Journal of
Risk and Financial Management

MDPI

Article

The Capitalist Spirit and Endogenous Growth

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Abstract: The aim of the study is to investigate the influence of the capitalist spirit in conjunction with the distribution of income on economic growth. The capitalist spirit is represented by the fact that savings rates increase with increasing relative income. We extend an endogenous AK growth model in an overlapping generational framework by implementing imperfect competition and Cournot competition. Using this model, we investigate the influence of profits on the intra- and inter-generational distributions of income and economic growth. While increasing incomes lead to a more unequal intra-generational distribution and to a redistribution of income from the old to the young generation, the impact on economic growth is in general ambiguous, although under specific assumptions it becomes positive. Furthermore, the model shows that increasing market power of firms is associated with declining labor and capital shares, declining interest rates, and an increased wealth-to-income ratio.

Keywords: oligopolistic competition; endogenous growth; spirit of capitalism; savings rate; price market power; distribution of income

Citation: Kumar, Ronald R., Peter J. Stauvermann, and Frank Wernitz. 2022. The Capitalist Spirit and Endogenous Growth. *Journal of Risk and Financial Management* 15: 27. https://doi.org/10.3390/jrfm15010027

Academic Editor: Thanasis Stengos

Received: 10 November 2021
Accepted: 28 December 2021
Published: 10 January 2022

1. Introduction

When investigating the economic development of national economies over the last 70 years, it is apparent that the most market-oriented economies, such as European or American economies, are not in the top tier. However, if we consider only countries with populations of more than 10 million, then the Asian economies, and more specifically the People's Republic of China and the Republic of Korea (Korea henceforth), have outperformed almost all other economies. Looking at GDP per capita rates in 1953, it is noted that by 2016, the GDP per capita was more than 26 times higher in Korea and more than 11 times higher in China (Bolt et al. 2018). To explain this strong growth and catch-up process, it is not sufficient to only consider the period from 1991 to 2017, because China and Korea surpassed all the other countries although they had similar GDP per capita rates in 1991. Of course, China is still lagging behind Korea in terms GDP per capita because the latter has experienced strong growth due to economic reforms since 1978. In terms of per capita income measured in purchasing power dollars, Korea's GDP per capita in 2017 was 9 times higher than for China in 1991, and increased by 200% for Korea in this period (World Bank 2021). This outcome is surprising, because highly concentrated markets and industries characterize the two economies. According to standard economic theory, highly concentrated industries lead to welfare losses and lower growth rates. Moreover, it is sometimes argued that competition in industry has increased in recent times in both countries, although this can be debated. In Korea, the families governing *chaebols* (large industrial conglomerate) can relatively easily bypass government regulations (Jones 2018; Jones and Lee 2018), while in China, the decline in the Hirschman–Herfingdahl index (HHI) score created an incorrect impression according to Bai et al. (2014). Bai et al. (2014) showed that it makes little sense to compare the HHIs from different time periods in growing

economies if only some of all firms from an industry (only the biggest 50 firms) are considered when calculating the HHIs. Additionally, Bai et al. (2009) argued that governments support large, state-owned firms because they minimize the layoff of surplus labor and care about social stability. According to Bai et al. (2009), this is the second-best policy that can be used to tackle the problem of unemployment, which otherwise would be much higher, such as in other countries that have transformed from a planned economy to a market economy. Moreover, not only does a high market concentration create welfare losses caused by distortions of the allocation of input factors, but a high market concentration also leads to high profits, and consequently to a more unequal distribution of income and wealth. In particular, the latter observation has gained much attention in recent years (Kuhn et al. 2020; Barkai 2020; Barkai and Benzell 2018; Bajgar et al. 2019; Díez et al. 2019; Guinea and Erixon 2019; Van Reenen 2018; Syverson 2019; Shapiro 2019; Basu 2019; Autor et al. 2017, 2020; Cavalleri et al. 2019; Berry et al. 2019; Lamoreaux 2019; Ge et al. 2019; Hall 2018; Azar et al. 2019; De Loecker and Eeckhout 2017; De Loecker et al. 2020; Poschke 2018).

The question of whether higher profits lead to more growth is still open for debate. Assuming that investments in (human and physical) capital are the main driver of growth, then savings behavior plays a crucial role in the growth process. The aim of this paper is to theoretically investigate the relationships between market power, economic growth, the distribution of income, and input factor compensation. For this purpose, we use a model of oligopolistic competition with economic rents and investigate the extent to which the aggregate savings rate is positively related to income inequality. We assume that individual savings rates depend positively on relative income. This leads to the outcome that poor individuals save not only less than rich individuals in absolute terms, but proportionally less than rich individuals. If savings are dependent on relative income, then a more unequal distribution of income may increase savings and investments, and consequently the growth rate of the economy. If the latter statement holds true, then higher profits will lead to more growth in the long run, and also poor households will benefit from these higher profits. This effect is called the "trickle-down" effect in the literature and was one of the foundations of Reaganomics, which has led to the neglect of strong antitrust policies in the USA (Krugman 2016) and elsewhere. This paper investigates these relationships theoretically using the endogenous OLG growth model with imperfect competition, developed by Kumar and Stauvermann (2020).

A possible explanation of why savings behavior is rarely considered in modern growth theory is that both the standard growth theory proposed by Solow (1956, 1957) and newer growth theories (e.g., Romer 1983, 1986, 1990; Rebelo 1991) consider only capital and wage incomes. In these frameworks, profits are part of the capital income, and profits in the sense of economic rents do not exist. Even in models of monopolistic competition (Romer 1990), the potential profits vanish because monopolistic competition leads to average cost pricing. In some sense, the exclusion of economic rents is surprising, because according to economic historians (Ogilvie 2014; Ogilvie and Carus 2014), barriers to entry, which imply imperfect competition and economic rents, have existed since ancient times.

Recently, the nonexistence of economic rents and profits has been questioned in the empirical studies by Barkai (2020), Barkai and Benzell (2018), Philippon (2019), De Loecker et al. (2020), and Eggertsson et al. (2021). Considering these outcomes, Stauvermann and Kumar (2021) and Kumar and Stauvermann (2020, 2021) developed three growth models that account for economic profits by assuming oligopolistic competition instead of perfect competition. The models proposed by Stauvermann and Kumar (2021) and Kumar and Stauvermann (2020, 2021) have close resemblance, in terms of the market structure comparability, with the static model proposed by Mankiw (1988). The advantage of the framework proposed by Kumar and Stauvermann is its tractability and comparability with the usual growth models. In this paper, we extend the study by Kumar and Stauvermann (2020), which is based on the studies by Rebelo (1991) and Romer (1983, 1986). We improve and extend the model proposed by Kumar and Stauvermann (2020, 2021) based on microeconomic foundations to take into account the well-known critique made by Hart (1982, 1985).

Additionally, we consider the "spirit of capitalism" as a motif related to household savings. The latter idea goes back to the studies by Zou (1995, 2011). In our setting, the spirit of capitalism means that the desire of individuals to save creates utility. This desire increases with increasing relative income. We introduce two different approaches to this model. The first one is a discontinuous approach, while the second one is a much more general approach. We show that increasing profits associated with an increasing market concentration lead to an increase in the growth rate, but at the price that the intragenerational distribution of income is more unequal, and that income is redistributed from the old to the young generation. The discontinuous approach leads to a unique outcome with respect to the impact of growth, while the general approach delivers an ambiguous outcome depending on the market concentration and the strength of the spirit of capitalism. Furthermore, we will show that the model delivers explanations for some puzzling empirical phenomena discussed recently. Particularly, the model aims to explain why an increasing market power has led to a declining (natural) rate of interest, a declining capital share of income, a declining labor share of income and an increasing wealth-to-income ratio over the last 40 years.

The rest of the paper is organized as follows. In the next section, we provide an overview of the relationship between income inequality and savings. In Section 3, we introduce an extension of the microeconomic model of Kumar and Stauvermann (2020), where we integrate the notion of capitalist spirit. In Section 4, we generalize the idea of capitalist spirit, and in Section 5, we calibrate the possible outcomes. In the last section, we conclude and discuss the results.

2. Overview: Distribution of Income and Savings Behavior

Although it seems to be common knowledge for non-economists to believe that the propensity to save increases with income, this may not be the case for economists. Some economists argue that people with a temporarily higher income have a tendency so save more, while people with a lower temporary income have a tendency so save less. In this context, Friedman (1957) argues that even if the savings rate is invariant with respect to the lifetime income, individuals with high current incomes save relatively more than those with low incomes. For example, in 2011 the 10% poorest households had a savings rate of 1.8%, while the 10% richest households saved 17% of their income in Germany (Brenke and Wagner 2013). This phenomenon may coincide with Friedman's permanent income hypothesis (PIH). From an empirical point of view, it is difficult to answer the question of if the marginal savings rate increases with lifetime income because data on lifetime incomes and the respective savings rates are rarely available. Assuming the permanent income hypothesis holds, and in addition, considering precautionary savings, Bewley (1977) argues that the very rich members of the society should have a lower savings rate than poorer individuals, mainly because a motive to save is to insure oneself against risks in an uncertain world. Thus, wealthier individuals should save less because wealth acts like an insurance and substitutes part of the savings. Accordingly, very wealthy individuals should have a negative savings rate. However, this phenomenon is contradicted by data (De Nardi and Fella 2017).

In contrast to the permanent income hypothesis, the early empirical research (Mayer 1966, 1972) concludes that rich households save a higher share of the income than poorer households. Dynan et al. (2004) argue that the notion that the savings rate is invariant to the proportional increases in wealth lacks empirical proof. Using appropriate lifetime income data for the USA, Dynan et al. (2004) show that the marginal propensity to save differs substantially across income groups. Their calculations show that the lowest 10% quintile of income earners and the top quintile of income earners have a propensity to save of 8% and 39%, respectively. Furthermore, the authors confirm that their results are consistent with Carroll (2000), who assumes, like Zou (1995, 2011), that wealth or savings is an argument of the utility function. Zou (1995, 2011) illustrates this idea, which he calls the capitalist's spirit. This idea goes back to Aristotle, and was considered by

classical economists such as Adam Smith, Nassau W. Senior, John S. Mill, Karl Marx, John R. MacCulloch, William S. Jevons, Alfred Marshall, Gustav Cassel, Thorstein Veblen, John M. Keynes, Josef Schumpeter and many others (Cole et al. 1992; Fershtman and Weiss 1993). Moreover, Luo et al. (2009a, 2009b), consider the notion of the "spirit of capitalism" in a model with uncertain future incomes. They demonstrate that the importance of precautionary losses and the so-called sensitivity puzzle can be explained, and that the model can partly explain the excess smoothness puzzle.

Gentry and Hubbard (2004) investigate the savings behavior of entrepreneurial households in the USA. They conclude that these households own a substantial share of the aggregate household wealth and aggregate income, and that the share is increasing throughout the income and wealth distribution. In addition, they note that savings rates of entrepreneurial households are higher than savings rates of nonentrepreneurial households.

Lieberknecht and Vermeulen (2018) investigate the relationship between top income and wealth shares for France and USA since 1913. They find evidence for a long-run cointegration, which is driven by savings rates of the top income earners. Consequently, if high-income individuals have a higher propensity to save than the rest of the society, an increase in income inequality lead to more wealth inequality and to higher aggregate savings.

Focusing on the decline of the natural rate of interest from around 5.5% to just 0.5% between 1975 and 2020 (Laubach and Williams 2003; Mian et al. 2021b), Mian et al. (2021b) argue that the top 10% income households have a saving rate which is between 10 to 20 percentage points higher than the savings rate of the bottom 90% income households. Additionally, they argue that the savings rate of the top 10% income households has increased since the 1980s by 3% to 3.5%. Based on the data provided by Kuhn et al. (2020), they argue that the income inequality has increased, and because of the fact that richer households' savings rate exceeds the savings rate of all other households, the aggregate savings have also increased, with the consequence that the return on savings has declined. An advantage of the data of Kuhn et al. (2020) is that it is possible to analyze the behavior of birth cohorts, so that statements about the permanent incomes can be derived. Liu et al. (2021) provide a theoretical model, which explains the decline of the interest rate with a model based on the assumption that firms compete for technologies and that market leaders will invest more than their followers if the interest rate declines. This will increase the technological gap between the leader and the followers, which will result in a higher market concentration, increasing profits of the leader, and less productivity growth. Furthermore, these outcomes lead to more income inequality and increased aggregate savings.

There are other studies (cf. Furman and Summers 2020; Rachel and Summers 2019; Lunsford and West 2019; Rachel and Smith 2015; Summers 2014) which conclude that the propensity to save of rich households exceeds the propensity to save of poorer households. Furthermore, Mian et al. (2021a) show that the annual savings of the households of the top 1% of the income and wealth distribution in the US have been larger than the average annual US domestic investments since 2000. The authors show that the savings of the top 1% households has increased dramatically since the 1980s, accounting for 5–6% of the national income. Mian et al. (2021b) report that the top 10% US households save on average 25.3% of their income, the next 40% of the households save on average 8.2% and the bottom 50% save only 2.6% of their income.

In summary, the important result that follows from the above-mentioned studies is that rich households have higher savings rates than poorer ones, and the idea of the "spirit of capitalism" may be appropriate to explain why wealth or savings can be justified as an argument in the utility function, with the consequence that savings rates differ throughout the income distribution.

3. The Model

3.1. Production and Distribution of Income

We consider a Diamond (1965) overlapping generation model, where members of the young generation are either workers or entrepreneurs and where members of the old generation are capital owners.

When integrating oligopolies in a general equilibrium model, it is important to ascertain that firms with market power on the good market do not have influence on the factor markets (Hart 1982, 1985). Although Kumar and Stauvermann (2020) do not address this problem, the derived results remain valid (cf. Kumar and Stauvermann 2021). To consider Hart's (1982, 1985) requirements, we assume that the quantity of final consumption goods Y is produced in a market with perfect competition. The firms in this final good sector use intermediate inputs of quantity Q_i to produce the final good. Furthermore, we assume that m different intermediate goods are produced in this economy, where m is a sufficiently large number, so that all oligopolists expect that they cannot influence the factor prices. The production function of a representative firm in the final good sector is given by:

$$Y = m\prod_{i=1}^{m}(Q_i)^{\frac{1}{m}}, \tag{1}$$

where Q_i represents the quantity of intermediate goods produced in the i-th sector of the intermediate good market. The production function (1) is symmetric, and it is linear–homogenous in all m intermediate goods. We assume, without loss of generality, that the price of the final good sector is a numeraire. The firms in the final good sector maximize the following profit function:

$$\Pi_y = m\prod_{i=1}^{m}(Q_i)^{\frac{1}{m}} - \sum_{i=1}^{m} p_i Q_i, \tag{2}$$

where p_i is the price of the i-th intermediate good. Maximizing (2) leads to the following demand function for intermediate good i:

$$p_i(Q_i) = \frac{Y}{mQ_i}, \ \forall i = 1, \ldots, m. \tag{3}$$

Furthermore, we assume that n oligopolistic firms compete in each of the m intermediate good markets. Therefore, on aggregate there are nm symmetric oligopolistic firms. Accordingly, the profit maximization problem of an oligopolist j in the intermediate good market i is given by:

$$\Pi_{i,j}(Q_{ij}, Q_{i,-j}) = p(Q_i)Q_{ij} - RK_{i,j} - wL_{i,j}, \tag{4}$$

where $Q_i = \sum_{j=1}^{n} Q_{ij}$ and $Q_{i,-j} = \sum^{n}_{\substack{j=1 \\ j\neq i}} Q_{ij}$.

Every oligopolistic firm uses the same production function (cf. Romer 1986; Rebelo 1991; Uhlig and Yanagawa 1996; Grossman and Yanagawa 1993; Stauvermann 1997), given by:

$$Q_{i,j} = F\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right), \tag{5}$$

where $K_{i,j}$ is the capital stock of firm j, $L_{i,j}$ is the labor force of firm j and $K = \sum_{i=1}^{m}\sum_{j=1}^{n} K_{i,j}$ the economy-wide aggregate capital stock and $L = \sum_{i=1}^{m}\sum_{j=1}^{n} K_{i,j}$ the economy wide labor force. The variable $\bar{k} = \frac{K}{L}$ represents the capital–labor ratio, which is taken as exogenous by every oligopolist. We assume that $F(.,.)$ is linear–homogenous in $K_{i,j}$ and $L_{i,j}$ and the production function satisfies the following conditions: $F_o(.,.) > 0$, $F_{oo}(.,.) < 0$, $F(0,.) = F(.,0) = 0$, $\lim_{o\to 0} F_o(.,.) = \infty$ and $\lim_{o\to\infty} F_o(.,.) = 0$, for $o = K_{i,j}, L_{i,j}$.

The function $\Phi\left(\bar{k}\right)$ represents the labor productivity, which depends on the aggregate capital intensity. This assumption implies spillover and learning-by-doing effects, which create positive externalities induced by capital accumulation. Furthermore, we assume that for the firms, the externality is exogenous, and that running a firm requires nonproductive administrative work, which leads to overhead costs. For simplicity, we assume that the capitalist or entrepreneur executes the business administration of the company. Thus, to cover the opportunity costs, the entrepreneur has to make a minimum economic profit equal to the wage rate she can earn as an employee elsewhere. Moreover, all n identical firms engage in a Cournot competition in one of the m intermediate good markets. That is, each firm determines its optimal quantity of goods whilst taking the actions of other firms of this sector and the factor prizes as given. Now, inserting the demand function (3) and production function (5) in the profit function (4) leads to:

$$\Pi_{i,j} = \frac{Y}{m\left(F\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right) + \sum^{n}{}_{\substack{j=1 \\ j\neq i}} Q_{i,j}\right)} F\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right) - \Phi\left(\bar{k}\right)\widetilde{w}L_{i,j} - RK_{i,j}, \ \forall i \in [1,n]. \tag{6}$$

and $\widetilde{w} = \frac{w}{\Phi\left(\bar{k}\right)}$ the wage rate per effective labor unit.

On the factor markets, firms take the wage rate $\widetilde{w}$ and the interest factor R as given. The depreciation rate of capital is set to 100% per period. Maximization of the profit with respect to firm's j capital and labor force results in the following first-order conditions equation:

$$\frac{\partial \Pi_{i,j}}{\partial K_{i,j}} = \left[p'(Q_i)Q_{i,j} + p(Q_i)\right] F_{K_{i,j}}\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right) - R = 0, \ \forall i \in [1,n], \tag{7}$$

$$\frac{\partial \Pi_{i,j}}{\partial L_{i,j}} = \left[p'(Q_i)Q_{i,j} + p(Q_i)\right] F_{L_{i,j}}\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right) - \Phi\left(\bar{k}\right)\widetilde{w} = 0, \forall i \in [1,n]. \tag{8}$$

Moreover, in the equilibrium—because of the symmetry assumptions—the following equalities hold: $K_i = \sum_{j=1}^{n} K_{ij} = \frac{K}{m}$ and $L_i = \sum_{j=1}^{n} L_{ij} = \frac{L}{m}$. Furthermore, the symmetry assumptions lead to the result $K_{ij} = \frac{K}{mn}$ and $L_{ij} = \frac{L}{mn}$.

Using these equalities, and after some reformulations, we get:

$$\left(\frac{n-1}{n}\right) F_{K_{i,j}}\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right) - R = 0, \tag{9}$$

$$\left(\frac{n-1}{n}\right) F_{L_{i,j}}\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right) - w = 0. \tag{10}$$

From the symmetry assumption, it follows that, $\bar{k} = k = \frac{K}{\Phi\left(\bar{k}\right)L} = \frac{K_{i,j}}{\Phi\left(\bar{k}\right)L_{i,j}}$. To simplify the analysis, we assume, like Rebelo (1991), that the labor productivity $\Phi\left(\bar{k}\right)$ is linear in the average capital intensity, such that:

$$\Phi\left(\bar{k}\right) = \Psi\bar{k}. \tag{11}$$

From the above, we can derive the aggregate production as:

$$Y = \sum_{i=1}^{m}\sum_{j=1}^{n} F\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right) = nmF\left(K_{i,j}, L_{i,j}\Phi\left(\bar{k}\right)\right) = F\left(K, L\Phi\left(\bar{k}\right)\right) = KF(1,\Psi) = AK, \tag{12}$$

where $A \equiv F(1,\Psi)$.

For the capital intensity measured in effective labor units, we obtain:

$$\bar{k} = \frac{K}{L\Psi k} = \frac{1}{\Psi}. \tag{13}$$

Invoking linear homogeneity of the production function (5) and the Euler theorem, it follows that the share of production contributed by capital can be defined as:

$$0 < \alpha = \frac{f'\left(\frac{1}{\Psi}\right)\frac{1}{\Psi}}{f\left(\frac{1}{\Psi}\right)} < 1. \tag{14}$$

Because of the symmetry assumptions, the following equality holds:

$$Y = mQ_i^* = nmF\left(\frac{K}{mn}, \frac{L}{mn}\Phi\left(\frac{K}{L}\right)\right) \tag{15}$$

where Q_i^* is the equilibrium quantity of sector i. Because of the symmetry of all sectors, the following holds $Q_i^* = Q^*, \forall i = 1, \ldots, m$.

Using the production function of the final good sector (1) and the inverse demand function (3), we obtain for the equilibrium prices of the intermediate good sector:

$$p_i^* = \frac{mQ^*}{mQ^*} = 1, \quad \forall i \in [1, n]. \tag{16}$$

Reformulating the first order conditions gives:

$$\frac{\partial \Pi_{i,j}}{\partial K_{i,j}} = \left(\frac{n-1}{n}\right)\alpha A = R, \tag{17}$$

$$\frac{\partial \Pi_{i,j}}{\partial K_{i,j}} = \left(\frac{n-1}{n}\right)(1-\alpha)Ak = w. \tag{18}$$

The aggregated interest income and aggregated wage income are given by:

$$RK = \left(\frac{n-1}{n}\right)\alpha AK. \tag{19}$$

$$wL = \left(\frac{n-1}{n}\right)(1-\alpha)AK. \tag{20}$$

Accordingly, the wage rate per capita is $w = \left(\frac{n-1}{n}\right)(1-\alpha)Ak$ and the interest factor is $R = \left(\frac{n-1}{n}\right)\alpha A$. Then, the total profits in this economy are given by:

$$\Pi = AK - \left(\frac{n-1}{n}\right)\left(\alpha AK + (1-\alpha)A\Phi\left(\frac{K}{L}\right)L\right) = \frac{AK}{n}. \tag{21}$$

Hence, the profit per firm becomes:

$$\Pi_{i,j} = F\left(\frac{K}{mn}, \frac{L}{mn}\Phi\left(\frac{K}{L}\right)\right)\frac{Y}{mn^2} = \frac{AK}{mn^2}, \ \forall j \in [1, m] \wedge \forall i \in [1, n]. \tag{22}$$

In the usual model of perfect competition, firm owners (firms) do not make any positive economic profit. In contrast, in this paper, running a firm requires some administrative work done by the entrepreneur to manage the firm, and these activities lead to overhead costs (Autor et al. 2017, 2020). As a consequence, an individual is only willing to start a business as long as $\Pi_i \geq w$ is satisfied, otherwise the overhead costs will not be covered

and the entrepreneur realizes a loss. Based on these assumptions, the maximum number of firms in an intermediate good market is calculated by solving:

$$\frac{AK}{mn^2} = \left(\frac{n-1}{n}\right)(1-\alpha)Ak. \tag{23}$$

We obtain the maximum or the equilibrium number of firms n^{max} by:

$$n^{max} = \frac{1}{2}\left(\frac{\sqrt{(1-\alpha)^2m^2 + 4Lm(1-\alpha)}}{m(1-\alpha)} - 1\right). \tag{24}$$

Therefore, if $n = n^{max}$, all young individuals earn the income w. This outcome is only an equilibrium if there are no barriers to entry in the market. It should be noted that $n^{max} < L$. Obviously, the maximum number of entrepreneurs rises with working force L.

If the number of firms strives to infinity, the equilibrium is identical to the outcome of the model proposed by Grossman and Yanagawa (1993), Uhlig and Yanagawa (1996) or Stauvermann (1997), who assume perfect competition in all markets. We can also derive that large economies are less concentrated than small economies, even without barriers to entry.

3.2. The Absolute and Relative Incomes

In the economy there are three income classes, the entrepreneurs E, workers W, and the capital owners C. The working force is given by the difference between the population of the young generation N minus the number of firm owners nm; $L = N - mn$. To avoid obscure outcomes, we have to make the technical assumption that $N > nm((1-\alpha)n + \alpha)$. The respective income of a worker is given by:

$$y_{W,t} = \left(\frac{n-1}{n}\right)(1-\alpha)\frac{AK_t}{N-nm} \tag{25}$$

An entrepreneur receives a rent income or profit income, which equals:

$$y_{E,t} = \frac{AK_t}{mn^2} \tag{26}$$

From the two equations above, we derive the average income in the first period of life as:

$$\overline{y}_t = \frac{\frac{AK_t}{n} + \left(\frac{n-1}{n}\right)(1-\alpha)AK_t}{N} = \left(\frac{1+(n-1)(1-\alpha)}{nN}\right)AK_t. \tag{27}$$

Differentiating the average income with respect to the number of firms leads to

$$\frac{\partial \overline{y}_t}{\partial n} = \frac{-\alpha Ak_t}{Nn^2} < 0. \tag{28}$$

Proposition 1. *The more firms are in each market, the lower is the average income of the working generation, or alternatively the more concentrated the markets, the higher is the average income of the working generation. In other words, more market power causes the average income of the working generation to rise.*

The explanation for this surprising result is that a change in the number of firms induces an intragenerational and intergenerational redistribution of income. If the number of firms is increasing, the market power of each firm will decline and therefore the markup declines. This will increase the interest income of the capital owners and the wage income of the workers in real terms. The fact that the capital owners, who are members of the old

generation, receive a higher income, causes the average income of the working generation to decline. In general, we can state that the more firms are in the intermediate markets, the higher is the wage and interest rate. Hence,

$$\frac{\partial R}{\partial n} = \frac{\alpha A}{n^2} > 0, \tag{29}$$

$$\frac{\partial y_{W,t}}{\partial n} = \frac{(1-\alpha)AK_t\left(n^2-2n+N\right)}{n^2(N-n)^2} > 0. \tag{30}$$

Proposition 2. *An increase in the number of firms leads to an increase in the wage and interest rate. In other words, an increasing market power results in a decline in wage rate and the interest rate.*

Because of the fact that $N > 2$, the derivative (30) is positive. Intuitively, the wage income increases with an increasing number of firms because of two reasons; first, the wage income increases because of the higher capital intensity per worker, and secondly, the wage income increases because of the declining market power of firms.

Furthermore, we are interested in the relative incomes of workers and entrepreneurs. The relative income of a worker is given by:

$$\frac{y_{W,t}}{\overline{y}_t} = \frac{(n-1)(1-\alpha)N}{(N-nm)(1+(n-1)(1-\alpha))} \leq 1, \tag{31}$$

Equality of (31) holds if $n = n^{max}$. If the latter condition is fulfilled, the profit income of an entrepreneur equals the wage income of a worker. If the number of firms is smaller than n^{max}, the wage rate is both less than the profit income and less than the average income. Accordingly, the relative income of workers is less than one, and with an increasing number of firms, the relative income of the workers is increasing:

$$\frac{\partial\left(\frac{y_{W,t}}{\overline{y}_t}\right)}{\partial n} = \frac{N(1-\alpha)\left((1-\alpha)n^2-m(2n(1-\alpha)+\alpha)+N\right)}{(N-mn)^2((1-\alpha)n+\alpha)^2} > 0. \tag{32}$$

The relative income of a worker increases with an increasing number of firms, because her wage rate will increase, while the average income of her generation will decrease. On the other hand, the relative income of the entrepreneur exceeds the average income.

$$\frac{y_{E,t}}{\overline{y}_t} = \left(\frac{1}{m}\right)\frac{N}{((1-\alpha)n+\alpha)n} \geq 1. \tag{33}$$

The relative income of an entrepreneur will equal one if $n = n^{max}$. If $n > n^{max}$, the relative income of entrepreneurs exceeds one. The relative income of an entrepreneur will decline if the number of firms increases.

$$\frac{\partial\left(\frac{y_{E,t}}{\overline{y}_t}\right)}{\partial n} = -\left(\frac{1}{m}\right)\frac{N(2n(1-\alpha)+\alpha)}{n^2((1-\alpha)n+\alpha)^2} < 0. \tag{34}$$

To summarize, we state the following proposition:

Proposition 3. *An increasing market power of firms will result in:*

- *An increase in the profits and the relative income of entrepreneurs;*
- *A decline in the labor and capital income;*
- *A decrease in relative income of workers;*
- *An increase in the average income of the working generation.*

These theoretical results coincide with empirical observations made in the last 40 years in developed countries. It should be noted that the results of Proposition 3 are static and do not imply that the wage incomes decline in time.

3.3. Households and Savings Behavior

To keep the Diamond (1965) overlapping generation model simple, we assume that individuals live two periods, and that a constant population of $2N$ exists, so that each generation consists of N members. As noted earlier, in the first period of life the individual is either a worker or an entrepreneur. We make the simplifying assumption that only n members of the society have the right to run a firm, and if they become old, they bequeath the right to run the firm to their child.

The members of the working generation save part of their income, enjoy their retirement in the second period of life, and live from their savings and the respective interest income. We use a modified utility function introduced by Zou (2011). While Zou (2011, chp. VII.1) assumes that individuals generate utility from holding wealth or savings, we simplify Zou's approach by using a log-linear utility function. Moreover, in contrast to Zou (2011) we endogenize the variable measuring the "capitalist spirit" by assuming that the variable depends on the relative income.

$$U(c_{i,t}, c_{t+1}) = ln(c_{i,t}) + \beta\left(\frac{y_{i,t}}{\overline{y}_t}\right) ln(s_{i,t}) + q ln(c_{i,t+1}). \tag{35}$$

The subjective discount factor is given by $0 < q < 1$. The function $\beta\left(\frac{y_{i,t}}{\overline{y}_t}\right)$ represents the "capitalist spirit". To extend the approach of Zou (1995, 2011), we assume that capitalist spirit depends on the relative income position. The variable $y_{i,t}$ represents the income of the individual and the variable $\overline{y}_t$ represents the average income. We assume that β is a weakly increasing function in the relative income position. The below equation indicates that rich people have a stronger capitalist spirit than poor people:

$$\beta\left(\frac{y_{i,t}}{\overline{y}_t}\right) = \begin{cases} \beta_C, \text{ if } \frac{y_{i,t}}{\overline{y}_t} > 1 \\ \beta_W, \text{ if } \frac{y_{i,t}}{\overline{y}_t} \leq 1 \end{cases}, \text{ with } \beta_C > \beta_W > 0. \tag{36}$$

To justify this assumption, we refer to the work of Zou (1995, 2011); Gong et al. (2010); Gong and Zou (2001) and Luo et al. (2009a, 2009b), who have indicated that the spirit of capitalism is strongly related to the relative income hypothesis (Duesenberry 1949). The notion is that people are interested both in their absolute level of consumption and social status. In general, the position in the income and wealth hierarchy in a society determines the social status of a person. In our specification of the utility function, we follow Zou (1995, 2011), who assumes that the savings shifts intertemporal consumption and is a direct argument in the utility function. Additionally, we extend this assumption by considering different income classes, i.e., workers and firm owners.

The budget constraint is given by:

$$c^1_{i,t} = y_{i,t} - s_{i,t}, \tag{37}$$

$$c^2_{i,t+1} = R_{t+1} s_{i,t}, \; \forall i \in \{E, W\}. \tag{38}$$

Inserting the budget constraints into the utility function, the individuals maximize and we obtain the following:

$$\max_{s_{i,t}} ln(y_{i,t} - s_{i,t}) + \beta\left(\frac{y_{i,t}}{\overline{y}_t}\right) ln(s_{i,t}) + q\left(\frac{y_{i,t}}{\overline{y}_t}\right) ln(R_{t+1} s_{i,t}). \tag{39}$$

From the first-order condition of (39), we derive the savings function. Because of the homotheticity of the utility function, we can write the savings function as:

$$s(y_{i,t}, \overline{y}_t) = \frac{\left(\beta\left(\frac{y_{i,t}}{\overline{y}_t}\right) + q\right)}{1 + \beta\left(\frac{y_{i,t}}{\overline{y}_t}\right) + q} y_{i,t} = \begin{cases} \frac{(\beta_C + q)}{1 + \beta_E + q} y_{i,t} = s_E y_{i,t}, \text{ if } \frac{y_{i,t}}{\overline{y}_t} > 1 \\ \frac{(\beta_W + q)}{1 + \beta_W + q} y_{i,t} = s_W y_{i,t}, \text{ if } \frac{y_{i,t}}{\overline{y}_t} \leq 1 \end{cases} \tag{40}$$

where $s_E = \frac{(\beta_C + q)}{1 + \beta_C + q}$ and $s_W = \frac{(\beta_W + q)}{1 + \beta_W + q}$. Accordingly, the propensity to save of entrepreneurs exceeds those of the workers', i.e.,

$$s_E > s_W. \tag{41}$$

Empirically, the work of Kuznets (1953); Projector (1968); Bosworth et al. (1991); Sabelhaus (1993) or Huggett and Ventura (2000); Mian et al. (2021a, 2021b) indicate that the individuals' average savings rates are positively related to their income. Frank (1985) or Frank et al. (2014) explain these outcomes with the relative income hypothesis. Furthermore, this result coincides with the assumptions made by Kaldor (1956, 1957), Pasinetti (1962), Samuelson and Modigliani (1966) or Kalecki (1971), regarding the average savings rates of workers and capitalists. In our study, the distribution of income determines the savings behavior.

The total savings of workers become:

$$S_{W,t} = s_W \frac{(1 - \alpha)(n - 1)}{n} A K_t. \tag{42}$$

As derived above, the relative income of workers increases with the number of firms; and differentiating the savings of workers with respect to the number of firms, we get:

$$\frac{\partial S_{W,t}}{\partial n} = A K_t s_W \left((1 - \alpha)\frac{1}{n^2}\right) > 0. \tag{43}$$

Hence, if the market power increases, the aggregate savings of the workers will decrease.

The aggregate savings of entrepreneurs are given by:

$$S_{E,t} = s_E \frac{A K_t}{n}. \tag{44}$$

Differentiating the savings of entrepreneurs with respect to the number of firms gives:

$$\frac{\partial S_{E,t}}{\partial n} = \frac{-s_E A K_t}{n^2} < 0. \tag{45}$$

The aggregate savings of the firm owners will increase with increasing market power.

Next, we consider the aggregate savings of the economy. The aggregate savings is calculated as:

$$S_t = [s_E + s_W(1 - \alpha)(n - 1)]\frac{A K_t}{n}, \tag{46}$$

To determine the growth factor of the economy, we take into account that the capital stock in period $t + 1$ equals the aggregate savings in period t:

$$K_{t+1} = [s_E + s_W(1 - \alpha)(n - 1)]\frac{A K_t}{n}. \tag{47}$$

Dividing both sides by K_t delivers the growth factor of the capital stock:

$$G_t(n) = \frac{K_{t+1}}{K_t} = \frac{A}{n}(s_E + s_W(1 - \alpha)(n - 1)). \tag{48}$$

Proposition 4. *If the number of firms increases, the growth factor of the economy will decline. Alternatively, if the market power of firms' increase, the growth factor of the economy also increases. Additionally, the savings or wealth related to the existent capital stock* $\frac{S_t}{K_t}$ *will increase if the number of firms declines.*

Proof. The first derivative of the growth factor becomes:

$$\frac{\partial G_t(n)}{\partial n} = \frac{-A(s_W(1-\alpha)-s_E)}{n^2} < 0.$$

□

This result is to some extent paradoxical, because more competition in the economy leads to less economic growth. The intuitive reasoning is that an increasing number of entrepreneurs will lead on the one hand to an intergenerational shift of income from the working generation to the old generation, and to a reduction in the savings of the entrepreneurs and their incomes. These three effects have a negative impact on the growth factor. On the other hand, the incomes of the workers will increase, and accordingly so will their savings. The latter effect has a positive impact on the growth factor of the economy. However, the overall or net effect of an increasing number of entrepreneurs will result in a decrease in the growth factor. The driver behind this result is, on the one hand, the decrease in income of the working generations and the increase in the incomes of the older generation, and, on the other hand, the fact that the aggregate propensity to save declines. Nevertheless, this outcome seems to be counter-intuitive, because of the fact that oligopolies generate inefficient factor allocations. However, this is not the case in this model because the labor supply is assumed to be wage-inelastic, and the savings are assumed to be interest-inelastic. These assumptions guarantee that all resources are allocated efficiently.

Even if we extend the model by considering a wage-elastic labor supply and interest-elastic savings, the results of this model may not change qualitatively. A qualitative change caused by the introduction of a wage-elastic labor supply and/or interest-elastic savings requires that the respective elasticities are relatively huge. However, considering the estimates of the labor supply elasticities in the literature (Blundell and MaCurdy 1999; Evers et al. 2008; Bargain et al. 2014; Jäntti et al. 2015; Chetty et al. 2011) and interest rate elasticities of savings (Blinder 1975; Hall 1988, 1989; Carroll and Summers 1987; Campbell and Mankiw 1989, 1991; Beznoska and Ochmann, 2013), we note that both elasticities are close to zero. However, the theoretical result that the growth factor will increase contradicts the empirical facts of the last 40 years. The explanation is that our model differs in two respects from the real world, which makes this positive outcome possible. We assume a closed economy, and that individuals can only invest their savings in real capital. Hence, relaxing these two assumptions will question the validity of Proposition 4. If the profits can be invested elsewhere, such as in bubbles in the financial markets or abroad, it is possible that the growth rate will decline with an increase in market power, which is something that we can observe in reality. Particularly, the great financial crisis has shown that the financial bubble was huge, and the current developments in the stock markets indicate that something similar is happening again.

Before we discuss the fundamental outcomes of this model, we analyze the case that the function of capitalist spirit is a continuous function.

4. A Generalized Function of Capitalist Spirit

Now we assume that β is an increasing function in the relative income position, i.e.,

I. $\beta\left(\frac{y_{i,t}}{\overline{y}_t}\right) > 0, \ \forall y_{i,t} > 0;$

II. $\beta'\left(\frac{y_{i,t}}{\overline{y}_t}\right) > 0$, this means β is increasing in $y_{i,t}$ and decreasing in $\overline{y}_t$;

III. $\lim\limits_{\frac{y_{i,t}}{\overline{y}_t}\to\infty} \beta(.) = \kappa \leq 1;$

IV. $\beta(0) = 0$;

V. $\beta\left(\frac{y_{i,t}}{\overline{y}_t}\right)$ is homogenous of degree zero in $y_{i,t}$ and $\overline{y}_t$. Thus, if individual incomes and average income are multiplied by a positive factor, the value of β remains constant.

Given these assumptions, the savings rates become:

$$s_E\left(\frac{y_{E,t}}{\overline{y}_t}\right) = \frac{\left(\beta_E\left(\frac{y_{E,t}}{\overline{y}_t}\right) + q\right)}{1 + \beta_C\left(\frac{y_{E,t}}{\overline{y}_t}\right) + q} \tag{49}$$

and

$$s_W\left(\frac{y_{W,t}}{\overline{y}_t}\right) = \frac{\left(\beta_W\left(\frac{y_{W,t}}{\overline{y}_t}\right) + q\right)}{1 + \beta_W\left(\frac{y_{W,t}}{\overline{y}_t}\right) + q}. \tag{50}$$

Because of (31) and (33), the following relationship holds:

$$s_E\left(\frac{y_{E,t}}{\overline{y}_t}\right) > s_W\left(\frac{y_{W,t}}{\overline{y}_t}\right), \text{ if } n < n^{max}. \tag{51}$$

The aggregate savings become:

$$S_t = \left[s_E\left(\frac{y_{E,t}}{\overline{y}_t}\right) + s_W\left(\frac{y_{W,t}}{\overline{y}_t}\right)(1-\alpha)(n-1)\right]\frac{AK_t}{n}. \tag{52}$$

Let us define $\widetilde{s}(n)$ as modified savings rate, where we consider the relative incomes (31) and (33):

$$\widetilde{s}(n) \equiv s_E\left(\frac{N}{((1-\alpha)n+\alpha)n}\right) + s_W\left(\frac{(n-1)(1-\alpha)N}{(N-mn)((1-\alpha)n+\alpha)}\right)(1-\alpha)(n-1). \tag{53}$$

Therefore, the aggregate savings can be rewritten as:

$$S_t = \widetilde{s}(n)\frac{AK_t}{n}. \tag{54}$$

The aggregate savings are given by the modified savings rate times the aggregate income of entrepreneurs. The resulting growth factor of capital becomes:

$$G_t(n) = \frac{K_{t+1}}{K_t} = \widetilde{s}(n)\frac{A}{n}. \tag{55}$$

Differentiating the growth factor with respect to the number of firms delivers:

$$\frac{\partial G_t(n)}{\partial n} = \frac{A}{n}\left(\frac{\partial \widetilde{s}(n)}{\partial n} - \frac{\widetilde{s}(n)}{n}\right) = \frac{\widetilde{s}(n)A}{n^2}\left(\eta_{\widetilde{s},n} - 1\right) \lesseqgtr 0, \tag{56}$$

where $\eta_{\widetilde{s},n} \equiv \frac{\partial \widetilde{s}(n)}{\partial n}\frac{n}{\widetilde{s}(n)}$ is the elasticity of the modified savings rate regarding the number of firms. If the elasticity is smaller than 1, then the growth factor will decrease. However, if the elasticity exceeds one, the growth factor increases with the number of firms. These outcomes are dependent on the functional form of β. To obtain a deeper insight, we differentiate the aggregate savings with respect to n:

$$\frac{\partial S_t}{\partial n} = \frac{AK_t}{n}\Bigg[\underbrace{\underbrace{\frac{\partial s_E\left(\frac{y_{E,t}}{\overline{y}_t}\right)}{\partial \beta_E}}_{+}\underbrace{\frac{\partial \beta_E\left(\frac{y_{E,t}}{\overline{y}_t}\right)}{\partial\left(\frac{y_{E,t}}{\overline{y}_t}\right)}}_{+}\underbrace{\frac{\partial\left(\frac{y_{E,t}}{\overline{y}_t}\right)}{\partial n}}_{-} - \frac{\widetilde{s}(n)}{n}}_{-}\Bigg] + \underbrace{(1-\alpha)\left(\underbrace{\frac{\partial s_W\left(\frac{y_{W,t}}{\overline{y}_t}\right)}{\partial \beta_W}}_{+}\underbrace{\frac{\partial \beta_W\left(\frac{y_{W,t}}{\overline{y}_t}\right)}{\partial\left(\frac{y_{W,t}}{\overline{y}_t}\right)}}_{+}\underbrace{\frac{\partial\left(\frac{y_{W,t}}{\overline{y}_t}\right)}{\partial n}}_{+}(n-1) + \underbrace{S_W\left(\frac{y_{W,t}}{\overline{y}_t}\right)}_{+}\right)}_{+}. \quad (57)$$

Proposition 5. *If the increase in the savings of workers induced by an increased number of firms exceeds the absolute value of the decline in the savings of entrepreneurs, the growth factor, the income share of workers and the income of capital owners will increase, while the incomes of the entrepreneurs will decrease.*

Proposition 6. *If the increase in the savings of workers induced by an increased number of firms will be less than the absolute value of the decline in the savings of entrepreneurs, the growth factor and the incomes of the entrepreneurs will decline, while the income share of workers and the income of capital owners will increase.*

Intuitively, it is clear: if the number of firms increases, the relative income of workers will also increase. An increased relative and absolute income of workers induces the savings rate of workers to increase. Additionally, the aggregate income of workers will also increase by the increased number of firms because the labor income share rises with the latter. Both effects, the increased savings rate of workers and the increased labor income, lead to more savings. These two effects are illustrated by the third expression in the brackets. On the other hand, the income of entrepreneurs will decline if the number of firms increases; and additionally, the relative income of entrepreneurs, and as a consequence, their savings rate, will decline. This effect is shown by the first and second expressions in the brackets. This means that in general, the effect of market concentration is ambiguous. Decisive is the interaction between the spirit of capitalism and decrease in profit income, and the increase of wage incomes. If the spirit of capitalism is strong, an increasing number of firms will decrease the growth factor over the whole range of potential number of firms. Regarding policy recommendations, it is important to investigate if the decrease in the savings of the entrepreneurs will be overcompensated by the increase in savings of workers. If the government wants to increase the growth factor, an increase in the number of firms is justified. A positive byproduct of this policy is reduction in inequality and an increase in the incomes of the old generation.

However, it must be noted that market concentration has a direct impact on the intergenerational distribution of income. If the number of firms is increasing, the income of the working generation will decline, and accordingly the income of the old generation will increase.

In summary, it should be recognized that without having detailed knowledge about the savings function, functional distribution of income and market concentration, it is a complex task to make policy proposals to increase economic growth. A calibration of the model will illustrate the outcomes of this section.

5. A Calibration

For calibration, we assume that the function $\beta\left(\frac{y_{i,t}}{\overline{y}_t}\right)$ has explicitly the following form:

$$\beta\left(\frac{y_{i,t}}{\overline{y}_t}\right) = B\left(\frac{y_{i,t}}{\overline{y}_t}\right)^{\rho}, \quad (58)$$

where $B > 0$, $\rho > 1$. Then, the spirit of capitalism is a convex function in the relative income. We choose this function because it fits very well to the observations on the savings rate. If

the relative incomes are low, people save only a little, or nothing if the relative incomes exceed one and the savings rate increases strongly, but does not exceed one. According to Brenke and Wagner (2013), in Germany, 55% of the bottom 50% income receivers saved nothing in 2011, while the average savings rate of this group was 5.74%. Moreover, the top 10% income receivers contributed 37% to the total savings in 2011 in Germany. Given the functional form (58), the individual savings rate becomes:

$$s_{i,t} = \frac{B\left(\frac{y_{i,t}}{\overline{y}_t}\right)^{\rho} + q}{B\left(\frac{y_{i,t}}{\overline{y}_t}\right)^{\rho} + q + 1} = \frac{B\left(y_{i,t}^{rel}\right)^{\rho} + q}{B\left(y_{i,t}^{rel}\right)^{\rho} + q + 1}, \ \forall i \in \{E, W\}. \tag{59}$$

where $y_{i,t}^{rel} = \frac{y_{i,t}}{\overline{y}_t}$ This function of the savings rate has the property that it has an inflection point at:

$$y_{i,t}^{rel} = \left(\frac{(\rho - 1)(1 + q)}{B(\rho + 1)}\right)^{\frac{1}{\rho}}. \tag{60}$$

Thus, the smaller the B is, the higher is the relative income associated with the inflection point. Figure 1 represents the calibration of three possible functions of the savings rate dependent on the relative income, with different values of B, whilst keeping all other parameter values identical (see Appendix A).

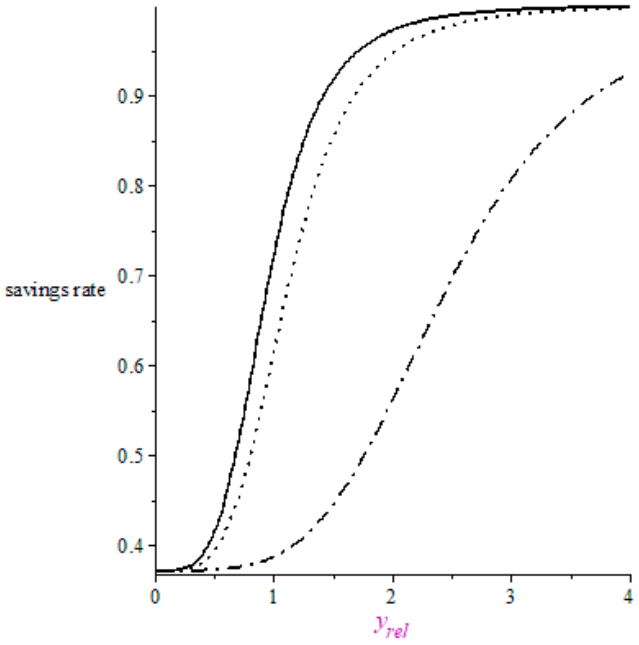

Figure 1. The savings rate depending on the relative income. The savings rates differ regarding the value of B: solid line $B = 2$, dotted line $B = 1$, dash-dot line $B = 0.04$.

The solid line represents the savings rate with $B = 2$, the dotted line represents the savings rate with $B = 1$ and the dash–dot line the case if $B = 0.04$. The shape of the savings rate has a crucial influence on the relationship between the degree of competition and the growth of the economy represented by the growth factor G. However, the values of the savings rate are exaggerated to emphasize the possible outcomes. To make the savings fitting to real values, the value of B has to be very small.

To illustrate the outcome of the growth factor in Figure 2, we calibrate the growth factor dependent on the number of firms in the m intermediate markets. Again, the three functions of the growth factor differ only with respect of the value of B. The solid line is calibrated by using $B = 2$, the dotted line represents the growth factor with $B = 1$, and the dash–dotted line represents the growth factor with $B = 0.04$. It is noted that the smaller the

value of B, the more probable it becomes that the relationship between growth and market competition will become positive if the number of competitors is sufficiently huge. In fact, the growth factor only continuously declines when $B = 2$.

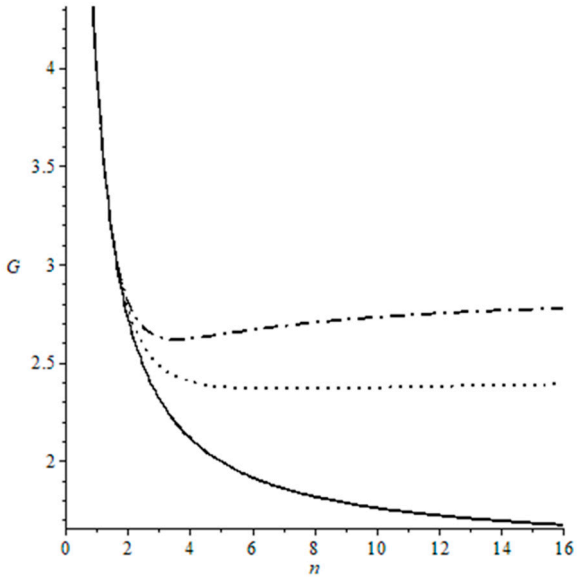

Figure 2. The growth factor depending on the number of oligopolists in a market. The growth factors differ regarding the value of B: solid line $B = 2$, dotted line $B = 1$, dash-dot line $B = 0.04$.

However, besides the result that a sufficiently huge B leads to a negative relationship between growth and number of competitors, the value of the production parameter α is relevant. To show this, we have calibrated Figure 2 again, but instead of using a very small value $\alpha = 0.01$, we set $\alpha = 0.4$. The outcomes are presented in Figure 3 (below).

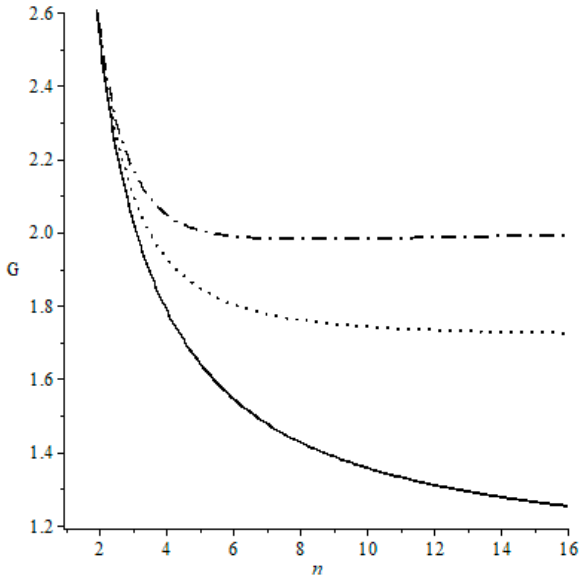

Figure 3. The growth factor depending on the number of oligopolists in a market. The growth factors differ again regarding the value of B like in Figure 2, but here a bigger value of α (=0.4) is used.

The value of α is important, because it determines the share of income which is transferred to the old generation or the capital owners. This implies that an increase in the number of firms always leads to an intergenerational income redistribution from the young to the old generation, and the bigger α is, the greater are the gains to the old generation from

the increase in the number of firms. Moreover, this implies that the income of the young generation declines with an increasing α, and there is a tendency that the savings and the growth rate will also decline. As noted in Figure 3, only in the case that $B = 0.04$ is the relationship between the numbers of firms and the growth factor positive for a sufficiently large number of firms. Thus, if B and α are sufficiently large, the growth rate of the economy will decline with an increasing number of firms.

6. Conclusions

In this study, we extend the OLG growth model of imperfect competition of Kumar and Stauvermann (2020, 2021), which is comparable with the OLG growth models of perfect competition. Additionally, we integrate and endogenize the degree of spirit of capitalism, a notion that goes back to Zou (1995, 2011).

Let us repeat the mechanisms which drive the results. An increase in market power has an intragenerational redistributive effect because it reduces the real income of workers and increases the profit income of firm owners. Further, the increase in market power has an intergenerational redistributive effect because it reduces the interest income of the capital owners, who are members of the old generation, and increases the profit income of firm owners, who are members of the working generation. Therefore, income is redistributed from the older to the younger generation. Additionally, the firm owners represent the rich members of the society, who have a higher savings rate than the workers, who represent the poor members. These two effects, the redistribution of income from the old to young generation and the redistribution of income from the poor to the rich, induced by increasing market power, make it likely that the growth rate will increase. This outcome implies that the workers and capital owners will benefit in the future, although these two groups suffer in the presence of increasing market power. However, more market power also implies a more unequal distribution of income. How this trade-off between inequality and growth will be solved has to be left to politics.

We have shown that increasing market concentration may increase the growth factor, but as noted earlier, this is only guaranteed in a closed economy without financial markets. However, the growth rate may increase with market power, because of the fact that the income of the working population is positively related to market concentration and because of the fact that the average savings rate will increase. So far, the model is able to explain the trickle-down effect. With the help of the model, it is possible to explain the observations made in the last 40 years in most developed countries. Particularly, it can explain the decline of the labor income share, the decline of the natural interest rate, and the increasing wealth-to-income ratio. In contrast to the empirical observations, it cannot explain the decline of the growth rate in most developed countries. This outcome is a consequence of the assumption that savings can only be invested in capital, and not invested abroad or in financial bubbles. However, these latter opportunities are, according to Krugman (2016) and Stiglitz (2019), important considerations to explain the decline of the growth rate and the low investments in real capital. To obtain results closer to reality, it is necessary to refine and extend the model, for example by introducing asset price bubbles, as in Grossman and Yanagawa (1993), or to allow for international borrowing and lending, as proposed by Buiter (1981). Nevertheless, it should be noted that the outcomes coincide with Stauvermann and Kumar (2021) results of an OLG model with a competitive and an oligopolistic sector.

Our analysis provides insights and lends support to the argument that the high market concentration observed in countries such as Korea or China could be an influential factor for their extraordinarily high growth rates in recent decades. In both countries, between 1980 and 2017, Confucianist traditions have resulted in high national savings rates (Jinguo et al. 2000) averaging around 35% and 41%, respectively. The markets in these countries are highly concentrated, but the capital flows and financial markets were most of the time strongly regulated. An exception is the period before the Asian crisis in Korea, but the problem was not that the Chaebols transferred savings abroad, but that Korean

banks took too many short-term loans from abroad, which were used to finance long-term investments in Korea.

Moreover, the model presented in this study also highlights that the market structure alone does not determine the development trajectories of an economy. Only if high market concentration is associated with a strong spirit of capitalism of entrepreneurs will the outcome be high growth rates. However, the price or cost of development is the relatively unequal intragenerational distribution of income and a relatively unequal intergenerational distribution of income. In fact, the old age poverty rate in Korea is the highest among OECD countries.

The approach can be easily extended to account for other production technologies such as the usual neoclassical production function (Solow 1956), human capital accumulation (Lucas 1988; Stauvermann and Hu 2018) or public investments (Barro 1990; Stauvermann and Kumar 2015).

Author Contributions: Writing—original draft preparation, P.J.S.; writing—review and editing, R.R.K.; writing—review and editing, F.W. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: Peter J. Stauvermann thankfully acknowledges the financial support of the Changwon National University 2021–2022.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Here, are the variable values which used to calibrate Figures 1–3.

Table A1. Calibrate Figure 1.

	B	q	Ψ
Solid line	2	0.59	4.09
Dotted line	1	0.59	4.09
Dash-dot line	0.04	0.59	4.09

Table A2. Calibrate Figures 2 and 3.

	B	q	Ψ	m	N	α	A
Solid line	2	0.59	4.09	400	10 mill	0.01.	4
Dotted line	1	0.59	4.09	400	10 mill	0.01	4
Dash-dot line	0.04	0.59	4.09	400	10 mill	0.01	4

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