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ECONOMIC DEVELOPMENT AND
BUSINESS OWNERSHIP REVISITED

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Abstract

This paper revisits the two-equation model of Carree, van Stel, Thurik and Wennekers (2002) where deviations from the ‘equilibrium’ rate of business ownership play a central role determining both the growth of business ownership and that of economic development. Two extensions of the original setup are addressed: using longer time series of averaged data of 23 OECD countries (up to 2004) we can discriminate between different functional forms of the ‘equilibrium’ rate and we allow for different penalties for being above or under the ‘equilibrium’ rate. The additional data do not provide evidence of a superior statistical fit of a U-shaped ‘equilibrium’ relationship when compared to an L-shaped one. There appears to be a growth penalty for having too few business owners but not so for having too many.

Keywords: entrepreneurship, economic development, economic growth, business ownership

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1. Introduction

The empirical investigation of the relationship between business ownership rates and economic development has been dominated by three stylized facts. *First*, the rate differs strongly across countries. Figure 1 (left bars) shows that the business ownership rate in 2004 in the G7 nations range from 8% in France to 19% in Italy. Van Stel (2005) demonstrates similar differences across the 23 OECD countries over a long recent period. The business ownership rate is expressed as the percentage of (non-agricultural) owner/managers of incorporated and unincorporated businesses relative to the labour force. *Second*, the negative relationship between the business ownership rate and economic development is well documented. Examples include Kuznets (1971), Schultz (1990), Yamada (1996) and Iyigun and Owen (1998). Particularly the first two-thirds of the 20th century witnessed a move towards industrial centralization and concentration fuelled by the pervasiveness of economies of scale (Chandler, 1990, and Teece, 1993). *Third*, a reversal of this trend appears in the later part of the last century driven mainly by a reduction of the importance of scale economies. This reversal is first documented by Blau (1987) and Acs, Audretsch and Evans (1994) while other conceptual explanations are given by Piore and Sable (1984), Jensen (1993), as well as Audretsch and Thurik (2001 and 2004).

Modelling the relationship between the business ownership rate and economic development is complex because there are several mechanisms at play (Thurik, Carree, van Stel and Audretsch, 2007). Low levels of economic development may push people towards self-employment. However, these low levels may also go together with a limited amount of market opportunities and a lack of personal wealth needed to set up shop (Verheul, van Stel and Thurik 2006). On the other hand, increased business ownership activity may increase the level of economic development. This ‘Schumpeterian’ effect, however, depends on the level of economic development (van Stel, Carree and Thurik 2005).

Carree, van Stel, Thurik and Wennekers (2002) try to bring together stylized facts and causalities introducing a two-equation model where the ‘equilibrium’ rate of business ownership plays a central role. Deviations from this rate determine both the growth of business ownership and the pace of economic development. This set up enables to investigate the shape of the ‘equilibrium’ rate (U-shaped or L-shaped), the speed of convergence towards this rate (the error correcting mechanism) and the ‘out-of-equilibrium’ growth penalty (see also Audretsch, Carree, van Stel and Thurik, 2002).

This two-equation model inspired others to do similar investigations. For instance, the concept of the ‘U-shape’ is used for Latin American countries in Amorós (2006) while Belso Martinez (2005) uses the two-equation model to study the interplay between business ownership and economic development in Spanish regions. The latter paper however lacks proper referencing to the two-equation model and suffers

from some flaws.¹ The concept of the ‘U-shape’ is also tested in Wennekers, van Stel, Thurik and Reynolds (2005) using nascent entrepreneurship data in stead of business ownership data.

The present paper extends the two-equation model and the earlier results in the following ways. *First*, the use of longer time series provides a better view of the shape of the ‘equilibrium’ rate. Two obvious candidates still are the U-shape and L-shape both inspired by the third of the above mentioned stylized facts. *Second*, the symmetry of the growth penalty is studied in the sense that too few or too many businesses need not necessarily lead to the same growth penalty.

The main conclusions of the present paper are that (i) the additional, more recent data do not provide evidence of a superior statistical fit of a U-shaped ‘equilibrium’ relationship when compared to an L-shape; (ii) there appears to be a growth penalty for having too few business owners but none for having too many. The next section presents the model. The variables are described in section 3. Section 4 presents the estimation results while section 5 provides a short discussion on country-specific institutional factors.

2. The model

Carree, van Stel, Thurik and Wennekers (2002) introduced a model of the interrelationship between business ownership and economic development at the country level. The model consists of two equations. The first equation explains changes in the rate of business ownership from an error-correction process towards ‘equilibrium’ rates. The second equation determines the growth penalty of the rate of business ownership being ‘out-of-equilibrium’. A third equation acts as a definition and describes the ‘equilibrium’ rate of business ownership as a function of economic development. The subscripts i and t are used for countries and years, respectively.

Equation (1) relates the change in the rate of business ownership E_{it} to the extent in which this rate deviates from the ‘equilibrium’ rate E_{it}^* , to which the unemployment rate U_{it} deviates from the sample average unemployment rate and to which the labour income share LIQ_{it} deviates from the sample average income share. Equation (2) predicts economic growth from the (absolute) deviation of the actual business ownership rate from the ‘equilibrium’ rate. It is hypothesized that strong deviations from the ‘equilibrium’ rate leads to reduced economic growth (the growth penalty).

¹ In particular, the author uses data only from a four-year period (1998-2002). Since the economic relations investigated in the two-equation model are intrinsically of a long-term nature (e.g. the speed of convergence towards equilibrium), the database is not suitable for estimating this type of model. Accordingly, it is not clear how the Belso Martinez estimations should be interpreted. In the present paper we use data for 23 OECD countries over the period 1972-2004.

Equation (2a) has a symmetric penalty for being below or above the ‘equilibrium’ rate. Equation (2b) allows for this penalty to differ between below and above ‘equilibrium’ situations. Catching-up effects are included in this equation using the (preceding) level of economic development. Following Carree, van Stel, Thurik and Wennekers (2002) economic growth is the relative change of $YCAP_{it}$, the per capita gross domestic product in purchasing power parities per U.S. dollar in 1990 prices. Equation (3) describes the ‘equilibrium’ relationship² between business ownership rates and economic development ($YCAP_{it}$) as either U-shaped (3a) or L-shaped (3b). In the quadratic form, entrepreneurship declines with per capita income up till a minimum (when $YCAP_{it}$ equals $-\beta/2\gamma$) after which entrepreneurship increases with per capita income. In the inverse function, entrepreneurship gradually declines towards an asymptotic minimum value (of $\alpha - \beta$). In the first two equations the following notation is used: $\Delta_4 X_t = X_t - X_{t-4}$. The model reads as follows:

$$(1) \quad \Delta_4 E_{it} = b_1(E_{i,t-4}^* - E_{i,t-4}) + b_2(U_{i,t-6} - \bar{U}) + b_3(LIQ_{i,t-6} - \overline{LIQ}) + b_{ITA} D_{ITA} + \varepsilon_{1it} \quad ;$$

$$(2a) \quad \frac{\Delta_4 YCAP_{it}}{YCAP_{i,t-4}} = c_0 + c_1 |E_{i,t-4}^* - E_{i,t-4}| + c_2 YCAP_{i,t-4} + \varepsilon_{2it} \quad ;$$

$$(2b) \quad \frac{\Delta_4 YCAP_{it}}{YCAP_{i,t-4}} = c_0 + c_{1,overshoot} D_{overshoot,i,t-4} |E_{i,t-4}^* - E_{i,t-4}| + c_{1,undershoot} (1 - D_{overshoot,i,t-4}) |E_{i,t-4}^* - E_{i,t-4}| + c_2 YCAP_{i,t-4} + \varepsilon_{2it} \quad ;$$

$$(3a) \quad E_{it}^* = \alpha + \beta YCAP_{it} + \gamma YCAP_{it}^2 \quad ;$$

$$(3b) \quad E_{it}^* = \alpha - \beta \frac{YCAP_{it}}{YCAP_{it} + 1} \quad ,$$

where

E : number of business owners per labour force,

E^* : ‘equilibrium’ number of business owners per labour force,

$YCAP$: per capita GDP in thousands of purchasing power parities per U.S. \$ in 1990 prices,

U, \bar{U} : unemployment rate and sample average, respectively,

² The term ‘equilibrium’ is consistently put between quotes throughout this paper as it refers to an optimum or a norm rather than that it is derived from a regular demand and supply configuration. Note that the ‘equilibrium’ variable is latent.

- LIQ, \overline{LIQ} : labour income share and sample average, respectively,
- D_{ITA} : dummy variable with value 1 for Italy, and 0 for other countries,
- $D_{overshoot}$: dummy variable with value 1 if E is higher than E^* , and 0 otherwise,
- $\varepsilon_1, \varepsilon_2$: uncorrelated disturbance terms of equations (1) and (2), respectively,
- i, t : indices for country and year, respectively.

Business ownership equation (1)

The variable to be explained in equation (1) is the growth in the number of business owners per labour force in a four-year period. The parameter b_1 reflects the speed of an error correction mechanism between the ‘equilibrium’ and the actual rate of business ownership at the start of the period and is expected to have a positive sign. The parameter b_2 represents the influence of lagged unemployment acting as a *push* factor for business ownership and its expected sign is positive. We choose a lag of six years instead of four for this variable because mental preparation, practical procedures and legal requirements are involved in starting a new enterprise. The parameter b_3 represents the influence of the labour income share and its expected sign is negative. This share is a proxy for the earning differentials between expected profits of business owners and wage earnings. We assume that a relatively high business profitability (as compared to wage earnings) acts as a *pull* factor for business ownership. The labour income share is defined as the share of labour income (including the “calculated” compensation of the self-employed for their labour contribution) in the gross national income. As with the unemployment variable, a time lag has been included. Finally, we follow Carree, van Stel, Thurik and Wennekers (2002) incorporating a dummy for Italy. Italy, and Northern Italy in particular, is exceptional in the sense that a relatively high value of GDP per capita is combined with a high and rising self-employment rate. Belussi (1998) and Muehlberger and Pasqua (2006) describe how the important phenomenon of ‘continuous and coordinated collaborators’ in Italy contributes to the high self-employment rate in Italy. Belussi (1998) also describes how governmental policies in Italy (at the local, regional and national level) have been very favourable to artisan production and self-employment, claiming that support programmes for self-employment amount up to almost 2% of Italian GDP.

Economic growth equations (2a) and (2b)

The variable to be explained in equations (2a) and (2b) is economic growth measured as the relative change in gross domestic product per capita in a four-year period. The parameter c_1 represents the influence of the (absolute) deviation of the actual rate of self-employment (business ownership) from the ‘equilibrium’ rate of business

ownership at the start of the period. This deviation is expected to have a negative impact on subsequent growth: $c_1 < 0$. We also investigate whether the growth penalty is different in situations of ‘undershooting’ (the actual number of business owners is lower than the ‘equilibrium’ number) or ‘overshooting’ (the actual number of business owners is higher than the ‘equilibrium’ number). See equation (2b). The parameter c_2 measures the impact of the level of per capita income at the start of the period. This variable allows for correcting for the convergence hypothesis: countries lagging behind in economic development grow more easily because they can profit from technologies developed in other countries. The expected sign of the parameter c_2 is negative.

3. The variables

Data are used from the 23 OECD countries (the former EU-15, Australia, Canada, Iceland, Japan, New Zealand, Norway, Switzerland and the US) and for the even years in the period 1972 through 2004. *OECD Labour Force Statistics* and the *OECD National Account* are the main data sources. Our sample consists of four-yearly data. Data for the years 1980, 1984, 1988, 1992, 1996, 2000 and 2004 are used. The total number of observations equals 161 (instead of the 115 in Carree, van Stel, Thurik and Wennekers, 2002). We do not use data for the other even years, such as 1982, 1986, etc., because the observation periods for two consecutive even years overlap. This may lead to a downward bias in the estimated standard errors of the parameters.

3.1. Variables and sources

The definition and the main source of the variables are as follows:

E: Business ownership (or self-employment). It is defined as the number of business owners (in all sectors excluding the agricultural sector), expressed as a fraction of the labour force. Business owners include unincorporated and incorporated self-employed individuals but exclude unpaid family workers. Data on business ownership are taken from EIM’s COMPENDIA data base (available through www.eim.net). In COMPENDIA numbers of self-employed reported in *OECD Labour Force Statistics* are harmonized across countries and over time. In the present paper version 2004.2 of the COMPENDIA data base is used. See van Stel (2005) for an account of how an earlier version of this data set is put together. Data on total labour force are from *OECD Labour Force Statistics*;

YCAP: Gross domestic product per capita. The variables gross domestic product and total population are taken from *OECD National Accounts* and *OECD Labour Force Statistics*, respectively. GDP (in thousands of US \$) is measured in

constant prices. Furthermore, purchasing power parities of 1990 are used to make the monetary units comparable between countries;

U: Unemployment rate. It is measured as the number of unemployed as a fraction of the total labour force. The labour force consists of employees, self-employed persons, unpaid family workers, people employed by the armed forces and unemployed persons. The main source for this variable is *OECD Main Economic Indicators*;

LIQ: Labour income share. Total compensation of employees is multiplied by (total employment/number of employees) to correct for the imputed wage income for the self-employed persons. Next, the number obtained is divided by total income (compensation of employees plus gross operating surplus and gross mixed income). The data of these variables are from *OECD National Accounts*.

4. Estimation results

Substituting equations (3a) and (3b) into equation (1) we obtain:

(4a)

$$\Delta_4 E_{it} = a_0 - b_1 E_{i,t-4} + b_2 U_{i,t-6} + b_3 LIQ_{i,t-6} + a_4 YCAP_{i,t-4} + a_5 YCAP_{i,t-4}^2 + b_{ITA} D_{ITA} + \varepsilon_{1it} \quad ;$$

$$(4b) \Delta_4 E_{it} = a_0 - b_1 E_{i,t-4} + b_2 U_{i,t-6} + b_3 LIQ_{i,t-6} + a_4 \frac{YCAP_{i,t-4}}{YCAP_{i,t-4} + 1} + b_{ITA} D_{ITA} + \varepsilon_{1it} \quad .$$

A weighted estimating procedure is used as we consider large countries such as the U.S. and Japan to be more important in establishing the interrelationship between business ownership and economic growth than small countries. For a detailed description of this weighting procedure using population numbers we refer to Carree, Van Stel, Thurik and Wennekers (2002). We apply weighted least squares to the equations and then find estimates for the ‘equilibrium’ rate parameters using the following three, respectively two, expressions:

$$(5a) \hat{\alpha} = (a_0 + b_2 \bar{U} + b_3 \overline{LIQ}) / b_1 \quad \hat{\beta} = a_4 / b_1 \quad \hat{\gamma} = a_5 / b_1 \quad ,$$

$$(5b) \hat{\alpha} = (a_0 + b_2 \bar{U} + b_3 \overline{LIQ}) / b_1 \quad \hat{\beta} = a_4 / (-b_1) \quad .$$

These parameters are substituted into equations (3a) and (3b) so as to calculate E*. This variable is incorporated in equation (2). This equation is then also estimated using (weighted) least squares. The estimation results are given in Table 1.

Table 1 Estimation results of equations (4a), (4b), (2a) and (2b)

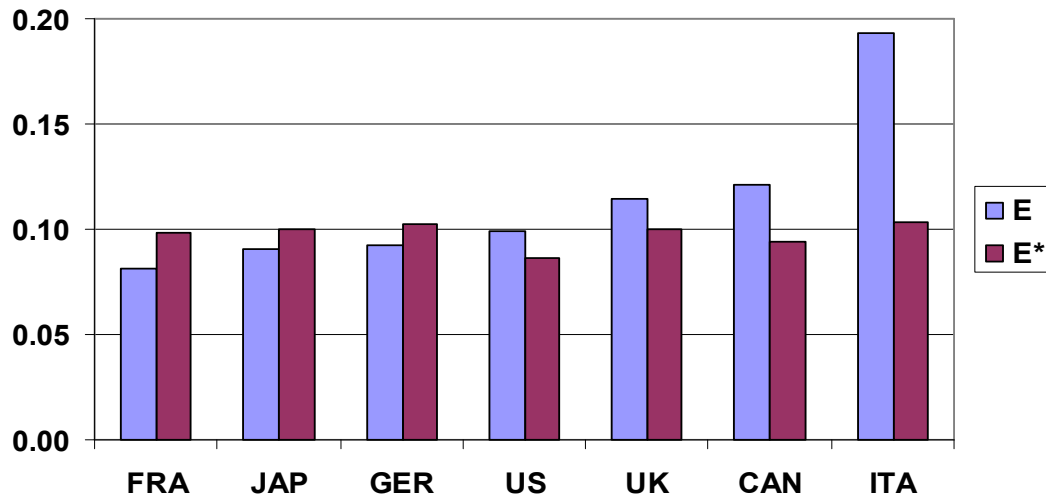
		Quadratic 'equilibrium rate': equation (3a)	Inverse 'equilibrium' rate: equation (3b)		
equations (4a) and (4b) , dependent variable: four-year growth of business ownership rate					
a_0	autonomous effect	0.061 *** (3.8)	0.183 *** (4.4)		
b_1	error correction	0.132 *** (5.2)	0.135 *** (5.3)		
b_2	unemployment	0.030 * (1.8)	0.033 ** (2.1)		
b_3	labour income share	-0.044 ** (2.4)	-0.037 ** (2.2)		
a_4	per capita GDP	-0.0014 * (1.9)	-0.153 *** (4.3)		
a_5	per capita GDP	0.000024 (1.1)			
b_{ITA}	Italy	0.014 *** (5.2)	0.014 *** (5.3)		
α	(3a) and (3b)	0.244 *** (5.0)	1.180 *** (4.6)		
β	(3a) and (3b)	-0.011 * (1.9)	1.133 *** (4.2)		
γ	(3a) and (3b)	0.00018 (1.1)			
Minimum		0.082			
Asymptote			0.047		
R^2_{adj}		0.222	0.223		
equations (2a) and (2b) , dependent variable: four-year growth of GDP per capita					
		equation (2a)	equation (2b)	equation (2a)	equation (2b)
c_0	autonomous effect	0.142 *** (7.7)	0.149 *** (7.5)	0.144 *** (7.8)	0.152 *** (7.7)
c_1	out of equilibrium	-0.305 (1.6)		-0.343 * (1.7)	
$c_{1,overshoot}$	out of equilibrium		-0.159 (0.6)		-0.177 (0.7)
$c_{1,undershoot}$	out of equilibrium		-0.416 * (1.8)		-0.496 ** (2.1)
c_2	convergence	-0.0034 *** (3.7)	-0.0038 *** (3.7)	-0.0035 *** (3.8)	-0.0039 *** (4.0)
R^2_{adj}		0.499	0.499	0.501	0.502

Note: Absolute t-values in parentheses. * Significant at 0.10 level; ** Significant at 0.05 level; *** Significant at 0.01 level. The number of observations is 161.

The results in the top part of the table show that there is very little difference in statistical fit between a U-shape and an L-shaped 'equilibrium' relationship. The adjusted R-square are 0.222 and 0.223, respectively. Despite the lack of difference in statistical fit, the implications of the two 'equilibrium' functions differ substantially. The U-shaped 'equilibrium' relationship has a minimum business ownership rate of 8.2% while the L-shaped one is declining to a asymptotic value of 4.7%. The speed of error-correction (measured by b_1) is about 13% for a four-year period. There appears to be a small unemployment push effect: b_2 is significantly positive. The labour income quote (LIQ) has, as expected, a significant negative effect: lack of profit opportunities decreases the tendency to be self-employed and owning a business. The dummy effect for Italy is strongly significant and even stronger than in Carree, van Stel, Thurik and Wennekers (2002) showing an even increased deviation of Italy from the general tendencies in the development of OECD business ownership data. Figure 2 shows the estimated L-shaped 'equilibrium' rate in combination with actual data for the G7-countries.

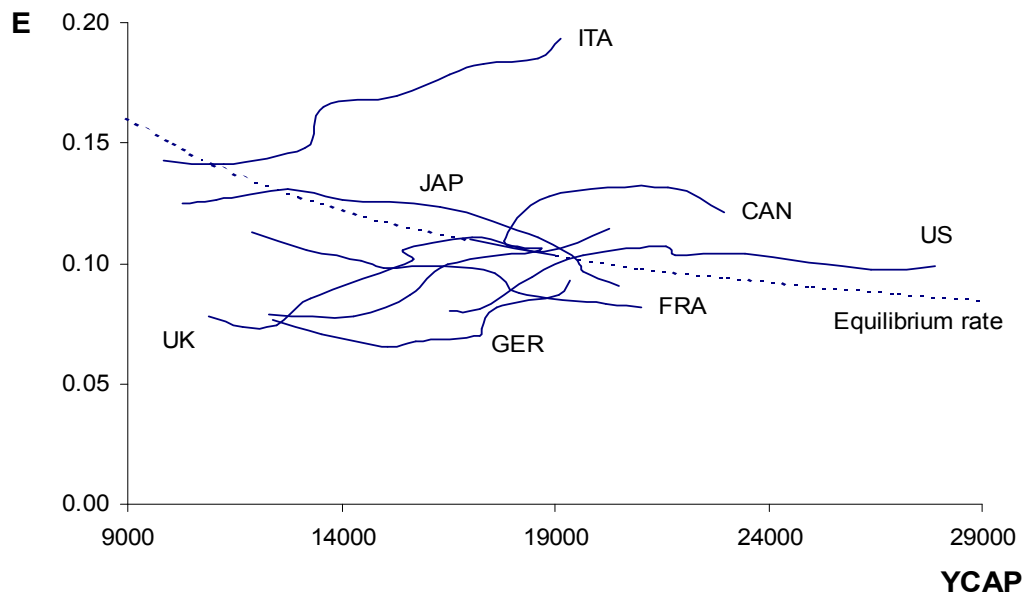
The results in the bottom part of the table indicate that there may not be a growth penalty for the business ownership rate being in excess of the 'equilibrium' rate. It may come as a surprise that for example Italy, being far above the 'equilibrium' rate (see Figure 1 and 2), would not suffer in terms of economic performance. Belussi (1998), however, stresses that the high level of self-employment in Italy should not be seen *per se* as positive or negative as in a typical Italian firm one can find very different contractual arrangements for the same type of task. For the business ownership being below its 'equilibrium' rate, there appears to be a significant negative effect on economic growth.

Figure 1. The actual and 'equilibrium' rate of business ownership for G7-countries, 2004.



Note: 'equilibrium' rate data (E*) based on L-shape (inverse 'equilibrium' rate).
 Source: COMPENDIA 2004.2 and own calculations.

Figure 2. The actual and 'equilibrium' rate of business ownership for G7-countries, 1972-2004, and per capita GDP (ppp per 1990 US \$).



Note: 'equilibrium' rate data based on L-shape (inverse 'equilibrium' rate).
 Source: COMPENDIA 2004.2 and own calculations.

5. Discussion

In this last section we address three questions. The *first* question concerns the new evidence our longer time series provides regarding the shape of the ‘equilibrium’ relation. While the statistical fit of a U-shape and an L-shape is almost equal, the two relations differ strongly in their future implications. The U-shape predicts a future increase of the ‘equilibrium’ rate while the L-shape foretells a gradual bottoming out towards a historically low level of ‘equilibrium’ business ownership around 5%. However, there is no obvious support in the sample data for either an upswing of the ‘equilibrium’ rate or for a continued decline.

The *second* question concerns the patterns of the actual business ownership rates across countries, and of their deviations from the ‘equilibrium’ rate. Which determinants, apart from the level of economic development, helps to explain these patterns? The literature suggests that demographic, cultural and institutional factors may be at play (Wennekers, 2006; Grilo and Irigoyen, 2006; Freytag and Thurik, 2007). Within our sample of OECD countries, several groups may be distinguished. First, all Scandinavian countries except Iceland have a low rate of business ownership (below 8.5% in 2004). These countries also share several characteristics associated with lower business ownership rates, including a high per capita income, high female labour participation rates, a low degree of income inequality and a large public sector (Henrekson, 2005; Wennekers, 2006). In contrast, the Mediterranean countries in our sample (Greece, Italy, Portugal and Spain) are among the nations with the highest business ownership rate (in excess of 12.5% in 2004). For Greece, Portugal and Spain, a relatively low per capita income rate and relatively high life dissatisfaction rates have been associated with higher self-employment (Noorderhaven, Thurik, Wennekers and van Stel, 2004). Italy is characterized by a low per capita income in Southern Italy (the *Mezzogiorno*) and a unique industrial structure in Northern Italy based on industrial districts and an emphasis on small family businesses. Third, the Anglo-Saxon countries have fairly high business ownership rates, and in recent years they all seem to be above ‘equilibrium’. These countries share several cultural and institutional characteristics, such as high individualism, low social security expenditures and a low degree of employment protection (Hofstede, 2001; OECD, 1999; Wennekers, van Stel, Thurik and Reynolds, 2005). Of these countries, Australia, New Zealand, Canada and the US also have high population growth and high immigration rates. Fourth, a group of five Western European countries in our sample (Belgium, the Netherlands, Germany, Austria and Switzerland) are somewhat of a mixed story. A common denominator in these countries might be a traditionally strong small business sector (‘Mittelstand’) not matched by a high level of dynamics in recent years. Although all these countries have a relatively high per capita income, the latter three countries are below ‘equilibrium’ while Belgium and the Netherlands are above it. Finally, Luxembourg, France and Japan seem to be separate cases, although the business ownership rate in all three countries has been continuously

dropping. Luxembourg, with its distinctive industrial structure (banking, steel), now has the lowest business ownership rate in our sample (5.3%). France, which remains slightly below 'equilibrium', is characterized by high uncertainty avoidance and power distance (Hofstede, 2001; Wennekers, Thurik, van Stel and Noorderhaven, 2007), by limited labour market flexibility and by centralized planning and control (Henriquez, Verheul, van der Geest and Bisschop, 2002; Groenewegen, 1991, 2000). Business ownership in Japan has followed the 'equilibrium' rate rather closely. The share of business owners in the labour force has been traditionally high in Japan through the protection of small firms in retailing and other sectors (van Stel, Thurik, Verheul and Baljeu, 2005; Harada, 2005; Masuda, 2006). These inefficient firms have only slowly started to disappear from the Japanese economy (Carree, Potjes and Thurik, 1993).

The *third* question of interest is the one-sided penalty for economic growth found regarding deviations from the 'equilibrium' business ownership rate. The main conclusion seems to be that particularly a business ownership rate below 'equilibrium' is harmful for economic growth. This would imply that it might be wise to err on the high side. For highly developed countries stimulating entrepreneurship may be a 'no regret policy'.

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