established firms are perfectly capable of exercising entrepreneurship (Foss and Klein, 2012).

As a parallel development in the same time period, economists have increasingly looked for institutional and policy-related determinants of growth performance (e.g., Barro, 1991; Temple, 1999; Glaeser et al., 2004). Here, too, gaps remain, in particular with respect to the understanding of the transmission mechanisms between institutions and growth. This is not surprising: to the extent that entrepreneurship plays a significant role in this mechanism—and we trust few economists would disagree with this—we face the well-known difficulties of modeling the entrepreneurial function and measuring the incidence and effects of entrepreneurship (Bianchi and Henrekson, 2005).

In previous work, we have explored the links between institutions and entrepreneurship (Bjørnskov and Foss, 2008) and entrepreneurship and economic growth, with institutions playing a moderating role (Bjørnskov and Foss, 2012). We proffer a specific theoretical mechanism through which institutions affect growth. Thus, we build on the argument that transaction costs, which are to a large extent shaped by the institutional matrix of society (North, 1990), include the costs of entrepreneurs searching for, combining, adapting, and fitting heterogeneous resources in the pursuit of profit under uncertainty (cf. Matsusaka, 2001; Foss et al., 2007; Foss and Foss, 2008). The lower the transaction costs, the more such activity will take place (Agarwal et al., 2010). In turn, entrepreneurial experimentation with new combinations of heterogeneous resources is one of the drivers of growth. In related work, we have explored the reasons that the institutional matrix, and particularly measures of economic freedom, influences the supply of entrepreneurship. In sum, institutions and entrepreneurship influence growth because they influence total factor productivity (TFP).

It is exactly this mediation that we examine in this chapter. Our basic research model is graphically represented in figure 6.1, and we follow the logic of this research model in the following. We first discuss how institutions of economic freedom may determine entrepreneurship and how entrepreneurial activity in turn affects total factor productivity (TFP). We next report on our empirical findings in two steps. First, we explore the effects of economic freedom on entrepreneurial activity across 25 countries observed in six five-year periods. Second, we estimate the effects of entrepreneurship on a standard measure of total factor productivity. We end the chapter by discussing some of the many questions left for future research.

Figure 6.1: Research approach



The determinants of entrepreneurship

Entrepreneurship

Because entrepreneurs are often taken to be the drivers of economic dynamism and change, one may expect the entrepreneur be recognized as "the single most important player in a modern economy" (Lazear, 2002: 1). However, as numerous writers (Hayek, 1945; Baumol, 1990; Bianchi and Henrekson, 2005) have argued, the real-world importance of entrepreneurs is not reflected in economic theorizing, although increasingly economists address the formation of new firms in the context of self-employment (both are usually associated with entrepreneurship in the economics literature). Moreover, much work has been done on entrepreneurship at the fringes of mainstream economics (i.e., Austrian and Schumpeterian traditions). Foss and Klein (2012) identify notions of entrepreneurship as innovation (e.g., Schumpeter, 1911; Aghion and Howitt, 1998; Baumol, 1993); entrepreneurship as alertness and discovery (Kirzner, 1997); and entrepreneurship as judgment, that is, profit-oriented decision-making under conditions of uncertainty, as the dominant conceptions in the economics literature.

Drawing on these conceptions, and echoing Wennekers and Thurik (1999: 46–47), in Bjørnskov and Foss (2008, 2012) we define "entrepreneurship as the manifest ability and willingness of individuals" to perceive new economic opportunities and to introduce their ways of seizing these opportunities into the market in the face of uncertainty. These opportunities may be new products, new processes, new modes of organization, and new product-market combinations, as well as possibilities for inter- and intra-market arbitrage.

Institutions

How institutions affect the supply, quality, and allocation (for example, across the categories of productive, unproductive, and destructive entrepreneurship described in Baumol 1990) of entrepreneurial efforts, and even their consequences, has been a relatively under-researched area in mainstream economics. The set of possible determinants of entrepreneurship is very large indeed, including the size of the government, the degree of administrative complexity and bureaucracy, the tax environment, the intellectual property rights regime, the enforcement of property rights in general, the level of trust, competition law, political freedom, labor laws, social security regime, bankruptcy law, corruption, crime, the ethnic composition of the population, availability of finance capital, and so on. Some of these have been examined in previous work. For example, in a survey of obstacles to the formation of firms in the private sector, Brunetti and colleagues (1997) show that the most frequently mentioned obstacles to entrepreneurs are taxes, labor, and safety regulations, and access to finance.[1] In a series of papers, Grilo and Thurik (e.g., 2004) build what they term an "eclectic framework" of determinants of entrepreneurship, highlighting demography, various kinds of government intervention, unemployment levels, and the risk-reward profiles of self-employment compared to other types of employment. While elements of their framework relate to economic freedom, and it may

1 It is a matter of argument how much finance really matters. For example, Kreft and Sobel (2005) apply Granger causality testing to US panel data, and argue that venture capital follows entrepreneurial activity rather than the other way around. For the contrary view, see Kortum and Lerner, 2000.

be possible to build indices of economic freedom from this framework, they do not directly develop any theory concerning how such freedom affects entrepreneurship, a generally neglected focus in the academic literature.

Economic freedom variables

In order to relate economic freedom to entrepreneurship, operational definitions of economic freedom are needed. Economists have typically treated economic freedom as a composite construct that includes components that all ultimately boil down to the security and extent of property rights, but include, for example, the freedom to save, to change jobs, to devise contracts, and to keep legal income. In the following, we discuss these components and relate them to the supply of entrepreneurship.

Many scholars have used the *size of government* in a broad sense as a good measure of economic freedom (e.g., Gwartney et al., 1999; Carlsson and Lundström, 2002). For many reasons, the size of government influences entrepreneurship. Thus, and perhaps most obviously, if economic activities in certain industries or sectors have been nationalized *de facto* (e.g., child care, health care, and care of the elderly), the scope for entrepreneurship is reduced to the extent that nationalization means public monopoly. Likewise, government enterprises—that is, when government directly competes with the private sector—also tend to crowd out private activity. More indirect governmental control, such as requirements that certain trades be licensed, may reduce entrepreneurial activity because public licensing amounts to a barrier to entry (Demsetz, 1967). To the extent that a large government is associated with high levels of publicly financed provision of various services (e.g., care of the elderly, education) and with generous social security systems, the incentives to engage in entrepreneurial acts in order to make a living—what is sometimes referred to as "necessity entrepreneurship"—are reduced because a relatively high reservation wage is practically guaranteed.

However, such schemes also reduce incentives for individual wealth formation that may be expected to influence the level of non-necessity entrepreneurial activity negatively (Henrekson, 2005: 11). One reason has to do with entrepreneurial judgment being idiosyncratic and often hard to communicate clearly to potential investors (Knight, 1921; Foss and Klein, 2012). The entrepreneur may have to finance his venture himself, at least in the start-up phase. As Kuznets (1955) argued, if individual wealth formation is reduced because of generous public-transfer schemes and highly progressive tax burdens, this makes such financing difficult. Moreover, if entrepreneurs are able to only commit small amounts of personal capital to their entrepreneurial venture, their signal to potential outside investors concerning their commitment to the venture is correspondingly weaker. In addition, assets that may otherwise function as collateral are not applicable with weakly defined property rights, which may limit access to credit.

A large government also needs to be financed, ultimately by taxation. As Henrekson rightly points out, "[i]n order to analyze how the tax system impacts on entrepreneurial behaviour, it is not sufficient to focus on the taxation of owners of firms. To a large extent, the return on entrepreneurial effort is taxed as wage income" (2005: 9). One reason is that parts of the income that accrue from closely held companies may be paid out as wage income (depending on the specific tax regime), and that entrepreneurial activity may be carried out by employees. Rewards for entrepreneurial behavior in firms (e.g., stock options, bonuses for suggesting improvements)

are taxed as wage income. Henrekson (2005: 14) also points out that a high level of taxation moves many household-related services out of the reach for entrepreneurial exploitation: "… higher rates of personal taxation discourage the market provision of goods and services that substitute closely for home-produced services" (2005: 15).

A related, yet distinct, item in an overall measure of economic freedom relates to the enforcement of property rights, that is, the extent to which property rights are secure over time (North, 1990; Barzel, 2005). Huge literatures in economic history, on intellectual property rights, and on innovation stress the importance for entrepreneurial activity at the micro-level and economic development at the macro-level of property rights being well-defined and enforced (e.g., Rosenberg and Birdzell, 1986; North et al., 2000; Glaeser et al. 2004). As we explain in greater detail later, well-defined and enforced property rights reduce the transaction costs of carrying out the commercial experimentation that we associate with entrepreneurship (Rosenberg, 1992). Well-defined and enforced rights to residual income imply that the risk of undertaking entrepreneurial activities is reduced, which may also stimulate the supply of entrepreneurship. If so, it should be expected that institutional features, such as the quality of regulations and the judicial system, affect the overall level of entrepreneurial activity. However, it is uncertain whether this activity is likely to take place within existing firms, which are better protected by legal institutions, or in new firms.

A third important item in a measure of economic freedom arguably is sound money (Friedman, 1962), in particular the rate and variability of inflation. While anticipations of future relative prices are important in general for economic decision makers, it is arguable that they matter particularly for entrepreneurs because they are essentially speculators who receive a residual income (Knight, 1921; Kirzner, 1997). Inflation, and particularly erratic inflation, "jams" the signaling effects of relative prices (Friedman, 1977). While this may be less of a problem for risk-loving entrepreneurs, many entrepreneurs, particularly those who engage in necessity entrepreneurship or activity within well-developed sectors, may well be averse to risk. In addition, the concept and measurement of sound money is associated with the level of financial development and financial depth, and as such is a proxy for the access to capital, which classical theories stress as a crucial condition of entrepreneurship.

The fourth area of economic freedom is the degree of openness to international trade and investment. A greater flow of trade through a country may imply more access to international price signals, thus allowing potential entrepreneurs to take advantage not only of national but also of international opportunities. In addition, freedom to invest may, as is often found in empirical studies, increase the rate at which technology is adopted (cf. Wazciarg, 2001), providing further impetus for entrepreneurial discovery, as well as competition from foreign entrepreneurs. In addition, the absence of capital restrictions also implies that entrepreneurs gain easier access to international capital markets, thereby potentially increasing the supply of venture capital.

Finally, following Kirzner (1985) public regulation is an important item in an economic freedom measure that is relevant to explaining the prevalence of entrepreneurial activity. Arguably, regulations can both help and hinder entrepreneurs who need clear rules and predictable enforcement of those rules. On the other hand, excessive regulation imposes burdens on all firms, not the least start-ups that may be faced with prohibitive start-up costs.

In sum, many elements of economic freedom and institutional quality are likely to influence entrepreneurial activity. This activity is, in turn, likely affects productivity and development.

The consequences of entrepreneurship

Total factor productivity

Economists have studied a variety of consequences of entrepreneurship, such as profit, self-employment (with which it is often identified), foundation of new firms, market equilibration, and, more recently, growth. Historically, there has been a divide in the understanding of the growth process between those who stress the driving role of capital accumulation (Jorgenson and Griliches, 1967; Lucas, 1988) and those who stress "technology" (Solow, 1956, 1957) and other factors that fall outside the accumulation of (physical and human) capital (cf. Aghion and Howitt, 1998; Hulten, 2001). According to the latter camp, the growth process is fundamentally one of improvements in total factor productivity (TFP). Thus, disparities in wealth and productivity across nations are driven by "residual factors." Klenow and Rodriguez-Clare (1997), Hall and Jones (1999), and Parente and Prescott (2005) present evidence that most of the extant cross-country differences in output per worker is driven by differences in total factor productivities.

Entrepreneurship as a driver of total factor productivity

Since the initial identification of the "unexplained" causes of growth (Solow, 1956), significant attention has been devoted to research and development (R&D) as a driver of growth (e.g., Romer, 1990; Coe and Helpman, 1995). However, R&D itself does not drive TFP; innovations that emerge from R&D do (Acs et al., 2009). In turn, innovations are introduced by enterprising firms and individuals (Schumpeter, 1939; Baumol, 1993; Ireland et al., 2003; Kuratko and Audretsch, 2009). In addition, innovations have many other sources than R&D, and include process innovations and innovations of management and organization. Fundamentally, these processes are entrepreneurial (Baumol, 1993; Foss and Klein, 2012): they amount to combining and recombining heterogeneous resources (Schumpeter, 1911; Rosenberg, 1992; Barney, 1991) in the uncertain pursuit of opportunities for profit. Their aggregate results are productivity advances and improvements in the use of resources, that is, increases in TFP.

While Kirzner (1980) and others point to the logical conclusion that the "entrepreneur is the prime mover of progress," growth economists until recently ignored any discussion or modelling of the entrepreneurial function (the first attempt to seriously grapple with the entrepreneur in growth economics is Aghion and Howitt, 1998). The dominance of the production function paradigm since the 1950s is a main cause of this neglect (Foss and Klein, 2012): if production factors are assumed to be homogenous within categories, such as Solow's assumption of "shmoo" capital, and production is assumed to be at the efficient frontier, there are, in Olson's (1996) words, no "big bills left on the sidewalk." In other words, there is no role for entrepreneurs or other actors to move the economy in any direction. Yet, within any description of the real world, factors of production are heterogeneous (Lachmann, 1956), and how they should be combined is not obvious and a matter of discussion. Settling this matter with the given tangible knowledge available at any time necessarily requires technical and commercial processes that are fundamentally

experimental (Hayek, 2002; Matsusaka, 2001). In addition, what is at any moment the optimal combination will change as a result of changes in underlying scarcities and newly discovered knowledge. Hayek (2002) argues that, given the dispersed nature of knowledge in society, competition performs this matching mechanism in a superior way compared to any known (political) alternatives.

On-going processes of industrial dynamics, that is, processes of mergers, divestments, spin-offs, new firm formation, and so on reflect such experimentation. On the aggregate level, these processes make the economy track its (moving) production-possibility frontier, improving the efficiency with which resources are used. These processes are driven by entrepreneurs and entrepreneurial firms. Also, entrepreneurs who are alert to knowledge produced abroad and import it in the hope of realizing a profit opportunity contribute to national catching-up (Fagerberg, 1987), that is, the national production possibility frontier tracking those of more advanced nations. In sum, entrepreneurship positively contributes to TFP.

Institutions and transaction costs

In addition to stressing the role of entrepreneurs in the growth process, economic historians have also pointed to the decisive role of institutions in the growth process (North, 1990; Rosenberg, 1992). The specialized literature on economic growth has for the last decade repeatedly documented the importance of different institutions and how they differentially affect growth (Acemoglu, 1995; Glaeser et al., 2004; Rodrik et al., 2004). The primary role of high-quality institutions seems to be that they entail decreased transaction costs through reducing the uncertainty of economic transactions. As North explains, "[t]he major role of institutions in a society is to reduce uncertainty by establishing a stable (but not necessarily efficient) structure to human interaction. The overall stability of an institutional framework makes complex exchange possible across both time and space" (North, 1990: 6; see also Barzel, 2005). The general characteristics of such institutional frameworks are generality (equals are treated equally), transparency and accountability in public decision-making and, importantly, a rational and verifiable expectation that the institutional decisions will be properly implemented and enforced. Thus, by creating proper incentives of political and economic actors to behave honestly and predictably, high-quality institutions help ensure that the consequences of economic undertakings are more easily foreseen and that incentives stimulate productive rather than unproductive behavior (Baumol, 1990). This certainty increases the expected value of projects, reduces risk premia, and hence makes projects where medium profits and high risk are foreseen more likely to be undertaken, which eventually contributes to economic growth.

Transmission mechanisms—freedom variables, entrepreneurship, and total factor productivity

Increases in TFP result from a large number of radical and incremental processes involving start-ups as well as the entrepreneurship exercised by established firms. Given this, the *flexibility* (that is, costliness) with which such changes can be carried out becomes highly important. In terms of economic-production theory, this flexibility is captured by the notion of the elasticity of factor substitution (Klump and de la Grandville, 2000), that is, the percentage change in factor proportions due to a change in the marginal rate of technical substitution (in the extreme case of a Leontieff technology, for example, the elasticity is 0). At the level of a country, the (aggregate) elasticity of substitution is a measure of the flexibility of the economy

in reacting to, say, external shocks. It is also clear that the elasticity of substitution is affected by a number of forces: for example, an argument for liberalizing trade is that it expands the possibility set with respect to input combinations that a country's entrepreneurs face. Hence, it becomes less likely that a single factor will act as a brake on the growth process (Ventura, 1997).

Thus, as argued by Arrow and colleagues (1961) the aggregate elasticity of substitution is endogenous. Although certain inherent technical constraints imply that factors will never be perfect substitutes, we argue that the aggregate elasticity of substitution is to a large extent endogenous to institutional variables, specifically to freedom variables. In turn, a high elasticity of substitution implies high factor productivity, because it means that resources are more easily allocated to highly valued uses, new modes of organization and new processes are more easily put into practice, and so on.

Underlying the positive impact on factor productivity of high elasticity of substitution is a high degree of certainty in dealings and, therefore, low transaction costs in searching for contract partners, bargaining, monitoring, and enforcing contracts. As we have already suggested, huge literatures in economic history, on intellectual property rights, and on innovation stress the importance for entrepreneurial activity at the micro-level and economic development at the macro-level of property rights being well defined and enforced (e.g., North, 1990; Mokyr, 2006). Well-defined and enforced property rights reduce the transaction costs of carrying out entrepreneurial activities: contracting costs are relatively low, implying low costs of searching for, negotiating with, and concluding bargains with owners of those inputs that enter into entrepreneurial ventures (Rosenberg, 1992). In short, the transaction costs of searching for, measuring, combining, and recombining heterogeneous assets in the pursuit of uncertain profits are low. Moreover, well-defined and enforced income rights imply that the risk of undertaking entrepreneurial activities is reduced (Foss and Foss, 2008), which may also stimulate the supply of entrepreneurship (Baumol, 1993). If so, it can be expected that institutional features, such as the quality of regulations and the judicial system, positively affect TFP. As we outline above, similar reasoning applies to the freedom variable of sound money (cf. Friedman, 1962, 1977).

Based on our earlier reasoning, the degree of openness to international trade and investment has a positive impact upon the elasticity of substitution and, in turn, TFP (Ventura, 1997). The reason is that a greater flow of trade through a country may imply a greater exposure to international opportunities, including adopting foreign technology, and a higher supply of venture capital.

Following Kirzner (1985), public regulation is another important item in any measure of economic freedom that is relevant to understanding the flexibility with which the market system works and, therefore, also how TFP develops. Arguably, regulations can both help and hinder entrepreneurs who need clear rules and predictable enforcement of those rules. On one hand, excessive regulations impose burdens on all firms, not the least firms just starting up, that may imply prohibitive start-up costs. On the other hand, a measurement problem may arise since heavy regulations can force individuals with low marginal productivity entirely out of the labor force, thereby seemingly increasing productivity while lowering overall wealth. In addition, as Baumol (1990) pointed out, individuals operating in a heavily regulated economic environment may have larger gains from engaging in rent-seeking activities within the public sector—what he termed "destructive entrepreneurship"—than in real economic activities.

There are many reasons that the size of government may be expected on *a priori* grounds to influence TFP. As we note above, the degree of nationalization and the extent to which public monopolies are prevalent directly influence the ability of the industries to adapt effectively to changing circumstances (Mises, 1949). High levels of publicly financed provision of various services (e.g., care of the elderly, education), generous social security systems, and high levels of taxation, also negatively influence the level of entrepreneurial activity (Henrekson, 2005: 11), as already explained, and thereby put a brake on TFP.

However, some scholars have argued that large welfare states create the sufficient stability to allow more people to commit larger amounts of capital to entrepreneurial activities (Galbraith, 2006). Another mechanism, introduced by Hirschman (1958), is the notion of a creative tension between government interventions and innovation: if government controls a large share of the economy, it places an artificial competitive pressure on private actors, which induces them to search for more productive solutions; that is, it forces them into entrepreneurial activities.

In sum, the above suggests the hypothesis that secure property rights and a high-quality judicial system, sound money, and openness to international trade and investment positively influence TFP, while a high level of regulation and a large government and high taxes may or may not be harmful to TFP. We next move on to describing the data and empirical strategies to explore these issues.

Data on entrepreneurship and total factor productivity

First, our institutional data all derive from the annual reports of the Fraser Institute in *Economic Freedom in the World*. These data have been used in many studies on growth and other macroeconomic outcomes (de Haan and Sturm, 2000; Méon and Weill, 2005; de Haan et al., 2006; Dreher et al., 2007; Knack and Keefer, 1995; Bjørnskov, 2008; Justesen, 2008; Aghion et al., 2010). This literature documents how several aspects of economic freedom are strongly associated with economic growth, productivity, and various measures of human development. Our interest is in how these aspects influence entrepreneurship and, through this channel, affect TFP. We therefore need proxies for entrepreneurship and productivity.

While TFP cannot be measured with any high degree of precision, we follow the standard in a growing literature in calculating a Solow residual from growth accounting exercises (e.g., Caselli, 2005; Bjørnskov and Foss, 2012). The identifying assumption in using the Solow residual is that production can be approximately characterized by a Cobb-Douglas production function with Y as output, K as physical real capital, L as labor input, and h as the stock of human capital; α captures the capital share of output while $1-\alpha$ measures the share contributed by quality-adjusted labor. We outline this function in logs:

$$logY = logA + \alpha\, logK + (1-\alpha) log\,(Lh) \qquad [1]$$

Sorting out the share of output that can be attributed to capital and effective labor implies that the rest, A, must logically derive from the productivity of inputs, *TFP*. Following Bjørnskov and Méon's (2010) estimates and setting α at .4, and using investment and output data from Heston et al. (2009) and human-capital data from Barro and Lee (2001), yields our *TFP* measure. We summarize the 2005 *TFP* measures in table 6.1.[2]

2 Bjørnskov and Foss (2012) provide all specific details relating to the calculation of these numbers, as well as their robustness to different assumptions of the capital share or the depreciation

Table 6.1: Total factor productivity (TFP) and entrepreneurship in 2005

	TFP	Entrepreneurship		TFP	Entrepreneurship
Australia	90.03	17.3	Japan	78.83	10.9
Austria	97.08	11.9	Mexico	64.66	27.4
Belgium	109.62	12.1	Netherlands	93.81	12.5
Canada	90.04	12.9	New Zealand	68.90	17.0
Denmark	82.28	7.6	Norway	95.09	9.1
Finland	87.45	10.9	Poland	67.71	16.8
France	97.31	9.8	Portugal	84.99	22.2
Germany	90.31	10.3	Spain	100.49	15.0
Greece	88.46	27.2	Sweden	99.07	9.2
Hungary	79.72	12.2	Switzerland	76.69	8.9
Iceland	96.08	13.7	United Kingdom	99.54	11.7
Ireland	116.03	15.8	United States	100.00	10.6
Italy	99.26	22.7			

Note: all TFP data are percent of US productivity.

Comparable, non-agricultural, self-employment rates would seem to be good proxies for entrepreneurship. Yet, while OECD statistics provide raw data on self-employment, these data do not rest on similar definitions of self-employment and incorporated businesses and are, in general, not comparable across countries (OECD, 2009). We therefore follow recent studies by employing the Compendia database, which provides the only cross-country data available that are comparable across countries by including owners and managers of both unincorporated and incorporated businesses, but neither family members nor self-employment as a secondary activity (van Stel, 2005). Although this excludes entrepreneurial activity that is kept within existing firms, entrepreneurship theory suggests that entrepreneurship is fundamentally about deploying resources to new uses in the pursuit of profit under uncertainty (Knight, 1921; Kirzner, 1997; Foss and Klein, 2012). Focusing entirely on primary self-employment ensures that we measure actual reported economic activity, and not prospective activities or activity in the shadow economy (Nyström, 2009).

In the following, we combine the data on economic freedom in the six five-year periods ending in 1980, 1985, 1990, 1995, 2000, and 2005 with a set of control variables to get at estimates of the joint importance of economic freedom and entrepreneurship. In regressions in which entrepreneurship is the dependent variable, we add control variables to the set of economic freedom indices. These controls are a post-communist dummy, openness to trade, investment prices and a measure of international information flows. The price level of capital and investment goods (from the Penn World Tables) captures the costs of entrepreneurial start-ups (cf. Fonseca et al., 2001) while international information flows, which we get from Dreher (2006), proxy for the ease with which entrepreneurs can get

rate used to calculate capital stocks. The capital stocks are calculated using the perpetual inventory method (King and Levine, 1994; Hall and Jones, 1999). In two robustness tests, we also provide the same numbers calculated with α set at either .3 or .5.

Table 6.2: Descriptive statistics of all variables

Variable	Mean	Standard deviation	Observations
Agricultural employment	3.80572	2.7413	140
Government consumption	4.784	1.650	140
Government enterprise	6.807	2.487	140
Government final consumption	15.043	3.882	140
Government size	4.864	1.268	140
Information flows	75.318	17.318	140
Investment prices	82.857	23.410	140
Legal quality	7.917	1.068	140
Log population size	9.609	1.469	140
Openness	68.746	32.439	140
Post-communist	0.050	.219	140
Entrepreneurship	14.988	5.816	140
Sound money	8.507	1.627	140
Special production	0.086	0.289	140
Tax burden	2.856	2.226	139
Total factor productivity	87.858	12.254	140
Transfers and subsidies	5.012	1.694	140
Regulatory freedom	6.357	1.02	140

information from the rest of the world. In TFP regressions, we follow the general literature by adding a set of determinants of TFP: openness (trade volumes as percentage of GDP), two dummies for post-communist and Asian countries, the share of the population employed in agriculture, and a full set of period dummies to take joint international productivity increases into account. All variables derive from the Penn World Tables, mark 6.3 (Heston et al., 2009) except agricultural employment, which is from the World Bank's (2011) database.

Finally, we note the possibility that entrepreneurship might respond to productivity potential, that is, that productivity differences across countries would drive entrepreneurial differences. We handle this causality problem in our TFP regressions by employing three variables as instruments. Investment prices and information flows derive from the first set of regressions, while we also add the logarithm to population as an instrument, based on the assumption that countries with faster growing populations also have more entrepreneurs. This has the benefit of giving us more temporal identification. All data are summarized in table 6.2.

These data provide a slightly unbalanced panel of 25 countries observed in the six five-year intervals between 1980 and 2005. We estimate determinants of entrepreneurship and TFP by simple OLS with Beck and Katz's (1995) panel-corrected standard errors, to which we add instrumental variables for entrepreneurship in the second set of regressions. In Bjørnskov and Foss, 2012, we argue that this is necessary if potential or actual entrepreneurs rationally react to opportunities resulting from being behind the international production possibility frontier. In this case, TPF difference would drive entrepreneurship.

Determinants of entrepreneurship and total factor productivity

Entrepreneurship estimates

First, we estimate the effects of economic freedom on entrepreneurial activity. We mainly follow our approach in Bjørnskov and Foss (2008) but use self-employment as our measure of entrepreneurship in order to make all results comparable to the following estimates. As such, our overall estimates in table 6.3 here closely resemble those in Nyström (2009).

We first note that the government-size index is positively associated with entrepreneurship. In other words, as in Bjørnskov and Foss (2008), which used a different measure of entrepreneurship, as well as the comparable analysis in Nyström (2009), more government intervention in the economy is detrimental to entrepreneurial activity. Similarly, we find that sound money and policies ensuring stable and predictable monetary institutions are associated with more entrepreneurship. Conversely, although legal quality is strongly associated with overall development, we find that it decreases the rate of entrepreneurship. While we can only speculate, this is consistent with legal institutions protecting innovation in formal firms, thus making self-employment and semiformal economic activity less attractive (Dreher and Gassebner, forthcoming).

We also find that investment prices and information flows, which we use as instrumental variables in the following, are both negatively associated with entrepreneurship. On one hand, more expensive capital goods reduce the supply of entrepreneurial activity simply by making starting-up a firm more expensive. On the other hand, while perhaps not immediately intuitive, reduced information flows increase the premium on people with a comparative advantage in collecting, combining, and recombining information, that is, entrepreneurs.

Results in columns 1 and 2 of table 6.3 suggest that a one-point improvement in the government size index is associated with almost half a percent more self-employment. In columns 3 to 6, we move beyond Nyström's (2009) study by exploring which subcomponents of government size are responsible for this effect. We find that two components are significant: government consumption and government enterprises, while transfers and subsidies and the tax burden are insignificant. This being the case, the estimates suggest that governments actively engaging in the economy, either through pure consumption or by competing with private actors through either government-owned enterprises or government subsidies, effectively crowd out entrepreneurial activity. Government enterprises, in particular, exert a strongly significant and sizeable negative effect on entrepreneurship. The same applies to sound money, which is also often negatively affected by governments trying to affect the economy and raise seignorage. Freely operating capital markets and predictable monetary circumstances clearly enable entrepreneurship.

In sum, elements of economic freedom thus affect entrepreneurial activity substantially. In the following, we assess the dynamic productivity consequences of these direct effects on entrepreneurship.

Estimates of total factor productivity

The estimates in table 6.4 first exhibit intuitive results with respect to the small set of control variables. Openness to trade is significantly positive in three of five columns and larger agricultural sectors are associated with substantially smaller measured

Table 6.3: Determinants of entrepreneurship

	1	2	3	4	5	6
Information flows	−.156*** (.027)	−.145*** (.026)	−.131*** (.027)	−.142*** (.026)	−.163*** (.026)	−.141*** (.026)
Investment price level	−.069*** (.014)	−.072*** (.013)	−.065*** (.014)	−.076*** (.013)	−.073*** (.012)	−.077*** (.013)
Openness	.010 (.007)					
Agricultural employment	.889*** (.168)	.915*** (.151)	.963*** (.148)	.908*** (.155)	.945*** (.149)	.959*** (.153)
Government size	.411** (.187)	.385** (.157)				
Government consumption			.340*** (.124)			
Transfers and subsidies				.184 (.133)		
Government enterprise					.367*** (.103)	
Tax burden						.007 (.092)
Legal quality	−1.439*** (.309)	−1.392*** (.295)	−1.308*** (.301)	−1.388*** (.296)	−1.437*** (.298)	−1.364*** (.303)
Sound money	.999*** (.235)	.948*** (.219)	.889*** (.219)	.989*** (.219)	1.008*** (.221)	.978*** (.224)
Freedom to trade	−.151 (.411)					
Regulatory freedom	.089 (.403)					
Post-Communist	−6.502*** (1.047)	−6.595*** (1.065)	−7.465*** (.988)	−6.819*** (1.120)	−5.860*** (1.173)	−7.084*** (1.098)
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes
№ of observations	140	140	140	140	140	139
Countries	25	25	25	25	25	25
R-squared	.825	.823	.823	.819	.829	.817
Wald Chi	741.69	684.37	660.49	636.18	622.52	585.39

Note: all estimates are 2SLS; *** (**) [*] denote significance at p <.01 (p <.05) [p <.10].

productivity. We also note that the Asian economies in the dataset on average are less productive, as originally suggested by Young (1995) while post-Communist economies are not (see also Felipe, 1997). The only instance in which we find a significant difference is in column 5 in which we use TFP measures calculated with a particularly high capital share. We also note that a set of five-year period dummies (not shown) documents an international trend towards higher TFP.

Turning to the economic-freedom indices, we find no support for direct effects of government size, sound money, or freedom to trade internationally. Logically, any effects of the two former indices are therefore indirect by being mediated by entrepreneurship. Conversely, we find a strongly positive effect of legal quality, which more than offsets the negative indirect effect through entrepreneurship. Finally, we find a negative effect of regulatory freedom. This seems surprising, yet we note two reasons for not placing too much weight on this finding. First, we show in further

Table 6.4: Basic estimates, determinants of total factor productivity

	1	2	3	4	5
Openness	.072** (.031)	.059* (.034)	.051 (.032)	.065** (.033)	.035 (.032)
Agricultural employment	−5.733*** (.720)	−6.282*** (.884)	−6.282*** (.849)	−6.563*** (.925)	−5.992*** (.812)
Asia	−8.014*** (2.373)	−7.921** (3.157)	−7.474*** (2.695)	−4.343 (2.800)	−10.769*** (2.623)
Post-communist	.970 (4.892)	7.078 (5.622)	9.329 (6.111)	3.526 (6.635)	15.802*** (5.966)
Economic freedom	−2.879* (1.507)				
Government size		−.157 (.728)			
Legal quality		3.901** (1.657)	4.350** (1.754)	4.970*** (1.861)	3.672** (1.774)
Sound money		−.373 (.839)			
Freedom to trade		−1.095 (1.765)			
Regulatory freedom		−4.871*** (1.493)	−5.207*** (1.378)	−6.922*** (1.465)	−3.453*** (1.344)
Entrepreneurship	1.820*** (.323)	2.185*** (.431)	2.339*** (.487)	2.464*** (.512)	2.202*** (.486)
Period dummies	Yes	Yes	Yes	Yes	Yes
№ of observations	140	140	140	140	140
Countries	25	25	25	25	25
R-squared	.433	.430	.396	.429	.383
Wald Chi / F stat	21.82	13.54	16.18	17.72	15.73
First stage F stat	23.52	18.33	14.61	14.61	14.61
Hansen J stat, p<	.329	.065	.458	.459	.084

Note: all estimates are 2SLS; *** (**) [*] denote significance at p <.01 (p <.05) [p <.10]. Instruments are the logarithm to population size, the investment price level, and Dreher's (2006) index of global "information flows," supplemented by add interactions between these instruments and the government size indices. Results in column 4 are with a TFP measure based on a capital share of .3; those in columns 5 are based on a capital share of .5.

tests in Bjørnskov and Foss (2012) that the effect of regulations is not as robust as one would ideally want. Second, further tests (not shown) suggest that this finding is driven by labor-market regulations. As such, regulations arguably drive low-productivity people out of the labor force and this would, for purely mechanical reasons, result in what appears as higher TFP, although making the economy poorer.

The estimate of the main variable, on the other hand, turns out significantly positive, as expected. We interpret this estimate as causal, since standard test statistics suggest neither weak identification nor over-identification problems; partial first stage R-squared is .36 and Hansen's J Statistic is very far from significance. Further tests also suggest that the relation between TFP and entrepreneurship is clearly endogenous (Durbin-Wu-Hausman test with Chi squared = 13.977; p < .000).

This being the case, we find that entrepreneurship—which itself is affected by economic freedom—is a main predictor of productivity differences across OECD countries. In societies with better protection for property rights and less

direct government intervention, entrepreneurial talent and effort might arguably flow more readily to its most productive uses. What the estimates show is that this entrepreneurial activity is actually contributing positively to productivity differences across OECD countries.

However, one needs to be careful when interpreting TFP studies, as results can often depend on specific identifying assumptions. In column 4 of table 6.4, we therefore replace our preferred TFP measures with data calculated using a much lower capital share ($\alpha = .3$) while in column 5 we do the opposite and assume a high capital share ($\alpha = .5$). While these changes cause large differences in the estimates of regulatory freedom, openness and the Asian dummy, the point estimate of entrepreneurship remains remarkably stable. As such, this finding is not sensitive to assumptions of the production function, that is, it is not driven by economies that are particularly labor- or capital-intensive. It also remains stable when deleting single countries, single periods, or adding further control variables (Bjørnskov and Foss, 2012).

How large are the effects?

As a final exercise, we therefore use the central estimates from both tables to track the effects of changes in economic freedom on TFP within a time horizon of five years (figure 6.2). First, a one-point improvement in the overall size-of-government index is associated with .39 percentage points additional entrepreneurial activity, or roughly 7% of a standard deviation. However, as only two of four elements of government size are significantly associated with entrepreneurship, the estimate of the overall index is likely to be biased towards zero. Adding the two significant components instead suggests a joint effect of the government consumption and government enterprise indices roughly double of the overall index. Similarly, a one-point improvement in sound money yields almost one percentage point more entrepreneurship, or 16 % of a standard deviation. A similar improvement in legal quality conversely causes a 1.3 percentage point (24% of a standard deviation) decline.

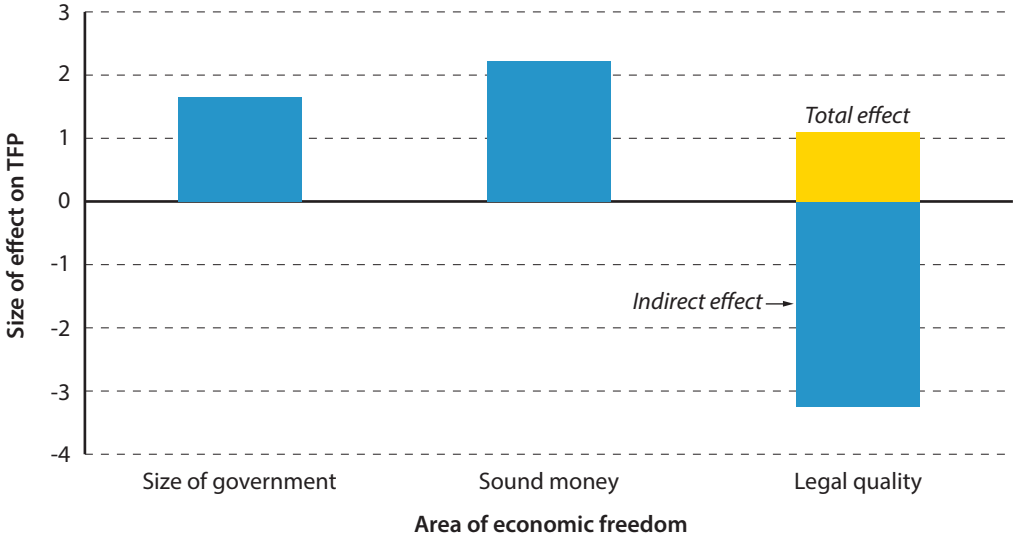
These changes in turn affect TFP. The government size improvements add 1.6 points to the TFP measure, an improvement of 13% of a standard deviation, entirely mediated by entrepreneurship. In the same way, an improvement in sound money results in a 2.2 point (16% of a standard deviation) improvement in TFP. Finally, while legal quality exerts a negative indirect effect through entrepreneurship within new firms, its direct effect—most likely by causing more entrepreneurial activity in existing firms—dominates and creates a net effect of 1.1 points (9% of a standard deviation).

As such, the total effects on TFP of changes in economic freedom are substantial. A one-point change to total economic freedom, arising from changes to government size, legal quality, and sound money, therefore result in an increase in TFP of approximately 35% to 40% of a standard deviation. In 2005, this was approximately the productivity difference between Portugal and Germany and, therefore, a substantial effect.

Concluding discussion

Entrepreneurship has often been linked to the growth process, albeit mainly informally and in policy-oriented work. The same may be said of institutions of economic freedom. However, few studies consider both determinants simultaneously,

Figure 6.2: Effect on total factor productivity of one-point change in three areas of economic freedom: size of government, sound money and legal quality



which is the main purpose of this chapter, perhaps due to the intricacies involved in featuring institutions and entrepreneurship in the same model, as well as the general problem of securing reliable data on entrepreneurship. There is nevertheless a need to bring these determinants together, as there are strong reasons to suspect that they are closely intertwined in the growth process. We have argued that entrepreneurship influences total factor productivity because the optimal combination of productive factors is not a datum but needs to be discovered and rediscovered in response to changing circumstances by enterprising firms and individuals (however, we do not possess the micro-level data that will allow us to test this part of our overall argument). We argued that it is particularly natural to assume that entrepreneurship affects TFP. Similarly, we argued that the effects of institutions of economic freedom on TFP are mediated through the reduction of uncertainty and transaction costs that institutions may bring about (cf. North, 1990), which in turns eases the process of commercial experimentation. Relative to the extant literature, our emphasis on TPF as well as the mediating role of entrepreneurship are novel contributions.

Relying on harmonized entrepreneurship data (van Stel, 2005), we exploit a unique dataset consisting of 25 countries observed in the six five-year intervals between 1980 and 2005, and test the influence of economic freedom on entrepreneurship, and in turn the influence of entrepreneurship on TFP. While entrepreneurship strongly and significantly affects TFP, our results only partially support the intuition that institutions of liberty as well as liberal economic policies promote growth in productivity. In fact, we find no significant direct effects of size of government or sound money on TFP in the medium run. What our set of estimates suggests is that two main elements of economic freedom—size of government and the access to sound money—affect TFP entirely through their influence on entrepreneurial activity. Conversely, institutions of property rights protection reduce entrepreneurial activity in new firms but still exert an overall positive effect on TFP.

Our results thus suggest that large welfare states and societies with weak monetary institutions suffer productivity loses relative to other comparable countries, as these features significantly reduce the supply of entrepreneurship (Henrekson, 2005; Kreft and Sobel, 2005; Bjørnskov and Foss, 2008; Nyström, 2009). However, while the mass of all these entrepreneurial activities have historically caused major technological breakthroughs that influenced growth and development in the course of economic history (cf. Mokyr, 2006), they are seldom visible from the point of view of politics. Yet, while very few single entrepreneurial innovations visibly drive overall job creation, a substantial part of job creation is driven by self-employment and small firms (Baptista et al., 2007; Malchow-Møller et al., 2011). In this perspective, it is a paradox that, although entrepreneurial ventures as activities are limited by the rise of the welfare state, they at the same time protect welfare states from falling too far behind in terms of productivity in the private sector that necessarily finances welfare spending. The long-run dynamics of such political-economic systems seem worthy of further research.

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