

The Influences of Economic and Technology Policy on the Dynamics of New Firm Formation

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ABSTRACT. This study attempts to reveal how macroeconomic and technology policies that encompass the opportunity and individual drivers of entrepreneurship explain the dynamics of new firm formation in a country. To do so we rely on the Schumpeterian, industrial organization, and labor economics traditions of entrepreneurship, and performed an exploratory test with longitudinal U.S. data from 1968 to 1993. The results of this study suggest that R&D investments, patents, economic concentration, pro-competition policy, and labor mobility are important areas in which government policy can influence the intensity of new firm formation.

KEY WORDS: entrepreneurial policy, government, new firm formation

JEL CLASSIFICATION: L50 (Regulation and Industrial Policy-General) M13 (Entrepreneurship) M20 (Business Economics-General)

1. Introduction

New firm creation is considered to be an integral feature of economic growth and progress (Reynolds, 1994). This is because entrepreneurial activity can diversify a country's sources of wealth creation. Thus its importance has driven governments to commit vast resources to entrepreneurial develop-

ment. In the last two decades, policymakers from developed and emerging economies have introduced macroeconomic policies to encourage the startup and viability of entrepreneurial firms (Gilbert et al., 2004). In spite of such activity, scholarly efforts to advance our understanding of entrepreneurship at the economy level still lag practice, when compared to the amount of research in such areas as industry dynamics and competition (Highfield and Smiley, 1987). Consequently, the implications of macroeconomic policies related to entrepreneurship are not fully understood.

This study attempts to model the macroeconomic and technology factors that drive new firm formation and in so doing uncover the reasons why it varies over time in a country. Early studies on national entrepreneurship rely on explanations of the differences in national cultures to explain the intensity of entrepreneurial activity (Shane, 1996). Cultural elements identified include the cultural legitimacy for entrepreneurial behavior (Weber, 1904), the societal tolerance for new ideas (Wallace, 1970), the attitudes toward firm formation (Shapiro and Sokol, 1982), the national culture dimensions of power distance, individualism, uncertainty avoidance and masculinity (McGrath et al., 1992), and the individual need for achievement (McClelland, 1961). Taken together these studies suggest that national cultures can impact individual behaviors and thus engender a higher propensity for entrepreneurial activity.

Due to the fact that cultural and individual traits tend to be enduring, such cultural approaches implicitly suggest that national entrepreneurial activity will tend to be stable over time. Yet, available empirical evidence suggests that entrepreneurial activity exhibits great dynamism

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in an economy. In the United States, for example, the rate of entrepreneurship, defined as either the number of startups (Audretsch, 1995) or the number of businesses in existence per individual (Shane, 1996), has shifted dramatically over time. Further, entrepreneurship is fundamentally an economic activity (Shane, 1996) so in the final analysis, rational individual choices will be a significant part of the determinants of entrepreneurship (Audretsch, 1995). Following the policy-centric approach employed by such authors as Gilbert et al. (2004) and Reynolds et al. (1994) we take the view that the dynamics of national entrepreneurship is affected by macroeconomic and technology factors associated with the demand for and supply of entrepreneurial activities in a country (Casson, 1995; Thornton, 1999). Some of these factors, such as the existence and enforce of anti-trust regulations, are in turn the function of government policy.

This article proceeds as follows. First, we build an opportunity-individual model of national entrepreneurship and identify macro factors related to each component of the model. Second, we describe our research methods and present the findings of our hypotheses tests. Finally, we discuss the theoretical and policy implications of the results.

2. Opportunity-individual model of entrepreneurial policy

The entrepreneurship literature suggests that entrepreneurship involves *opportunities* in the economy and the presence of *enterprising individuals* who can exploit them (Audretsch, 1995; Shane and Venkataraman, 2000). Broadly, the availability of opportunity is driven by two dimensions of an economic system: technological capital, in the Schumpeterian tradition (Schumpeter, 1934; Venkataraman, 1997), and the attractiveness of industrial support, in the industrial economics tradition (Casson, 1995). Since entrepreneurs supply the human capital to undertake entrepreneurial activities, the macro supply side factors are those that drive entrepreneurial career choices (Reynolds et al., 2004). Therefore, our model is premised on the principle that entrepreneurship occurs at the confluence of factors that drive technological and economic

opportunities, and the willingness of individuals to engage in self-employment.

2.1. Opportunities and entrepreneurial policy

Opportunities come from various sources. Inventions and technological knowledge in an economy provide the sources of entrepreneurial opportunity (Kirzner, 1997; Venkataraman, 1997). In addition, an economy's economic structure (e.g., industry concentration and competition policy) may affect the capacity of its participants to perceive and act upon opportunities (Glade, 1967).

2.1.1. Technological capital

Technological opportunities arise because an economy accumulates knowledge capital over time, which becomes the basis for new firm formation by potential entrepreneurs who have unique insights into their workings (Audretsch, 1995). Scholars who study the antecedents of opportunity agree that people with technological knowledge are more likely to create or recognize new opportunities and are thus more likely to belong to the set of potential entrepreneurs in an economy. Venkataraman's (1997) strong premise of entrepreneurship talks about opportunity *creation*, "even if some markets approach a state of equilibrium, the human condition of enterprise, combined with the lure of profits and advancing knowledge and technology, will destroy the equilibrium sooner or later" (p. 121). His weak premise of entrepreneurship emphasizes opportunity *identification* through the exploitation of market and societal inefficiencies in resource allocation. Under both premises, ways to exploit market inefficiencies or create new opportunities require knowledge accumulation and technology.

However, not all innovations and technological knowledge lead to new firm formation. For example, Audretsch (1995) and Audretsch and Acs (1994) demonstrated that new-firm startups tended to be lower in industries in which the overall innovation rate is high but the small-firm innovation rate is low. Similarly, we are careful to make a distinction between the effects of R&D expenditures and patents on new firm formation. R&D expenditures represent the

inputs to a knowledge creation process. Scientists and engineers working on R&D projects accumulate tacit knowledge through learning and knowledge spillovers, which confers the resources for them to start new ventures. Further, public and corporate investments in research and development contribute to the sophistication and level of technological capacity in a country (Audretsch and Acs, 1994). Together with knowledge spillovers among the participants of R&D activities in universities and private/public laboratories, such investments increase the stock of technology capital in an economy, creating new opportunities for new firm formation.

Patents, on the other hand, represent the *protected* outputs of the R&D process. Once a discovery has been patented, the use of similar knowledge by potential entrepreneurs and the rate of spillover effects slow down because a fence has been erected to protect future rent streams. Further, it is not clear if patenting is a necessary condition for firm formation. By virtue of the cost and time constraints,¹ it is conceivable that entrepreneurs may start their ventures without the benefit of patents, but instead register patents only after they have successfully raised financing. Thus, patents filed by technological entrepreneurs may be an indication of venture success rather than a *cause* of new firm formation, as shown by the positive association between patenting and the stock of entrepreneurship, defined as the number of businesses in existence per individual, as reported in Shane's (1996) study. In short, although patents are an important form of knowledge capital in an economy and can be a source of rents for business organizations (Teece, 1986; Barney, 1991), they may be not a cause for new firm formation. Thus,

Hypothesis 1a: Everything else being equal, R&D expenditures will lead to new firm formation.

Hypothesis 1b: Everything else being equal, patenting will not necessarily lead to new firm formation.

2.1.2. The economic structural determinants of opportunity

Industry concentration has long been considered an entry deterrent for new firms (Bain, 1956).

Dean et al. (1998) found that the concentration in U.S. manufacturing industries negatively impacted new firm formation. In such industries a few large incumbents can effectively block entry by raising the minimum efficient scale of entry for new firms, increasing the cost of entry for entrepreneurs and thus limit new firm formation to those opportunities only with very high potential rates of return (Aldrich and Auster, 1986). As Dobbin and Dowd (1997) put it, "[P]otential entrepreneurs will perceive that the presence of large firms undermines their likelihood of success and consequently will not enter the market" (p. 514), and they choose to remain in employment rather than take a risk on self-employment. Audretsch and Acs (1994) empirically showed that new firm startups tend to be inhibited in an environment where retaliation from the incumbent enterprises is more likely to be high and effective. Thus, the supply of entrepreneurs would likely be attenuated in highly concentrated economies.

The economic dominance of large firms also influences how resources are allocated among economic agents as high concentration will reduce the availability of capital and human resources for new firms (Casson, 1995). Assuming a normal distribution of risk aversion in the population of resource providers, higher startup risk will reduce the number of resource providers who are willing to fund new starts. The reduction in resource availability will in turn intensify competition for remaining resources, elevate the cost of startup, and further attenuate the attractiveness of new ventures. Further, a highly concentrate economy (i.e., one dominated by large firms) will leave little room for entry by small firms. Large firms may require ever-higher growth opportunities to maintain their growth rate as their size increases. Since maintaining growth becomes more difficult to achieve in mature industries, large firms likely look for growth opportunities outside of their core activities. Thus, highly concentrated economies are characterized by diversified firms that expand to fill market niches, which would normally be exploited by small startups. Because they have the scale to enter at lower costs, the large established firms 'crowd out' their smaller counterparts.

Hypothesis 2a: Everything else being equal, economic concentration will be negatively related to new firm formation.

Business historians and institutional theorists hold that a government's competition policy frames the behaviors of incumbent firms (Nelson, 1995; Fligstein, 1996), which may affect potential entrepreneurs' decision to start new businesses. In the U.S., the public interest has historically taken a dim view of excessive industry concentration, motivating policymakers to use pro-competition policies such as antitrust and fair trade policies to control monopolistic behaviors whenever possible (Golodner, 2001). However, pro-competition policies may discourage new firm formation. Although anti-trust policies can enliven competition between incumbent firms, they can potentially promote active retaliation against weaker new entrants by incumbents who struggle to protect market shares (Barnett and Carroll, 1993; Dobbin and Dowd, 1997). In addition, less aggressive pro-competition policies may work to diminish direct competition and stabilize industries by allowing interfirm agreements on prices and quantity to keep profits healthy, which can encourage new entry (Chandler, 1990; Fligstein, 1996).

Although the empirical case for the impact of competition policy on firm formation is unclear, the *normative* purposes of anti-trust and fair trade policies are to create business environments wherein large incumbent firms are prevented from misusing their market powers to exploit smaller competitors and consumers. In such environments, we argue that the ability of incumbents to retaliate against new entrants will be limited by regulatory boundaries, and, at minimum, subject to review. Further, even if the lack of competition policies encourage monopolistic rents that attract new entrants (Fligstein, 1996), the ability of the latter to actually enter is constrained because incumbents can form coordinated distribution or supply agreements that can effectively lock out sources of inputs or channels of distribution to new players. Examples of such predatory behaviors include the Standard Oil Trust and the American Tobacco Company, both of which employed ruthless tactics (local price cutting, denial of pipeline or

other distribution access) to acquire large market shares, charge high prices, and lock out new entrants (Bittlingmayer, 1996; Golodner, 2001).

We also argue that it is unreasonable to expect dominant incumbents to accept entry without reaction, particularly if they are not limited by regulation to the forms of retaliatory tactics they can employ. Substitution effects ensure a negative impact on profits with increased entry and incumbent firms in such industries as pharmaceuticals, airlines, telecommunications, and information technology have repeatedly demonstrated their willingness to expend valuable resources to retaliate against even small new entrants.² In emerging economies such as those of Asia and 19th and early-20th century America, the commonly encountered diversified conglomerate, in search of greater growth, have been shown to act quickly to exploit new opportunities whenever they arise and to leave little room for new firm formation.

In sum, we suggest that pro-competition policies such as anti-trust policy and fair trade practices will tend to encourage new firm formation by ensuring that markets stay open and that incumbent retaliation is limited. The combined effect is to increase the supply of resource providers for entrepreneurship by reducing the resources needed to surmount entry barriers.

Hypothesis 2b: Everything else being equal, pro-competition policy will be positively related to new firm formation.

2.2. Individuals and entrepreneurial policy

Traditionally, research in entrepreneurship began with the questions, "Who is an entrepreneur?" and "Are entrepreneurs different from other people?" (Gartner, 1988). While the empirical link between individual differences and entrepreneurial behaviors has not been completely verified, the question is still of great interest to policy level researchers (Reynolds et al., 2004). At this level, the question is framed as an individual's choice between self-employment (entrepreneurship) and employment, and the macro level factors of that choice. Factors that lower the opportunity costs of self-employment will tend to positively influence entrepreneurship

while those that increase the returns to employment will tend to work in the opposite direction. In short, a favorable market for employment will work against the market for self-employment and vice-versa.

2.2.1. Unemployment

The influences of unemployment on firm formation can be explained in two ways; namely, the “push” and “pull” hypotheses (Ritsilä and Tervo, 2002). “Pull” argues that individuals are attracted to self-employment by the prospect of founding new businesses because they can generate a great deal of personal wealth (Ritsilä and Tervo, 2002). Higher levels of unemployment are a sign of poor economic strength, with accompanying reductions in disposable income and consumer demand (Reynolds et al., 1994). This shrinkage in market size will affect incumbent firms but is more likely to reduce the survivability of smaller and newer firms. Hence, the lower rate of return expected from self-employment in such unfavorable circumstances likely decreases new firm formation. This “pull” hypothesis suggests a negative relationship between unemployment and new firm formation. On the other hand, the “push” argument says that new firm formation results from “circumstances wherein an individual feels forced to establish a new enterprise due to negative labor prospects, such as personal unemployment and job insecurity” (Ritsilä and Tervo, 2002, p. 31). This “push” hypothesis suggests a positive relationship between unemployment and new firm formation.

Reynolds and others associated with the Global Entrepreneurship Monitor study (2000) suggested that entrepreneurship can be characterized as resulting from economic necessity (i.e., ‘push’) or opportunity driven choice (i.e., ‘pull’). Based on this view, we argue that in the American labor market, which is highly flexible when compared to other economies (Casey et al., 1999), the “push” argument will be more compelling than the “pull” argument. Labor market flexibility lowers the opportunity cost of failure from self-employment (Evans and Leighton, 1989). Hence, in developed economies with flexible labor markets, the negative impact of unemployment on firm creation will be attenuated. In flexible labor markets, the “push” effect

will be also promoted, as the unemployed may easily choose self-employment with smaller opportunity cost than in other labor markets with rigidity. Studies performed in the U.S. support the effect of unemployment consistent with the push hypothesis (Audretsch and Acs, 1994; Reynolds, 1994). Thus,

Hypothesis 3a: Everything else being equal, unemployment in flexible labor markets will be positively related to new firm formation.

2.2.2. Barriers to labor mobility

The supply of labor is partly determined by the incentives that employees receive to stay employed with a company. For example, when employee benefits are allocated on the basis of seniority with entitlements that are not transferable from one enterprise to another, mobility tends to be low and therefore, supply is constrained. These mobility barriers, which can occur at the firm, industry or national levels, result in labor market rigidity. Sources of labor mobility barriers include permanent employment contracts, seniority wage systems, and labor unionism (Sakamoto and Powers, 1995).

The sources of mobility barriers in the labor market may also be interrelated. For example, to build a stable membership labor unions try to strengthen the link between job tenure and wages. Job-specific investments in human capital such as on-the-job training and executive education are often correlated with tenure (Becker, 1984). Such investments may be exposed to holdup and opportunism by the firm, which gives labor a natural incentive to unionize (Hogan, 2001). Empirical studies have shown that unionism leads to lower rates of labor mobility in the U.S. and the U.K. because of tenure-related union benefits (Sousa-Poza and Henneberger, 2004). As stricter employment protection legislation may actually reduce self-employment (Robson, 2003), we argue that the existence of the ‘union mark-up’ will reduce the incentive for individuals to start new firms. Thus,

Hypothesis 3b: Everything else being equal, labor unionism will be negatively related to new firm formation.

3. Method

3.1. Data and construct operationalizations

To test our hypotheses, we analyzed time series data on new firm formation in the United States for the years 1968–1993. The selection of the study period was entirely determined by data availability. The dependent variable, *new firm formation*, was measured by the annual number of new firms created per 1,000 people in the working population. The data was taken from the annual Statistical Abstracts of the U.S. (U.S. Census Bureau, Annual), which was based on Dun & Bradstreet's Survey of Companies. The U.S. data does not include self-employed professionals and farmers, many one-person service firms and companies in finance, insurance, real estate, railroad, and the amusement industries (Shane, 1996).

R&D stock per capita was calculated as the 3-year average value of R&D investments (in millions of constant 1992 dollars) divided by 10,000 people in the working population (National Science Foundation, 2000). *Patent application per capita* was measured as the number of patent applications per 1,000 people in the working population (U.S. Patent and Trademark Office, 1977, 2000). To measure *economic concentration* we used the contribution to total production by the *Fortune* Industrial 500 firms in the U.S. (Fortune and U.S. Census Bureau, Annual, 1960–1993). The rationale for measuring concentration this way is simple. The more the largest firms in an economy contribute to total economic activity (in production), the greater their collective market power and therefore the greater the overall industrial concentration in the economy. To measure the United States Government's stance on *competition policy*, we used the amount of funding (in millions of constant 1992 dollars) to both the federal antitrust division of the U.S. Department of Justice (Antitrust Division of the Department of Justice) and the Federal Trade Commission for investigations into unfair trade practices (Center for the Study of American Business, 1998). *Unemployment* was measured as the percentage of the unemployed populations to the total civilian labor force (Bureau of Labor Statistics, 2004). *Labor unionism* was measured

by the percentage of union members to total labor force (U.S. Labor Research Association, 2003).

3.2. Control variables

Model endogeneity suggests that the rate of new firm formation in the previous year and the rate of failure may influence the rate of new firm formation in the current year. Statistically, we found that new firm formation has a one-lag autocorrelation. The density dependence explanation, offered by organizational ecologists, suggests a curvilinear effect of density on founding rate – density increases new firm formation by increasing the legitimacy of a new organizational form but also decreases new firm formation by increasing competitive selection pressures on the population (Hannan and Carroll, 1992). *New firm formation at time $t-1$* was measured the same way as new firm formation at time t . To account for the curvilinear effect on new firm formation, we also included a squared term of *new firm formation at time $t-1$* .

Organizational ecology studies have shown that recent failures tended to foster new firm founding because failures create a pool of fungible resources that became available for redeployment to new ventures (Delacroix and Carroll, 1983). On the other hand, the high failure rates of new firms may signal the presence of a hostile environment and thus significantly reduce the legitimacy of newly founded businesses. The *failure rate* is defined as the annual number of bankruptcies per 10,000 firms (U.S. Census Bureau, Annual). Entrepreneurship represents one option in a range of economic activity that individuals can choose to create personal wealth, and thus the relative cost of using money will influence entrepreneurial intensity (Shane, 1996). Thus, we control for interest rates in this model. The prevailing *interest rate* was measured as the bank prime loan rate in the U.S. (Federal Reserve Board of Governors, 2004).

3.3. Analysis

The purpose of our empirical test is to provide exploratory evidence on how macroeconomic

and technology policy factors influence new firm formation at the national level over a period of time. Autocorrelation of disturbances that arise most frequently in time series data often leads to biased estimators in ordinary least squares regression (Kennedy, 2003). To determine whether or not the disturbances in the data are autocorrelated, the Durbin-Watson and Breusch-Godfrey Lagrange Multiplier tests were performed. The results indicated that autocorrelated disturbances were presented in the data. Following the recommended procedure by Ostrom (1978), we identified the disturbance as a first-order autoregressive term. The Breusch-Pagan test for heteroskedasticity indicated that the disturbances were constant and therefore, we employed a time series autoregression [AR(1)] using the maximum likelihood method to test our hypotheses (Shane, 1996).

4. Results

The means, standard deviations, and bivariate correlations for the variables are presented in Table I. The correlation matrices report a number of highly correlated variables although their coefficients fall within the tolerances acceptable for regression analysis without undue variance inflation. Only the correlation between new firm formation and labor market mobility (measured by labor unionism) slightly exceeded 0.90. Table II presents the MLE time series regression models of the determinants of new firm formation in the U.S. Model 1 reports the effects of the control variables. Model 2

TABLE II
MLE time series regression on new firm formation

	Model 1 Control model	Model 2 Full model
Constant	2.41 ***	6.55***
Controls		
New Firm Formation ($t-1$)	0.35	-0.55*
New Firm Formation ($t-1$) ²	0.09***	0.04**
Failure Rate	0.00	-0.00
Interest Rate	0.01	0.01
Opportunity Factors		
R&D Stock		0.58 ⁺
Patent Application		-1.81**
Economic Concentration		-3.73***
Pro-Competition		0.01***
Individual Factors		
Unemployment		0.05
Labor Unionism		-0.07**
Log Likelihood	0.77	23.16

*** $P < 0.001$; ** $P < 0.01$; * $P < 0.05$; + $P < 0.10$.

estimates the full model with all the control and independent variables.

We found that R&D stock per capita is positively related to new firm formation in the U.S., with a coefficient estimate that is statistically significant. Patent application is negatively associated to new firm formation in the full model. Thus, Hypotheses 1a and 1b were supported. Regarding economic opportunity driven entrepreneurship, we found that economic concentration is significantly and negatively related to new firm formation. Pro-competition policy is significantly and positively related to new firm

TABLE I
Descriptive statistics and correlations among variables

	Mean	s.d.	1	2	3	4	5	6	7	8
1 New Firm Formation	4.65	0.95	1.00							
2 Failure Rate	66.92	34.11	0.76	1.00						
3 Interest Rate	9.40	3.26	0.42	0.06	1.00					
4 R&D Stock	3.23	0.43	0.50	0.75	-0.22	1.00				
5 Patent Application	1.12	0.13	-0.24	0.10	-0.56	0.61	1.00			
6 Economic Concentration	0.77	0.07	0.64	0.28	0.50	-0.01	-0.34	1.00		
7 Pro-Competition	138.65	30.82	0.50	-0.03	0.51	-0.38	-0.60	0.80	1.00	
8 Unemployment	6.49	1.53	0.47	0.43	0.35	-0.16	-0.47	0.65	0.56	1.00
9 Labor Unionism	20.10	6.55	-0.91	-0.83	-0.19	-0.73	-0.13	-0.59	-0.28	-0.36

For correlations greater than 0.41, $P < 0.05$, 2-tailed.

formation. Thus, Hypotheses 2a and 2b were supported. On the labor market side of the model, we found that unemployment is not significantly related to the dependent variable. Thus, Hypothesis 3a was not supported. With respect to the impact of labor market mobility, recall that the lower the number of labor union members per unit working population, the more mobile the labor market. Labor unionism is negatively and significantly related to new firm formation. Thus, Hypothesis 3b was supported.

5. Discussion

This study has attempted to demonstrate that new firm formation at the level of the economy can be explained by macroeconomic and technology policy factors that affect perceived opportunity and individual choices to pursue entrepreneurship. The results of this study, using a longitudinal U.S. dataset, show that opportunity drivers (R&D stock, patent application, economic concentration, and pro-competition) and an individual choice driver (labor unionism) were significantly related to new firm formation over time. Contrary to previous studies, we did not find a significant relationship between unemployment and new firm formation. Overall, this study demonstrated that macro policies designed to enhance technological and market opportunity and lower the opportunity costs of self-employment can lead to a higher level of new firm formation.

The results of this study revealed interesting findings regarding the role of technological opportunity in new firm formation. Specifically, we found that R&D spending and patenting have opposite effects on entrepreneurial intensity. Patents per se, may not indicate the potential for *new* firm formation in the same way that R&D expenditures may. Instead, it indicates the potential for *rent* creation and the survival of existing organizations. If indeed most of the patents filed in the U.S. came from large corporations, a negative association with new venture creation will not be unexpected because the successful patenting of discoveries by large corporations effectively locks out the entrepreneurs who are attempting to compete in the same knowledge domain. In fact, between

1963 and 1998, U.S. individuals' share of patents ownership comprised an average of 15% of total patents filed. During that period, this share has steadily declined (US Patent and Trademark Office, 1999).

The issue of economic opportunity driven entrepreneurship deserves further attention. The negative influence of economic concentration on new firm formation in the U.S. provides clear evidence on the entry deterring effects of concentration. In the U.S. economy, conglomerates and large firms like the Fortune 500 firms possessing substantial market power have generally regarded corporate diversification as a strategy for growth. Thus, an increase in their productive capacity would most likely lead to an increase in diversification (cf. Khanna and Rivkin, 2001). In such situations, there would be a higher probability of direct competition between the diversified firms and entrants to fill available market niches, likely leading to retaliation against entrants by the conglomerates. The positive relationship between pro-competition policy and new firm formation in our data supports this notion.

The findings of this study indicate that the labor market's characteristics are an important element of entrepreneurial policy. The negative relationship between labor unionism and new firm formation supports the argument that labor market mobility is an antecedent to entrepreneurial activity. Even though it is statistically insignificant, the positive association between unemployment and new firm formation in the U.S. seems to be in part due to the flexibility in the U.S. labor market. Therefore, policymakers should consider the nature of labor market in conjunction with technological and economic opportunity factors when attempting to encourage entrepreneurship through macroeconomic policies.

5.1. Possible extensions

A logical extension to this study would be to include more international data from such fast growth countries and regions as Korea, Singapore, Ireland, Scandinavia, and Israel. These countries have had histories of active government intervention in economic development with widely varying degrees of entrepreneurial

intensity in the technology sector. Such a study will allow us to further test the generalizability of this approach and give us a greater degree of freedom to draw useful policy conclusions.

As suggested by Gilbert et al. (2004), the policy-centric approach of national entrepreneurship can be further specified and tested at the regional level by shrinking the level of analysis to a well-defined geographic region or industry cluster in a large economy such as the United States. Doing so will allow researchers to obtain higher quality panel data and thus achieve finer measures of the model's constructs. Finer grained data would improve the operationalization of the constructs and thus confer higher discriminant validity to the variables.

6. Conclusion

This study demonstrated that technological knowledge capital, economic opportunity structure, and labor mobility are important areas in which government policy can influence the intensity of new firm formation. Our discussion of how policy can provide plausible explanations for the differences in new firm formation over time in the U.S. complements the cultural explanations of national entrepreneurship. The study extends ongoing research on national entrepreneurship by providing evidence that entrepreneurial policy factors that vary over time can materially impact the variations in entrepreneurial intensity. We believe that our approach is potentially useful to policymakers looking for a better framework for understanding how to accelerate national entrepreneurship. For example, the strength of our findings regarding the relationships between policy factors (in technology, economic concentration, competition, and labor market mobility) and entrepreneurial intensity places the role of government squarely in the center of the new firm formation dynamic.

Notes

¹ Patenting fees in multiple jurisdictions can reach US\$250,000. If one includes the cost of litigation against infringements, these fees can rise to US\$500,000 (Markman et al., 2003).

² American Airlines unsuccessfully spent 3 years (1997–2000) legally challenging the Shelby Amendment, passed by the U.S.

Congress to allow jet aircraft with less than 56 passengers using Love Field in Dallas to serve markets outside of Texas, to stop competition to its Dallas/Fort Worth hub (American Airlines, Inc. v. U.S. Dep't of Transportation, 202 F.3d 788, 793–95 (5th Cir. 2000), cert. denied, ___ U.S. ___, 147 L. Ed. 2d 1005, 147 L. Ed. 2d 1022 (June 29, 2000)). Alleging that AA's actions are part of attempts to "monopolize by means of the reputation for predation", the Department of Justice in U.S. v. AMR Corp. (99–1180–JTM) charged that AA's efforts to overturn Shelby were aimed at Legend Airlines, which, deterred from using DFW, had planned to offer premium jet service for business travelers from Love Field. Although AA failed to overturn Shelby, the legal costs incurred by Legend to fight AA eventually led to Legend's Chapter 11 bankruptcy in December 2000 (<http://www.usdoj.gov/atr/cases/f8100/8134.pdf>). We thank the managing editor for pointing out this interesting example.

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