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Abstract: This study examines how tax progressivity affects entrepreneurial dynamics in 18 countries. The results show that increased downside progressivity has a positive influence on the transition rate from nascent entrepreneurship to established business ownership. In addition, only downside progressivity calculated using marginal tax rates is related to the transition ratio, implying that it is marginal tax rates, and not average tax rates, that are used in the entrepreneurial decision-making process. This paper contributes to our understanding of entrepreneurial dynamics and the effect of tax progressivity on the transition from nascent entrepreneurship to established business ownership.

Keywords: entrepreneurial dynamics; tax progressivity; transition ratio; panel data

1. Introduction

Entrepreneurship (innovation) as a catalyst for economic growth can be traced in the economics literature to Ref [1], and encouraging entrepreneurship has kept the attention of policymakers to the present day. Taxes have been cited as a potential boost or deterrent to entrepreneurship at least since the 1940s (e.g., [2]). Therefore, an existing literature on the relationship between taxes and entrepreneurship is unclear [3]. According to Clingingsmith and Shane [4], while the deterrent effects are associated with risk taking explanation (i.e., the asymmetric taxation of profits and losses), the boosting effects are associated with the tax avoidance story. It should be also noted that tax systems can differ in their progressivity, and designing a tax structure is a very complex task due to their effects on different individuals such as employees, business owners, and so on [5,6]. However, from a policy perspective, assuming that any changes to the tax code must be revenue-neutral, it is only the tax structure that can be changed. These tax code changes can include items such as proportional or progressive tax rates, incentives for investments in innovation, loss-carryforwards that act as insurance for risk-averse prospective entrepreneurs, and tax code simplifications that decrease the cost of tax compliance. In this paper, we study the impact of tax progressivity on entrepreneurial dynamics. Specifically, we study how the convexity of marginal and average tax rates above and below-average income affects the transition from nascent entrepreneur to business ownership.

Early theoretical studies that build on the probability approach to risk theory show that higher tax progressivity leads to increased entrepreneurial entry [7–10]. This is due to the ease of tax avoidance by the self-employed when high progressive tax rates increase the financial incentive for tax avoidance. Higher tax progressivity also leads to increased entrepreneurial entry by offering insurance for risk-averse entrepreneurs against uninsured idiosyncratic risk ('insurance' effect, e.g., [7,8,11]. The rationale is that if the full offset of losses are deductible from their future tax duties, which leaves the return per unit of risk-taking unchanged, then it will encourage entrepreneurial activity. However, the yield can be reduced at a greater percentage under conditions of taxation without full or partial

loss offset. Therefore, the likelihood of entrepreneurial entry depends on the provisions in the tax law based on the aforementioned possible cases of loss deduction.

Later theories of the effect of tax progressivity on the decision to become an "entrepreneur" build on simple discrete-choice examples, such as probit models for entrepreneurial entry [12,13], predicting that progressive tax rates with imperfect loss offsets can discourage entrepreneurial entry by increasing the average tax burden. The rationale is that in progressive tax rates, successful entrepreneurs have a larger share of payoffs than less successful entrepreneurs, and thus this asymmetric treatment leads to decreased entrepreneurial entry. These outcomes imply the possibility of a 'success' effect, which means that entrepreneurial entry is reduced with an increase in tax progressivity. In recent years, however, both micro- and macro-level empirical literature [14–17] have provided mixed evidence for this relationship. Consequently, the following theoretical literature has examined why tax progressivity can have positive [7], negative [18,19], or ambiguous effects [20] on entrepreneurial entry.

Despite these analyses and various cross-national panel examinations, little is known about the relationship between tax progressivity and the transition from nascent entrepreneurship to established business ownership. Two recent studies, [16] and [17], both explored the effect of tax progressivity on entrepreneurial entry at the macro level using cross-national panel analysis. While [16] examines the effect of tax progressivity on nascent entrepreneurship, [17] explores the effect of tax progressivity on entrepreneurial activity by distinguishing two types of entrepreneurship–nascent entrepreneurship and established business ownership. Both studies found a negative association between tax progressivity and nascent entrepreneurship at higher incomes. However, neither of them examine the effect of tax progressivity on the entrepreneurial process by synthesizing the transition between nascent entrepreneurship and new business ownership. As noted by [21] (p. 946), " ... a key transition in the entrepreneurial process is that from nascent entrepreneurship to new business ownership, i.e., the transition from taking steps to starting a business to actually creating an operational firm."

A key challenge faced in the literature has been to develop a concrete measure of "entrepreneurial activity" [22,23]. This paper is focused on the transition phase, when nascent entrepreneurs develop into operational businesses. This is measured using the transition ratio, the proportion of new business owners divided by the proportion of nascent entrepreneurs in the previous year. Therefore, the purpose of the current study is two-fold. First, it attempts to identify the effect of tax progressivity on the entrepreneurial process. Second, the most significant contribution of the present study is that it proposes to test a new theory on the aforementioned association. The main reason for this is that earlier theoretical and empirical works have been unable to provide much guidance on the effect of tax progressivity due to the competing predictions of the 'insurance' and 'success' effect, and no clear theory for when each might apply. Moreover, as Ref [16] (p. 171) note, "Oddly the bulk of the empirical evidence on the impact of average tax rates points to a positive effect on entrepreneurship (self-employment). This difference in the effects of average and marginal tax rates suggests that tax progressivity may play an important role." This quote serves as motivation for the research questions: Does tax progressivity play an essential role in entrepreneurial dynamics; and are marginal or average tax rates important when examining nascent entrepreneurs' decisions to start a business?

The empirical tests, using macro-level panel data for 18 countries over the period 2002–2007, show that downside progressivity, which is progressivity measured at income levels below the average level of income, have a positive impact on the transition rate from nascent entrepreneurship to established business ownership. However, there is no significant relationship between the transition ratio [21] and upside progressivity, which is progressivity measured at income levels above the average level of income. In addition, downside progressivity calculated using marginal tax rates is significantly related to the transition ratio, but downside progressivity calculated using average tax rates is not related to the transition ratio. This implies that entrepreneurs are using marginal tax rates in their decision-making process and not average tax rates.

This contributes to our understanding of entrepreneurial dynamics. Previous research has found that upside progressivity impacts nascent entrepreneurship negatively [16,17], and progressivity has

no impact on established business ownership [17]. We find that the conversion rate from nascent entrepreneur to established business ownership is positively related to downside progressivity. Thus, a clearer picture of entrepreneurial dynamics develops. High upside progressivity dampens entrepreneurial enthusiasm. However, some entrepreneurs are not dissuaded from beginning the entrepreneurial process, becoming nascent entrepreneurs. For this group, a key factor in advancing to the next stage of entrepreneurship, established business owner, is downside progressivity.

These results have implications for policymakers interested in encouraging entrepreneurship. Decreasing upside progressivity encourages nascent entrepreneurs to investigate the possibility of starting a business. Increasing downside progressivity increases the transition rate from nascent entrepreneur to established business owner. Also, policymakers need to make sure that marginal tax rates are clear to taxpayers, as they are more important than average tax rates in entrepreneurial dynamics.

In Section 2, we develop theory and hypotheses, Section 3 presents the data and methodology, followed by the empirical tests in Section 4. Section 5 concludes the paper with a discussion of the results, limitations of the current research, and implications for practice and future research.

2. Theory and Hypotheses

There are two dimensions to taxes: tax progressivity and tax rates [16,17,20,24–27]. The sections that follow examine each dimension separately, and the impact they have on entrepreneurial dynamics.

2.1. Tax Progressivity

When an employee is considering giving up the stability of employment for the uncertainty of self-employment (entrepreneurship), they will consider the effect of taxes on their future earnings. If a conservative entrepreneur is in a high tax progressivity environment, they will be primarily concerned with downside progressivity, which is progressivity below the average income level. High downside progressivity means lower tax rates in the initial phases of the enterprise. In a high tax progressivity environment, the initial tax rate faced by the entrepreneur is very low, but will increase steeply with success. A similar entrepreneur in a flat or low progressivity tax structure is faced with a higher initial tax rate due to less downside progressivity. As income increases, the tax rate increases only slightly due to the low progressivity.

Upside progressivity applies to applicable taxes above the average income level. This is likely many years after the start of the entrepreneurial process, which means it is often not within the entrepreneur's forecast horizon. Due to an entrepreneur's focus on the short-term, only downside progressivity is used in the decision-making process.

When comparing the entrepreneur in the high progressivity case and the entrepreneur in the low progressivity environment, high progressivity is preferred. This is because of the low initial tax rate. Due to the struggle for survival by early-stage entrepreneurs, low tax rates can mean the difference between success and failure when cash is at its scarcest. Low initial tax rates are also advantageous simply due to the time value of money. Low initial rates in exchange for higher rates at a later point in time mean the present value of the after-tax earnings stream is higher.

An optimistic entrepreneur will be less affected by the progressivity of tax rates when deciding to become an entrepreneur. The benefits outlined above from low initial tax rates that exist in the early stages in the high progressivity setting will still benefit the entrepreneur, but the increased tax rates might deter the entrepreneur at the higher income levels. This is a paradox of high progressivity, low initial tax rates that might only apply for a brief period, but high tax rates then apply for many years in the long run. Thus, any initial benefit of lower taxes is quickly evaporated, and year-after-year higher taxes are a deterrent to entrepreneurial entry. However, this also assumes a somewhat symmetrical tax structure, where downside progressivity and upside progressivity are approximately equal. The ideal situation for the entrepreneur is large downside progressivity and small upside progressivity. In this

case, the entrepreneur gets the benefit of low initial tax rates in the early stages, and does not have to pay extraordinarily high taxes if the venture is a booming success.

The transition ratio used in this study measures the annual transition rate from nascent to established entrepreneur. Based on the above discussion, we predict that downside progressivity will be positively related to the transition ratio, and upside progressivity will be negatively related to the transition ratio. This leads to the following hypotheses:

Hypothesis 1. *Downside progressivity will be positively related to the transition ratio.*

Hypothesis 2. *Upside progressivity will be negatively related to the transition ratio.*

2.2. Tax Rates

Tax researchers discuss two distinct groups of tax features: actual ("objective") and perceived ("subjective") [28–30]. The idea stems from the tax perception literature, which claims that for measuring, analyzing, and explaining the reaction of individuals to taxation, perceived, or subjective, tax features are more essential [28]. These studies stress the importance of taxes on individual decision-making, but they do not mention which tax rates (average or marginal) are relevant.

Taxpayers can use average or marginal tax rates in their decision-making process [31]. Published marginal tax rates that the individual will pay are known ex-ante, whereas average tax rates are known only ex-post after actual taxes have been paid. It is important to examine both of these to determine which tax rates are used by potential entrepreneurs when deciding to pursue self-employment (entrepreneurship). The heterogeneity in perception (e.g., some individuals might use average tax rates and some marginal tax rates) makes it difficult to test which tax rates are relevant for individual decision-makers when using data collected by surveys or interviews.

Using a laboratory experiment on investment decisions, [31] suggests that it is incorrect to assume marginal tax rates are used exclusively in individual decision-making. In Ref [31]'s experiments, individuals assumed the average tax rates 'as if' they were the marginal tax rates, and tended to be confused when the marginal tax rates were less explicit. Additionally, in the tax psychology literature, some of the prior studies emphasize that individuals overestimate their marginal tax rates (e.g., [32,33]).

It has been proposed that either marginal or average tax rates can be used to measure progressivity. However, average tax rates can only be calculated ex-post, whereas marginal tax rates are available ex-ante when the decision is being made. Average tax rates are based on actual taxes paid and will only be known after the change to self-employment has been made, too late to use in decision making. Therefore, in the empirical tests, average tax rates and progressivity measured using average tax rates will not be related to the conversion ratio. However, marginal tax rates and progressivity measured using marginal tax rates will be related to the conversion ratio. This leads to the third hypothesis:

Hypothesis 3. *Nascent entrepreneurs use marginal tax rates and not average tax rates, when deciding whether to transition from nascent entrepreneur to established business owner.*

Tax rates, whether average or marginal, have a negative or positive or effect on the labor supply [34,35]. Increased taxes reduce net earnings received, which causes either a decreased supply of labor due to the decreased cost of leisure (substitution effect) or an increased supply of labor if the worker desires to maintain their income level (income effect). This is also true of prospective entrepreneurs, with future taxation reducing the payoffs from their efforts [36,37]. As the current study is concerned with the effect of tax progressivity on the decision to give up employment for self-employment, the level of tax rates are included, but no predictions are made regarding their impact on the entrepreneur's decision.

3. Data and Methodology

3.1. Data and Sample

In order to examine the relationship between tax progressivity and the transition to entrepreneurship, we gather country data from several independent sources, including [21,38–45]. The dependent variable is the transition ratio, and the primary independent variables are tax progressivity and tax rates. There are a myriad other factors influencing entrepreneurial entry. Country-level control variables that are considered influential factors of entrepreneurial entry are added to the regression model in line with [16] and [17]. Control variables included in the models are income per capita, start-up costs, quality of credit information, tertiary education, risk, subsidies, and inflation. The variables are described in Table 1.

The final dataset covers 18 countries over the period 2002–2007. The sample was constructed by matching the transition ratio from [21] with tax rate data for all available countries. The absence of the ideal data is limits both the country and time coverage of our empirical analysis. Ref [21] calculate the transition ratio using GEM individual-level data. GEM is an organization of teams from countries around the world, primarily affiliated with academic institutions, which conducts representative surveys of the adult population annually.

Table 1. Variables, Descriptions, and Sources.

Variable	Variable Description	Mean	SD	Min	Max	Source
Dependent Variable						
Transition Ratio (Tran Ratio)	The transition ratio is calculated by dividing the proportion of new business owners by the proportion of nascent entrepreneurs in the previous year.	0.44	0.25	0.00	1.42	(1)
Independent Variables						
Downside Progressivity ($DownProgress_M$)	Downside progressivity (with subscript M) is calculated as the difference between tax rates at 100% and 67% of average earnings using marginal tax rates.	3.40	5.77	−6.49	20.00	(2)
Upside Progressivity ($UpProgress_M$)	Upside progressivity (with subscript M) is calculated as the difference between tax rates at 167% and 100% of average earnings using marginal tax rates.	6.39	7.17	−12.68	23.80	(2)
Downside Progressivity ($DownProgress_A$)	Downside progressivity (with subscript A) is calculated as the difference between tax rates at 100% and 67% of average earnings using average tax rates.	3.97	1.78	0.56	7.98	(2)
Upside Progressivity ($UpProgress_A$)	Upside progressivity (with subscript A) is calculated as the difference between tax rates at 167% and 100% of average earnings using average tax rates.	6.42	2.31	2.85	12.64	(2)
$Tax67_M$	Net personal marginal tax rates of single workers with no children at 67% of average earnings.	35.90	9.28	18.75	61.41	(2)
$Tax100_M$	Net personal marginal tax rates of single workers with no children at 100% of average earnings.	39.31	9.72	22.88	59.91	(2)
$Tax167_M$	Net personal marginal tax rates of single workers with no children at 167% of average earnings.	45.69	9.43	26.95	62.28	(2)
$Tax67_A$	Net personal average tax rates of single workers with no children at 67% of average earnings.	24.84	7.15	5.89	37.00	(2)
$Tax100_A$	Net personal average tax rates of single workers with no children at 100% of average earnings.	28.82	7.22	13.87	43.37	(2)
$Tax167_A$	Net personal average tax rates of single workers with no children at 167% of average earnings.	35.24	7.61	21.68	50.00	(2)
Control Variables						
Income	GDP per capita, in log.	10.59	0.18	10.10	11.08	(3)
Start-Up Cost (Start Cost)	Cost of business start-up procedures (% of GNI per capita)	5.87	6.23	0.00	22.80	(3)
Risk	Investment Risk (0 = very low to 6 = very high)	5.41	0.68	3.17	6.00	(4)
Tertiary Education (Education)	School enrollment, tertiary (% gross)	67.58	12.51	49.79	97.94	(3)
Credit Information (Credit Info)	Depth of credit information index (0 = low to 8 = high)	6.43	1.11	4.00	8.00	(3)
Inflation	Inflation, GDP deflator (annual%)	2.46	1.88	−1.69	8.78	(3)
Subsidies	Subsidies and other transfers (% of expense)	55.56	16.75	15.87	81.24	(3)

Notes: For all variables, n = 102; Subscripts denote Marginal (M) or Average (A) tax rates; Sources: (1) [21]; (2) [38]; (3) Ref [40–45]; (4) [39].

The transition ratio is not available for all years and countries. The missing values are not imputed into the transition ratio, as it is the key dependent variable in the current analysis. After eliminating observations with missing values, the final sample comprises 108 observations of the variables of interest. The list of the countries included in the model is shown in Table 2.

Table 2. Countries Included in the Analysis.

Australia	Germany	Norway
Belgium	Iceland	Slovenia
Canada	Ireland	Spain
Denmark	Italy	Sweden
Finland	Japan	UK
France	Netherlands	USA

Table 3 contains descriptive statistics and correlations for the key variables used in the empirical tests. There is considerable variation in tax progressivity and the transition ratio within and between countries, which enables us to perform empirical analysis on the tax variables and entrepreneurial dynamics. For instance, the transition ratio, the percentage of 18-to 64-year-olds in the population switching from nascent entrepreneurship to established entrepreneurs, ranges from a minimum of 0% to a maximum of 1.42%. The mean value for the transition ratio is 0.44%. Iceland, Belgium, and France all had a zero transition ratio in 2004 and 2005, respectively. The highest transition ratios were in Japan at 1.42 in 2004, and Spain at 1.41 in 2006. The net personal marginal tax rate varies from 18.75% (Japan in 2003 and 2004, at 67% of average earnings) to 62.28% (Denmark from 2004 to 2007, at 167% of average earnings), while the net personal average tax rate varies from 5.89% (Ireland 2007, at 67% of average earnings) to 50% (Germany 2003, at 167% of average earnings). There is considerable variability in downside progressivity calculated using marginal tax rates, from low downside progressivity of −6.5 in Belgium in 2004 through 2007 to a high of 20.0 in Sweden in 2007. There is even greater variability in upside progressivity calculated using marginal tax rates, from −12.7 in Germany in 2005 to 23.8 in Sweden in 2004. There is less variability in downside progressivity calculated using average tax rates, from low downside progressivity of 0.56 in The Netherlands in 2005 to a high of 7.98 in Ireland in 2007. There is less variability in upside progressivity calculated using average tax rates than calculated using marginal tax rates, from 2.85 in Japan in 2002 to 12.64 in Ireland in 2005.

3.2. Dependent Variable

The transition ratio is computed based on the approach developed by [21], who developed a new method to measure entrepreneurial dynamics. The transition ratio measures the transformation from someone doing preparatory work to start a business (nascent entrepreneur) to establishing a functioning business (new business owner). Nascent entrepreneurship (NE) is measured as the percentage of adults that have taken actions to start a business as an owner or co-owner. In addition, the nascent entrepreneur has not received any income from the venture, or their income has been received for less than three months. A new business owner (NBO) is one who has received wages, profits, or in-kind payments from their new venture for more than three months, but less than 1.5 years. The transition ratio is calculated as NBO from the current year divided by NE from the previous year.

$$TR_t = NBO_t / NE_{t-1} \quad (1)$$

The transition ratio can be calculated only when a country has data for at least two consecutive years between 2001 and 2008. The authors of [21] tested the transition ratio's reliability and validity over numerous countries and years.

Table 3. Correlations and Descriptive Statistics.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1. Tran Ratio	1.00																	
2. DownProgressM	0.04	1.00																
3. UpProgressM	0.15	−0.38 *	1.00															
4. DownProgressA	−0.26 *	−0.09	−0.14	1.00														
5. UpProgressA	0.03	0.03	0.58 *	0.34 *	1.00													
6. Tax67M	−0.30 *	−0.23 *	−0.19	0.36 *	0.10	1.00												
7. Tax100M	−0.26 *	0.37 *	−0.41 *	0.29 *	0.12	0.82 *	1.00											
8. Tax167M	−0.16	0.10	0.34 *	0.20 *	0.56 *	0.69 *	0.72 *	1.00										
9. Tax67A	−0.24 *	0.14	−0.20 *	−0.09	−0.07	0.79 *	0.84 *	0.71 *	1.00									
10. Tax100A	−0.30 *	0.12	−0.23 *	0.16	0.02	0.87 *	0.90 *	0.76 *	0.97 *	1.00								
11. Tax167A	−0.28 *	0.12	−0.04	0.26 *	0.32 *	0.86 *	0.89 *	0.89 *	0.90 *	0.95 *	1.00							
12. Income	0.03	0.02	0.15	0.01	0.34 *	0.05	0.06	0.18	−0.04	−0.04	0.07	1.00						
13. Start Cost	0.03	−0.13	−0.18	0.14	−0.12	0.11	0.03	−0.11	−0.07	−0.04	−0.07	−0.41 *	1.00					
14. Risk	0.00	0.01	0.08	−0.03	0.08	0.05	0.05	0.11	0.08	0.07	0.09	0.05	0.00	1.00				
15. Education	0.06	0.18	0.23 *	−0.07	0.25 *	0.03	0.13	0.31 *	0.13	0.11	0.18	0.18	−0.31 *	0.03	1.00			
16. Credit Info	0.10	−0.21 *	−0.16	0.10	−0.19	−0.27 *	−0.38 *	−0.51 *	−0.44 *	−0.41 *	−0.44 *	0.23 *	−0.14	0.00	−0.20 *	1.00		
17. Inflation	−0.11	0.00	0.00	0.07	0.06	0.03	0.03	0.03	−0.04	−0.02	0.00	0.10	0.11	0.07	0.16	0.03	1.00	
18. Subsidies	0.13	−0.14	−0.33 *	−0.08	−0.34 *	0.25 *	0.16	−0.08	0.14	0.12	0.01	0.01	0.11	0.04	−0.06	−0.01	−0.17	1.00

Notes: Subscripts denote Marginal ($_M$) or Average ($_A$) tax rates. * Level of significance is 5%.

3.3. Independent Variables

The main variables of interest in the empirical analysis are measures of tax progressivity. The two tax progressivity variables were developed by [16], "downside progressivity," and "upside' progressivity." Downside and upside progressivity are calculated using both marginal and average tax rates. Therefore, there are four progressivity measures: downside and upside progressivity based on marginal tax rates, and downside and upside progressivity based on average tax rates. These measures have been commonly used to make cross-country comparisons of the entrepreneurial process [16,17].

Downside progressivity is calculated as the difference between the net personal tax rate at 100% of average earnings in the country and the net personal tax rate at 67% of average earnings in the country. Upside progressivity is calculated as the difference between the net personal tax rate at 167% of average earnings in the country and the net personal tax rate at 100% of average earnings.

Tax rates used in the empirical tests are taken from the Organization for Economic Co-operation and Development [38]. The tax rates used are net personal average and marginal income tax rates for incomes matching 67%, 100%, and 167% of average earnings. Previous research shows that tax rates might have a significant negative effect on entrepreneurship [12,13,46,47], a significant positive effect on entrepreneurship [24,36,48–51] or may not have a significant effect on entrepreneurship [52–55].

3.4. Control Variables

3.4.1. Income

The income measure, GDP per capita, is taken from Ref [40]. It is based on purchasing power parity in constant 2011 international dollars. We control for income as Ref [56] and Ref [57] emphasize that theoretically, income has an ambiguous effect on entrepreneurial entry, while other studies suggest that there exists a U-shaped relation between income and entrepreneurial activity [58,59].

While income can have a positive impact on entrepreneurial entry due to higher aggregate demand [16], it can also have a negative impact on entrepreneurial entry due to greater capital per worker and larger company size [60]. The negative association between income and entrepreneurial activity has been found in several studies [58,61–63].

3.4.2. Start-Up Costs

The start-up cost control variable is taken from the Ref [41]. It corresponds to the cost of business start-up procedures, which is measured as a percentage of gross national income (GNI) per capita. Start-up costs are an important control variable, as they may discourage entrepreneurship [64–66].

3.4.3. Credit Information

The index for the quality of credit information control variable is taken from Ref [42]. The index for the quality of credit information ranges from zero to eight, with zero indicating low quality of credit information and with eight indicating high quality of credit information. We control for the quality of credit information, because high-quality credit information can minimize the liquidity constraint and help entrepreneurs to access money that creditors have available [16,17,67–69].

3.4.4. Education

The human capital control variable is tertiary education, which corresponds to the level of education (% gross enrollment ratio) and is taken from Ref [43]. Tertiary education refers to education beyond the secondary level. We control for human capital, as it can have positive effect on entrepreneurial entry due to higher opportunity cost and wage earnings of being an entrepreneur [66,70–73]. However, human capital has also been shown to have a negative effect [74], and no significant effect [75–77].

3.4.5. Risk

The risk control variable is taken from [39]. The effect of risk on entrepreneurial entry is ambiguous. While [16] find a negative relationship between the risk factor and entrepreneurial entry, [17] finds a positive relationship between the two variables.

3.4.6. Subsidies

The subsidies control variable is taken from Ref [44]. The subsidies variable corresponds to subsidies, grants, and other social benefits, measured as a percentage of total cash payments for providing goods and services operated by the government. Ref [16] empirically found a negative effect of subsidies on entrepreneurial entry.

3.4.7. Inflation

The inflation control variable is taken from Ref [45]. It corresponds to the rate of price change in the economy as a whole, which is measured by the annual growth rate of the GDP implicit deflator (the ratio of GDP in current local currency to GDP in constant local currency). The results of previous research are mixed, as inflation may encourage entrepreneurial entry [78], although its influence can be negative [57,79,80] or can have no significant effect on entrepreneurial entry [81].

3.5. Model Specification

Following previous research [16,17] to examine the relationship between tax progressivity and entrepreneurial dynamics, the Arellano-Bond Dynamic Generalized Method-of-Moments (GMM) estimator is used [82]. This estimator has been employed in several recent entrepreneurship studies [83–86]. Additionally, the GMM estimator is specifically considered for small T and large N panels, as we are particularly interested in many countries and few years. We follow the guidance in Ref [87], as the GMM estimator has numerous advantages over other methods when the dependent variable in the model partly depends on its own past realizations, predictors may not be strictly exogenous (i.e., they can be correlated with past or current error terms), and heteroscedasticity or autocorrelation within individuals (but not across individuals) is assumed to exist.

In general, three main econometric complications can be solved by employing a GMM estimator [88]. The first advantage of this method is that it can account for unobserved country-specific effects, which reduce the probability that model estimation is subject to omitted variable bias due to unobservable heterogeneity [89,90]. Second, the GMM estimator utilizes lags to create instruments for considering the exogenous components of feasibly endogenous independent variables [87,91], which lessens the endogeneity concerns and their correlation with the error terms. Third, there is a potential autoregression process in the data due to the dynamic nature of the decision to become an entrepreneur. Using a model with lagged dependent variables controls for the possible reverse causality.

The GMM estimator is given by Equation (1). The model uses year dummies to capture macroeconomic shocks and country fixed-effects for differences in country-specific effects

$$Transition\_Ratio_{it} = \beta_1 Transition\_Ratio_{it-1} + \beta_2 Tax\_progressivity_{it} + \beta_3 Controls_{it} + u_{it} \quad (2)$$

where in each country i at time t, $Transition\_Ratio_{it}$ captures entrepreneurial entry, $Transition\_Ratio_{it\text{-}1}$ is the lagged dependent variable in the current model, $Tax\_progressivity_{it}$ denotes the measure of tax progressivity, and β are parameters to be estimated. Control variables defined in the variable measurement section are added to the model with $Controls_{it}$. In equation (1), the error term, u_{it}, contains the unobserved country-specific effects that are independent and identically distributed over the countries, ν_t, and observation specific errors, e_{it}, which are given by

$$u_{it} = v_t + e_{it} \quad (3)$$

It is not appropriate to estimate dynamic panel models with lagged dependent variables using Ordinary Least Squares (OLS), Fixed Effects (FE), Random Effects (RE) [92], as the correlation between lagged dependent variable and unobserved country-specific effects can lead to "dynamic panel bias" [93]. The initial estimator suggested by Ref [82] was adjusted for dynamic panel data models by first-differencing the data to remove any unobserved country-specific effects. However, the first-difference GMM estimator has a disadvantage because it does not use the cross-sectional information reflected in the differences between countries by removing unobserved country-specific effects. Therefore, we use the system GMM estimator [94,95] instead of the difference GMM estimator [82]. The system GMM estimator deals with time-invariant regressors in the model and accounts for potential endogeneity, as persistence of the dependent variable (transition ratio) could cause a critical weak instrument problem in difference GMM models [87]. However, in the system GMM estimator, the corresponding level of lagged variables are utilized as instruments in difference regressions, while the corresponding level of lagged differences are utilized as instruments in the level regressions.

Two tests were used in order to examine potential misspecification of the models employed. The Hansen J-test [96] of overidentifying restrictions is applied as a specification test in order to check the absence of correlation between the instruments and the error term. The AR (2) [82] test is applied as a second-order serial correlation test to verify that the differenced errors are not serially autocorrelated. There is no validity problem, as the Hansen J-test and AR (2) tests failed to reject the null hypothesis. Additionally, the Wald $\chi 2$ test serves as a test of overall model fit, showing a good fit for the model.

As per previous literature [16,17], tax rate (net personal marginal tax rate and average tax rate) and tax progressivity are treated as endogenous variables due to potential two-way causality between them and the dependent variable. Since selecting proper contemporaneous instruments is a challenging task, the suggestions made by Ref [95] were followed; the t-2 lagged values of the dependent variable and t-1 lagged values of all endogenous variables were used as instruments. Numerous recent studies have used a similar method to address endogeneity concerns [89,97,98]. We follow the superiority of collapsed instruments proposed by Ref [87] in determining proper contemporaneous instruments, as all endogenous variables are collapsed in our model to limit the instrument count. This is done to keep the number of instruments lower than the number of countries, because including an extreme number of instruments may result in finite-sample bias, fail the power of Hansen J-test, and cause severely downwardly biased standard errors [87].

The data was transformed using orthogonal deviations, enabling us to represent valid instruments. Following Ref [87], we use a robust two-step system GMM estimator with Windmeijer finite-sample correction [99] to avoid downwardly biased standard errors. We use the 'xtabond2' routine in STATA version 13 to attain the empirical estimations.

3.6. Robustness Strategy

To measure whether the results of the baseline model are robust to other model selections, tests were conducted by adding additional variables from previous research [16,17]. Start-up costs and income were added as endogenous variables to the baseline model. Exogenous variables that were significant in the studies mentioned above were also added to the baseline model. These variables: time dummies, credit information, tertiary education, and risk function as instruments for themselves ("IV style") in our robustness tests.

4. Results

Dynamic Panel System GMM Baseline Model Results.

Table 4 presents the results of our baseline two-step system GMM estimation for tax progressivity and entrepreneurial dynamics, where tax variables (average and marginal tax rates) are treated as endogenous when controlling for year effects as exogenous. Before interpreting the results of the

empirical tests, it is worth confirming numerous statistical tests that are essential when employing a two-step system GMM estimation [87]. In Specification 1 of Table 4, the Arellano-Bond tests of autocorrelation show that there is no serial correlation in the error terms ($p = 0.186$), and the number of instruments does not exceed the number of countries (i.e., $8 < 18$). The Hansen J-test is not significant in the baseline model ($p = 0.957$), which indicates that the employed variables are appropriate instruments and can be treated as exogenous. We now move to examining the tests of our hypotheses. Hypothesis 1 predicts a positive relationship between downside tax progressivity and the transition ratio. The findings provide support for hypothesis 1. Hypothesis 2 predicts a negative relationship between upside progressivity and the transition ratio. The findings do not support Hypothesis 2. Hypothesis 3 predicts that only marginal tax rates are perceived by entrepreneurs in the transition from nascent entrepreneurship to established entrepreneur. The results support Hypothesis 3.

Table 4. System Generalized Method-of-Moments (GMM; Arellano-Bond) Estimates.

	Marginal Tax Rates	**Average Tax Rates**		
Specification	**1**	**2**	**3**	**4**
	Downside	**Upside**	**Downside**	**Upside**
	Progressivity	**Progressivity**	**Progressivity**	**Progressivity**
Tax Progressivity	0.028 **	−0.002	−0.008	−0.013
	(0.012)	(0.015)	(0.080)	(0.052)
Tax Rate	−0.013	0.018	0.057	0.004
	(0.011)	(0.040)	(0.287)	(0.042)
Transition Ratio$_{t=-1}$	0.306 **	0.128	0.217	0.146
	(0.150)	(0.190)	(0.476)	(0.254)
Observations	84	84	84	84
Number of countries	18	18	18	18
Number of instruments	8	8	8	8
Wald $\chi 2$	11.376 **	2.694	1.442	0.966
AR(1) (p-value)	0.024	0.070	0.260	0.126
AR(2) (p-value)	0.186	0.190	0.359	0.221
Hansen J-test	0.314	1.698	2.152	4.216
Hansen (p-value)	0.957	0.637	0.541	0.239

Notes: Dependent Variable is Transition Ratio. Tax Rates and Tax Progressivity Are Endogenous. The Wald $\chi 2$ test for the overall model holds ($p = 0.023$) in specification 1. The Arellano-Bond test for AR(2) in Specifications 1–4 suggest that serial correlation is not a concern (p-values ranging from 0.186 to 0.359). The Hansen J-test of over-identification of the system GMM instruments in Specifications 1–4 does not reject the null that the instruments are uncorrelated with the error term (p-values ranging from 0.239 to 0.957), confirming the validity of the instruments used in the system GMM estimation. The number of instruments does not exceed the number of countries (i.e., $8 < 18$). Windmeijer-corrected standard errors in parentheses. All p-values are based on two-tailed tests; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In Table 4, four specifications are displayed. Specifications 1 and 2 use a two-step system GMM estimation with tax rates and progressivity measured using the net personal marginal tax rates (marginal tax rates). The results in Specification 1 suggest that downside progressivity positively affects switching from nascent entrepreneurship to established entrepreneur ($\beta = 0.029$; $p = 0.016$). This means that increasing downside progressivity by 35 units increases the rate of transition to entrepreneur by about one point. Put differently, a 1-unit increase in downside progressivity increases the rate of transition to entrepreneur by about 0.03 units. Additionally, the coefficient of the lagged dependent variable is positive and statistically significant ($\beta = 0.306$; $p = 0.041$). This supports our choice of the two-step system GMM estimator, because the current transition ratio depends on its own past realizations.

In specification 2, upside progressivity has an insignificant effect on the transition to the established entrepreneurs from the nascent entrepreneurship ($\beta = -0.002$; $p = 0.903$). Thus, hypothesis 2 is not supported.

Tax rates and tax progressivity are calculated with net personal average tax rates (average tax rates) in Specifications (3) and (4). Specifications 3 reports the results for downside progressivity at average tax rates in the lower income range (from 67 to 100% of average earnings). Specification 4 reports the results for upside tax progressivity at average tax rates in the higher income range (from 100 to 167% of average earnings). There are no significant results for the effect of tax progressivity on the transition from nascent to established entrepreneurs in either model ($\beta = -0.008$; $p = 0.923$) and ($\beta = -0.013$; $p = 0.807$). These results support hypothesis 3, that prospective entrepreneurs use marginal tax rates, and not average tax rates, when deciding to leave employment for self-employment.

In Table 5, four specifications are displayed. Specifications 5 and 6 use the two-step system GMM estimation with marginal tax rates and progressivity calculated using marginal tax rates. We find support for our baseline prediction that increasing downside progressivity increases transition from nascent to established entrepreneur, reflected in the positive and significant coefficient in Specification 5 ($\beta = 0.036$; $p = 0.008$). This demonstrates that increasing downside progressivity by 28 units would increase the rate of transition ratio by about one point. Put differently, a 1-unit increase in downside progressivity would increase the rate of transition ratio by about 0.04 U. However, for tax progressivity calculated using average tax rates, in Specifications 7 and 8 of Table 5, none of the coefficients are statistically significant, neither downside progressivity ($\beta = -0.006$; $p = 0.789$) nor upside progressivity ($\beta = -0.028$; $p = 0.380$). None of the explanatory variables added in specifications 5 through 8, income and startup costs are significant. In addition, none of the control variables, credit information and tertiary education, are significant. The coefficient of the lagged dependent variable is positive and statistically significant ($\beta = 0.530$; $p = 0.041$) for Specification 5, but not Specifications 6 through 8.

Table 5. Robustness checks, System GMM (Arellano-Bond) Estimates.

	Marginal Tax Rates	**Average Tax Rates**		
Specification	**5**	**6**	**7**	**8**
	Downside Progressivity	Upside Progressivity	Downside Progressivity	Upside Progressivity
Tax Progressivity	0.036 ***	−0.009	−0.006	−0.028
	(0.014)	(0.015)	(0.022)	(0.032)
Tax Rate	−0.016	0.015	0.024	0.002
	(0.016)	(0.047)	(0.028)	(0.014)
Log(Income)	0.804	−0.519	0.065	−0.393
	(1.092)	(1.416)	(0.686)	(0.762)
Start–Up Cost	0.002	0.005	−0.003	0.004
	(0.014)	(0.026)	(0.035)	(0.020)
Credit Information	−0.041	0.101	0.046	0.037
	(0.085)	(0.248)	(0.111)	(0.060)
Tertiary Education	−0.003	0.002	−0.001	0.004
	(0.005)	(0.010)	(0.008)	(0.004)

Table 5. *Cont.*

	Marginal Tax Rates	Average Tax Rates		
Specification	**5**	**6**	**7**	**8**
Transition Ratio$_{t\ =\ -1}$	0.530 **	0.235	0.303	0.208
	(0.259)	(0.190)	(0.387)	(0.335)
Observations	84	84	84	84
Number of countries	18	18	18	18
Number of instruments	14	14	14	14
Wald χ2	81.213 ***	17.893 **	15.540 **	29.145 ***
AR(1) (p-value)	0.031	0.090	0.239	0.229
AR(2) (p-value)	0.595	0.361	0.477	0.401
Hansen J-test	1.644	7.680	6.534	5.148
Hansen (p-value)	0.896	0.175	0.258	0.398

Notes: The Dependent Variable is the Transition Ratio. Tax Rates, Tax Progressivity, Income and Start Cost Are Endogenous; Credit Info and Education Are Exogenous. The Wald χ2 test for the overall model holds in Specifications 5–8 ($p < 0.05$). The Arellano-Bond tests for AR(2) in Specifications 5–8 suggest that serial correlation is not a concern (p-values ranging from 0.361 to 0.595). The Hansen J-test of over-identification of the system GMM instruments in Specifications 5–8 does not reject the null that the instruments are uncorrelated with the error term (p-values ranging from 0.175 to 0.896), confirming the validity of the instruments used in the system GMM estimation. The number of instruments does not exceed the number of countries (i.e., 14 < 18). Windmeijer-corrected standard errors in parentheses. All p-values are based on two-tailed tests; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Following [16] and [17], we run a second set of robustness checks by adding income-squared and risk to the previous models. Table 6 displays the results for the second set of robustness checks in Specifications 9 to 12. While Specifications 9 and 10 use the two-step system GMM estimation with tax rates and tax progressivity calculated using marginal tax rates. Specifications 11 and 12 use average tax rates and progressivity calculated using average tax rates. In Specification 9, the results for downside progressivity are essentially the same as in Specification 1. The coefficient on downside progressivity is positive and significant ($\beta = 0.028$; $p < 0.001$), which shows that the baseline model results hold, even after controlling for the other variables of interest. Increasing downside progressivity by 36 units would increase the rate of transition ratio by about one point. Put differently, a 1-unit increase in downside progressivity would increase the rate of transition ratio by about 0.03 U. In Specification 10, the coefficient on upside progressivity is not significant ($\beta = -0.005$; $p = 0.668$). When tax rates and tax progressivity are calculated using average tax rates, downside tax progressivity is not significant ($\beta = -0.008$; $p = 0.765$), and upside tax progressivity is not significant ($\beta = 0.038$; $p = 0.599$). Past entrepreneurial dynamics continue to indicate a strong, positive, and statistically significant relation ($\beta = 0.451$; $p < 0.001$).

In Table 7, we report the results of our final robustness checks. We continue the analysis by incorporating government subsidies and inflation into the models used previously. In Table 7, four specifications are presented. Specifications 13 and 14 employ the two-step system GMM estimation with tax rates and tax progressivity calculated using marginal tax rates. Specification 15 and 16 use average tax rates and progressivity calculated using average tax rates. As expected, in Specification 13 of Table 7, the regression coefficient on downside progressivity is positive and significant ($\beta = 0.027$; $p < 0.001$) and yields results that are robust with respect to the baseline model (Specification 1). Thus, the results from the two-step system GMM estimation appear to strongly support hypothesis 1, suggesting that increasing downside progressivity by 37 units would increase the rate of transition ratio by about one point. Put differently, a 1-unit increase in downside progressivity would increase the rate of transition ratio by about 0.03 U. In Specification 14, the coefficient on upside progressivity is not significant ($\beta = -0.003$; $p = 0.840$). When tax progressivity is calculated using average tax rates, as shown in Specifications 15 and 16, the tax progressivity variables do not display any effect on the rate

of transition ratio, which is consistent with the previous results. In Specification 13, the marginal tax rate at 100% of average earnings is negative and statistically significant ($\beta = -0.015$; $p = 0.058$). Prior period entrepreneurial dynamics continue to indicate a positive and statistically significant relationship with the rate of transition ratio ($\beta = 0.382$; $p = 0.016$).

Table 6. Robustness checks, System GMM (Arellano-Bond) Estimates.

	Marginal Tax Rates	**Average Tax Rates**		
Specification	**9**	**10**	**11**	**12**
	Downside	Upside	Downside	Upside
	Progressivity	Progressivity	Progressivity	Progressivity
Tax Progressivity	0.028 ***	−0.005	−0.008	−0.037
	(0.009)	(0.012)	(0.027)	(0.071)
Tax Rate	−0.015 *	0.000	0.021	0.015
	(0.009)	(0.042)	(0.040)	(0.015)
Log(Income)	4.104	29.820 *	21.135	54.587
	(3.378)	(16.476)	(16.272)	(70.867)
Log(Income)^2	−0.182	−1.395*	−0.987	−2.563
	(0.165)	(0.775)	(0.768)	(3.331)
Start–Up Cost	0.002	0.008	0.009	0.012
	(0.009)	(0.021)	(0.028)	(0.032)
Credit Information	−0.022	−0.013	0.038	−0.02
	(0.028)	(0.245)	(0.159)	(0.196)
Tertiary Education	0.000	0.004	0.002	0.003
	(0.003)	(0.009)	(0.007)	(0.010)
Risk	0.030	0.000	−0.013	0.016
	(0.032)	(0.051)	(0.031)	(0.044)
Transition Ratio$_{t=-1}$	0.451 ***	0.132	0.273	0.108
	(0.123)	(0.145)	(0.561)	(0.477)
Observations	84	84	84	84
Number of countries	18	18	18	18
Number of instruments	17	17	17	17
Wald $\chi 2$	1799.336 ***	44.008 ***	61.573 ***	39.282 ***
AR(1) (p-value)	0.031	0.078	0.384	0.484
AR(2) (p-value)	0.514	0.297	0.542	0.357
Hansen J-test	5.157	7.670	8.153	15.622
Hansen (p-value)	0.524	0.263	0.227	0.016

Notes: Dependent Variable is Transition Ratio. Tax Rates, Tax Progressivity, Income, Income Squared, and Start Cost Are Endogenous; Credit Info, Education, and Risk Are Exogenous. The Wald $\chi 2$ test for the overall model holds in Specifications 9–12 ($p < 0.01$). The Arellano-Bond tests for AR(2) in Specifications 9–12 suggest that serial correlation is not a concern (p-values ranging from 0.297 to 0.542). The Hansen J-test of over-identification of the system GMM instruments in Specifications 9–11 does not reject the null that the instruments are uncorrelated with the error term (p-values ranging from 0.227 to 0.524), confirming the validity of the instruments used in the system GMM estimation. The number of instruments does not exceed the number of countries (i.e., 17 < 18). Windmeijer-corrected standard errors in parentheses. All p-values are based on two-tailed tests; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7. Robustness checks, System GMM (Arellano-Bond) Estimates.

	Marginal Tax Rates	**Average Tax Rates**		
Specification	**13**	**14**	**15**	**16**
	Downside	**Upside**	**Downside**	**Upside**
	Progressivity	**Progressivity**	**Progressivity**	**Progressivity**
Tax Progressivity	0.027 ***	−0.003	−0.013	0.006
	(0.008)	(0.016)	(0.016)	(0.022)
Tax Rate	−0.015 *	−0.010	−0.013	0.002
	(0.008)	(0.035)	(0.027)	(0.022)
Log (Income)	0.449	−0.915	−0.434	−1.078
	(1.131)	(1.626)	(0.749)	(0.807)
Start–Up Cost	0.003	0.013	0.010	−0.003
	(0.011)	(0.013)	(0.008)	(0.014)
Subsidies	0.007	0.010	0.010	0.011 **
	(0.006)	(0.014)	(0.008)	(0.005)
Credit Information	−0.033	0.014	0.010	0.060
	(0.059)	(0.228)	(0.050)	(0.087)
Tertiary Education	−0.001	0.007	0.005	0.004
	(0.006)	(0.011)	(0.004)	(0.004)
Inflation	−0.020	0.016	0.002	0.022
	(0.042)	(0.065)	(0.032)	(0.032)
Transition Ratio$_{t\ =\ -1}$	0.382 **	0.164	0.229	0.215
	(0.159)	(0.132)	(0.166)	(0.138)
Observations	84	84	84	84
Number of countries	18	18	18	18
Number of instruments	17	17	17	17
Wald $\chi 2$	90.747 ***	98.717 ***	41.073 ***	564.475 ***
AR(1) (p-value)	0.037	0.028	0.074	0.097
AR(2) (p-value)	0.249	0.353	0.316	0.388
Hansen J-test	3.169	7.170	5.904	3.783
Hansen (p-value)	0.787	0.305	0.434	0.706

Notes: Dependent Variable is Transition Ratio. Tax Rates, Tax Progressivity, Income, Start Cost, and Subsidies Are Endogenous; Credit Info, Education, and Inflation Are Exogenous. The Wald $\chi 2$ test for the overall model holds in Specifications 13–16 ($p < 0.01$). The Arellano-Bond tests for AR(2) in Specifications 13–16 suggest that serial correlation is not a concern (p-values ranging from 0.249 to 0.388). The Hansen J-test of over-identification of the system GMM instruments in Specifications 13–16 does not reject the null that the instruments are uncorrelated with the error term (p-values ranging from 0.305 to 0.787), confirming the validity of the instruments used in the system GMM estimation. The number of instruments does not exceed the number of countries (i.e., 17 < 18). Windmeijer-corrected standard errors in parentheses. All p-values are based on two-tailed tests; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5. Discussion and Concluding Remarks

Using macro data across 18 countries from 2002 to 2007, we investigate the effect of tax progressivity on the rate of transition (conversion) from a state of "nascent entrepreneurship" to a state of "established business." Three main hypotheses were proposed and tested. Hypothesis 1 predicts a positive relationship between downside tax progressivity and the transition ratio. The findings provide support

for Hypothesis 1. Hypothesis 2 predicts a negative relationship between upside progressivity and the transition ratio. The findings do not support Hypothesis 2. Hypothesis 3 predicts that only marginal tax rates are perceived by entrepreneurs in the transition from nascent entrepreneurship to established entrepreneur. The results support Hypothesis 3.

The implication for policymakers is that to encourage entrepreneurial activity, they should maximize downside progressivity in marginal tax rates. However, the opportunity to change progressivity is constrained by the current levels of tax rates and progressivity. For example, in 2005, Ireland had a low transition ratio of 0.28. To try to increase this by increasing downside progressivity from the current level of 2.0 requires decreasing marginal tax rates at the lower levels of income, or increasing tax rates at higher levels of income. However, in 2005, Ireland already had one of the lowest marginal tax rates at 67% of average income (at 24% the second lowest in the sample countries after Japan). It might not be possible to decrease the already low tax rates at low levels of income, and policymakers are not likely to increase tax rates at higher levels of income due to the potential dampening effect higher tax rates might have on entrepreneurship [12,13,37,46,47]. These conditions give Ireland less flexibility in setting policy to encourage entrepreneurship through increasing downside progressivity.

The second example of a country with a low transition rate from nascent entrepreneurship to entrepreneurship is Belgium, with a 0.14 transition ratio in 2006 and 0.08 in 2007. This is also two years when Belgium had negative downside progressivity and high marginal tax rates. At 67% of average earnings, the marginal labor tax rate faced by a single person with no children was 61.3% in 2006 and 61.4% in 2007. To achieve the average transition ratio of the sample countries in 2006, Belgium would have to increase downside progressivity by 10.7% by reducing the tax rate faced by taxpayers at 67% of average earnings to 50.6%. Everything else being equal, this would increase the transition ratio by 0.30.

The results also have significant implications for research on entrepreneurial dynamics. We have demonstrated one use of the transition ratio, the importance of tax structure on entrepreneurial dynamics. This adds to our understanding of how the structure of tax rates is more important in explaining the transition ratio than the levels of tax rates. In many ways, this makes sense when considered from the standpoint of the entrepreneur. A nascent entrepreneur that is still working is faced with a current tax rate at their present level of income. When they consider giving up employment, the tax rate they face is not something they control. If the entrepreneur is in a high tax progressivity environment, they will consider two potential outcomes, if the new enterprise is more or less successful than their current situation as an employee. In the first case, if the new enterprise returns less than their current income, they will find comfort in knowing ex-ante that they will face a much lower tax rate. This reduces the risk of leaving employment for self-employment. In the success scenario, with income from the new enterprise above their current income as an employee, the nascent entrepreneur would, of course, like to face a lower tax rate, but is happy that they have more after-tax income than they did as an employee. Both scenarios in a high tax progressivity environment have something of a positive outcome for the nascent entrepreneur. Low success is offset somewhat by low tax rates, and high success still results in increased after-tax income.

The ideal situation for the nascent entrepreneur is high downside progressivity and low upside progressivity. In this case, the nascent entrepreneur benefits from low tax rates in the less-successful scenario, and in the high-success scenario tax rates close to what they were paying as an employee. This situation is found in our sample in Norway and Sweden. For example, in 2004, Norway had large downside progressivity of 13.5, and small upside progressivity of zero. This led to their 2004 transition ratio to be 0.89, twice the average transition ratio in our sample. Similarly, in 2003 Sweden had downside progressivity of 16.7, and small upside progressivity of 4.6. This led to their 2003 transition ratio to be 0.71, almost twice the average. These entrepreneur-friendly tax policies make it easier for the nascent entrepreneur to transition to become an established business owner.

Of course, tax structure is one of many factors affecting the transition rate from nascent entrepreneur to established business owner. Due to country-specific factors associated with tax structure, there might

be limited generalizability to other countries and time periods. Even within countries, there might be limited generalizability due to regional, state, or provincial income taxes that cause the tax rate faced by entrepreneurs to be significantly different from the average or statutory federal income tax rate. Future studies can investigate other variables and conditions that have been shown to affect levels of entrepreneurial activity and see if they also affect the transition ratio. In this study, we have demonstrated how one of those, increasing downside progressivity, increases the transition ratio.

Our paper contributes the existing literature in two dimensions. First, our research sheds some light on the studies showing significant cross-country variation in the relationship between tax progressivity and the entrepreneurial process. Second, as proposed by theory, econometric analysis of the current sample shows that downside progressivity has a positive influence on the transition rate from nascent entrepreneurship to established business ownership.

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