Have the Danish Enterprise Foundations Reached a Break Point?[1] [2]

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Abstract

The Danish enterprise foundation model is widely regarded as a success based on its past performance, but many trends in the current business environment – including deglobalization, credit contraction, digital disruption and tax issues – could potentially endanger its continuing success. In this paper we document that a breakpoint – or at least a slowdown - may have occurred around 2012 after which the number of Danish enterprises, the growth rates of foundation-owned companies and their relative share of the economy have declined. However, we also show that they did no worse than other private businesses.

Keywords: Enterprise foundations, economic performance.

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1. Introduction

We define enterprise foundations as foundations, which own business companies.[5] This distinct governance model has recently attracted attention as an alternative to conventional capitalist corporations. For example, enterprise foundations are motivated by charity and business purpose rather than profits. As perpetuities, they have a long time horizon which enables investments in R&D and human capital (Thomsen et al. 2018). They have no owners and therefore do not contribute to economic inequality. They treat their employees better and have better reputations (Børsting and Thomsen 2017). Given these attractive characteristics it is interesting to examine their business performance. Can they compete successfully with conventional companies? Do they flourish or stagnate in the current business environment?

Foundation ownership is found around the world in companies like Bosch (Germany), Hershey (US), Tata (India), Ikea (Netherlands, Lichtenstein) or Rolex (Switzerland), but it is particularly important in Denmark, where 3 of the 4 largest companies are foundation-owned and where foundation-owned companies account for the bulk of the country's stock market capitalization and R&D (Thomsen 2017). Denmark is therefore an ideal testing ground for the foundation model because there are enough observations for statistical studies and because foundation ownership is sufficiently widespread to influence the national economy.

Historically the Danish foundation model has been regarded as a success. However in this paper we provide new evidence on the evolution of Danish enterprise foundations 2004-2018, which indicates a break point – or at least a slowdown - after 2012, after which their progress has stalled.

2. Institutional Context

Danish enterprise foundations are regulated by the law on enterprise foundations (adopted in 2015) and the law on taxation of enterprise foundations (adopted in 2015). The enterprise foundation law of 2015 was intended to increase transparency and accountability regarding foundation governance, compensation, accounting and donations.

The Danish enterprise foundations are supervised by a foundation authority (under the Ministry of Business and Economy). According to the law, they are subject to a "comply or explain" regime, in which they have to react to recommendations by the Committee on Good Foundation Governance.

According to the enterprise foundation register, there are about 1350 enterprise foundations in Denmark, but only about 400 of these are so-called holding foundations which own own companies, and many are established by government organizations or associations with little formal independence and very limited business activity.

However, the largest enterprise foundations are important because they own some of the largest Danish firms. It is estimated that foundation-owned companies account for about 5%

[5] Strictly speaking, they are foundations which engage in business activity which they can do directly through the foundation or indirectly through ownership of a business company. However, in this paper we will only be concerned with foundations which own business companies.

of domestic employment, 10% of value added and 50% of R&D.

3. Research objectives

Theoretically, enterprise foundations can be modelled as commitment mechanisms (in the sense of Schelling 1960, Mayer 2011, 2018, Thomsen 2017), which enable the founders to commit irrevocably to a set of goals and values stated formally in the foundation charter or informally in a company culture. The commitment can persist as long as the foundation retains ownership control of the company.

Commitment comes with both costs and benefits. Generally, it provides a long-term time horizon, stable ownership, and greater stakeholder orientation than found in conventional for-profit companies (Thomsen 2017, Børsting, and Thomsen 2017). However, it is also possible that long-termism may become procrastination and passivity and that foundation-owned company may be captured by key constituencies such as employees or managers to the detriment of their competitiveness.

We would expect the survival and performance of enterprise foundations and foundation-owned companies to reflect the balance of these costs and benefits. Thus enterprise foundations and foundation owned-companies might be expected to flourish in industries and business regimes which benefit from long-termism and stakeholder orientation, while conventional for-profit business would benefit when agility and cost efficiency are called for.

Reflecting on these costs and benefits, a number of global trends seem to have challenged the foundation model in recent years.

Deglobalization. It is generally recognized that globalization has fostered the growth of large multinational corporations. A benign and stable regime for world trade and business may have been conducive to foundation-owned companies while the more recent period of financial crisis and deglobalization (James 2018) could conceivably put them at a disadvantage relative to more agile competitors.

Credit contraction. Foundation-owned enterprises are typically less inclined to issue new equity shares than investor-owned companies because the foundations are reluctant to let their controlling stakes be diluted. While credit was abundant up to the financial crisis, the deflated asset price bubble and ensuing bank regulation (Bijlsma Dubovik and Straathof 2013, Giebel and Kraft 2020) may have put foundation-owned companies at a relative disadvantage.

Technology disruption. Many business observers including Erik Brynjolfsson and Andrew McAfee (2014) argue that the cumulative effects of digitalization have led to business disruption in most industries that puts a premium on business agility. Such changes may challenge the steady growth of foundation-owned companies. Potentially, such structural changes can disrupt the business models of existing companies and particularly foundation-owned companies which are committed to their ongoing businesses and reluctant to give up control in mergers or acquisitions.

Taxation. Partly as a consequence of the liberalization of financial markets, most countries around the world seem to have reduced wealth taxes after the millennium (OECD 2018). This may have reduced the tax incentive to create new enterprise foundations.

This paper takes stock of how the Danish enterprise foundations have coped with these challenges. We track the evolution of the foundations and the companies that they own compared to other businesses using financial statements and other indicators.

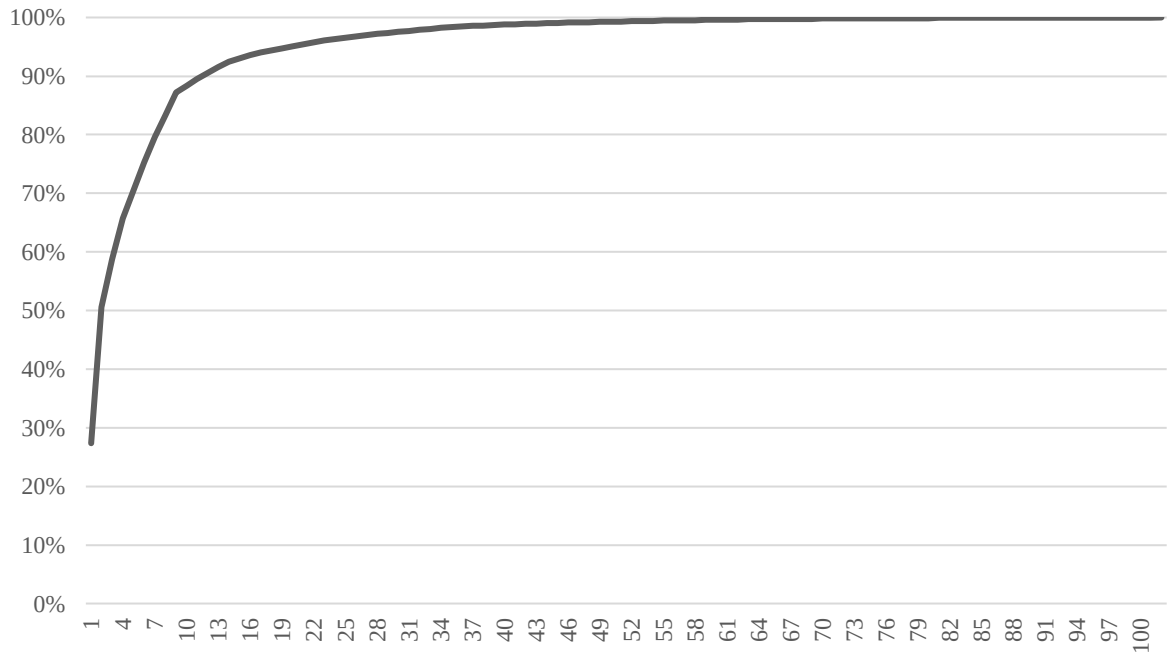
4. Data and Methodology

In this paper we will analyze multiple datasets to form an overall picture of the evolution of the Danish enterprise foundations and their companies. We use the Enterprise Foundation Register from the Danish Business Authority, which covers all Danish Enterprise foundations. We use data from Statistics Denmark, where we have access to micro data. We use data from Copenhagen Stock Exchange (OMX) to chart the evolution of listed foundation-owned companies.

We focus on the largest enterprise foundations and foundation-owned companies because we are interested in the economy-wide impact. Occasionally, we even rely on a database, which covers the 120 largest Danish foundation-owned companies. Since there are almost 1400 enterprise foundations in the enterprise foundation register, this may seem restrictive.

However, as we show in figure 1, foundation equity is highly concentrated so that the 10 largest foundations account for about 85% of total foundation equity while the 50 largest account for more than 100%. Therefore, we obtain a good approximation of the foundations' total economic impact by focusing on the largest entities and their subsidiaries.

Figure 1: Largest Foundations share (%) of Total Equity Capital (book value) 2019

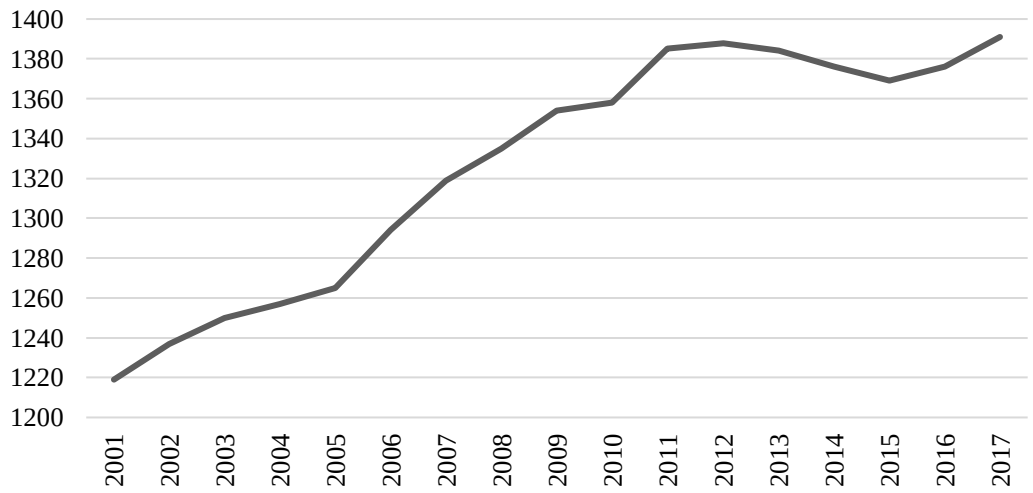


Similar skewed size distributions are well-known for companies, and since the bulk of enterprise foundation assets are invested in the companies that they own, this similarity is not surprising. The size distribution is approximately log-normal. However, a few of the largest and most successful enterprise foundations (such as the A: P. Moeller Foundation, the Novo Nordisk Foundation, the Lundbeck Foundation and the William Demant Foundation) have now diversified over multiple companies which may have increased concentration at the top even further.

4. Number of foundations

We begin by numerical growth. As we show in figure 2, the number of Danish Enterprise Foundations has been steadily growing since the foundation register was established and until about 2012 after which growth appears to cease.

Figure 21: Number of Enterprise Foundations, Statistics Denmark, DST (2020)

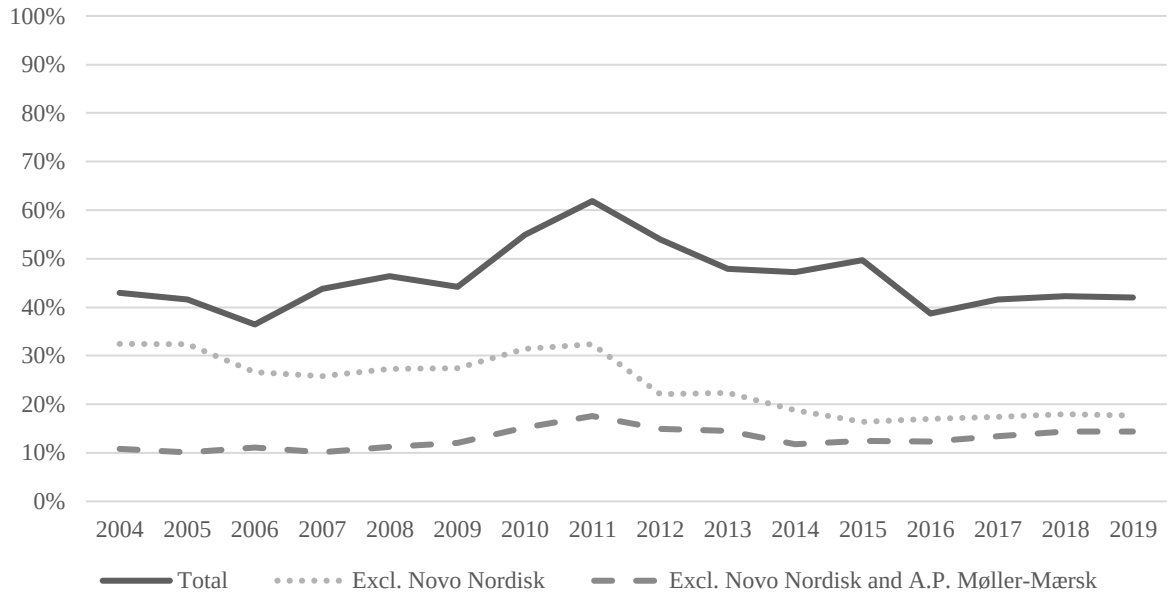


Moreover, closer examination of the data reveals that many new enterprise foundations are not established by business owners, but by foundations, associations or government organizations. Many are quasi NGOs. In contrast, the majority of older foundations appear to have been established by business owners.

5. Market Capitalization

In figure 3 we show the foundation-owned companies' share of total market capitalization at Copenhagen Stock Exchange.

Figure 3: Foundation-Owned Companies' (% of Total Market Value CSE)



The share is high – currently about 40% - and no doubt the highest in the world. Nowhere else do enterprise foundations play such a large role. Their share of Danish market capitalization grew from about 30% in 2000 to a maximum of 60% in 2011 after which it declined somewhat. In other words, we see a break point at about the same time as in the previous graph.

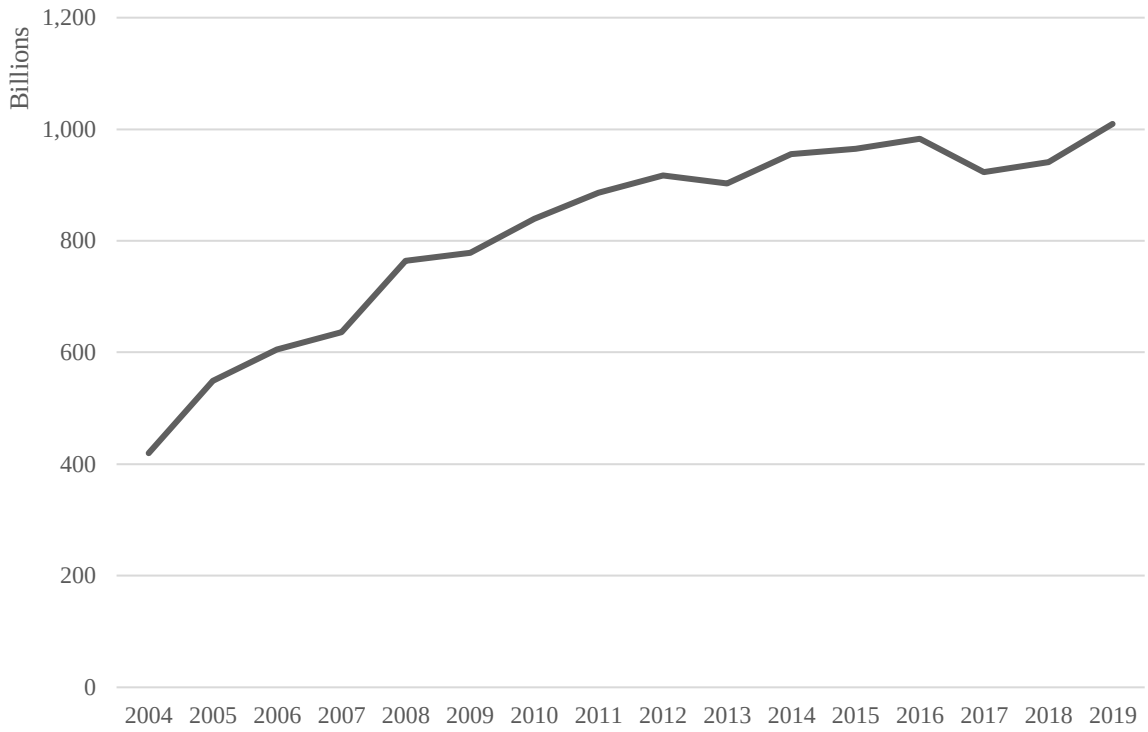
However, the numbers are sensitive to developments in the two largest foundation-owned companies, Novo Nordisk and A. P. Møller Maersk, which have both faced serious challenges since 2012. Excluding Novo Nordisk and Maersk, the market share of foundation-owned companies seems relatively stable at just under 20%.

The pharmaceutical Novo Nordisk faced prince pressure and slower revenue growth in the US which account for half of its sales. The shipping company Maersk suffered from declining growth rates in world trade after the financial crisis. Both companies are now restructuring seeking to become more agile. Novo Nordisk has cut costs and aims to diversify its product portfolio. Maersk streamlining its conglomerate structure and has sold off its oil and retail businesses. In both cases, the relative stagnation appears to be caused by challenges to business efficiency.

6. Asset Growth

We observe the same pattern in foundation-owned company assets, which grew rapidly up to a break point around 2012-14, after which they have stagnated (see figure 4).

Figure 4 120 Largest foundation-owned companies. Total Assets (bill DKK) 2004-2018



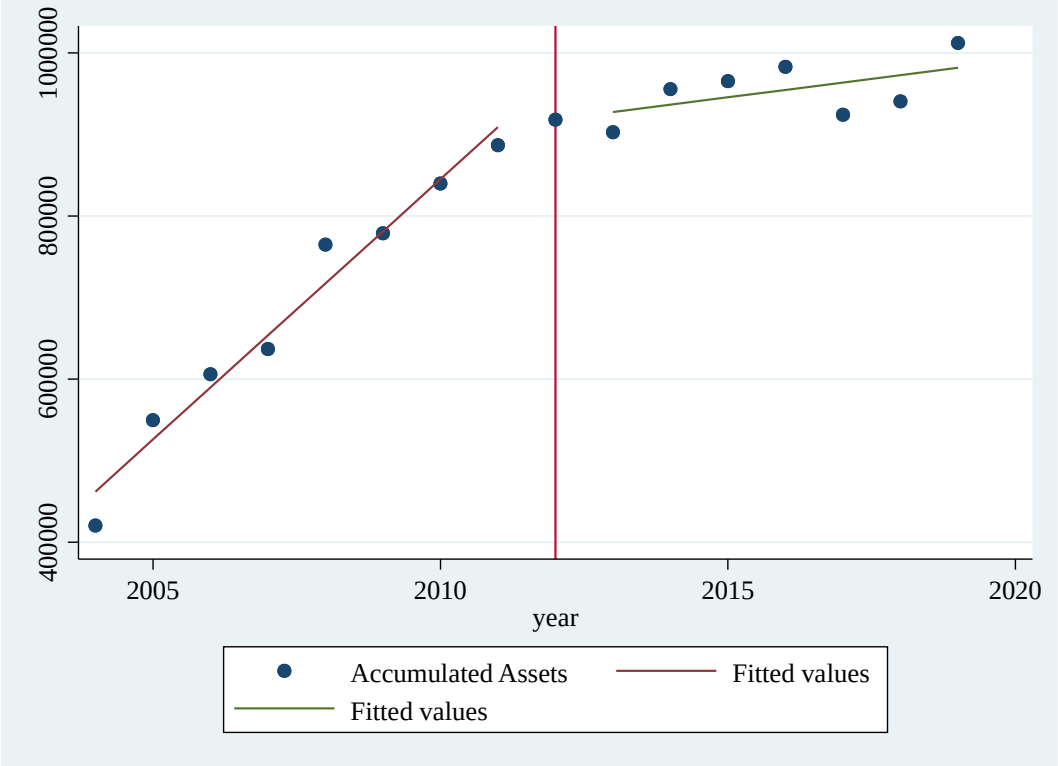
While foundation-owned company assets more than doubled during the first half of the period (2004-2012) i.e. growth of 119%, the cumulative growth in the last half (2012-2019) was only 10%, which is a dramatic decline.

We test the breakpoint hypothesis statistically by a so-called regression kink design. We do not have many observations to analyze because the analysis is conducted at an accumulated level, but we find that the "kink" in 2012 is significant at the 5% level. See the appendix for a more technical analysis.

The growth pattern is consistent with positive asset growth up to 2012 and zero growth after that with no indication of non-linearity in 2009 (see figure 5 below).

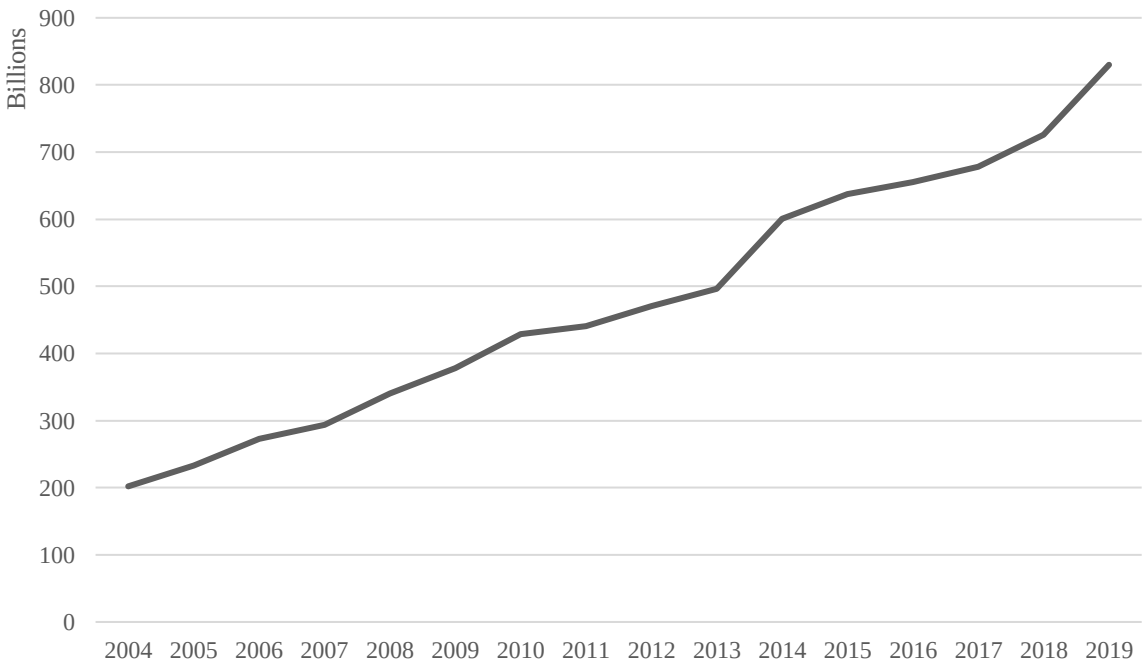
The statistical significance of the decrease in growth in 2012 indicates that a dismissal of the hypothesis of a breakpoint is not feasible. However, we cannot rule out a non-linear evolution which would correspond to a more gradual slowdown in the asset growth of the foundation-owned companies.

Figure 5: Growth of foundation-owned company assets 2004-2018, Kink analysis,



Interestingly, the growth of total foundation assets is somewhat different (see figure 6).

Figure 6: 120 Largest Danish Enterprise Foundations, Total Assets (bill DKK) 2004-2019



We note that total enterprise foundation assets are somewhat smaller than the total assets of the foundation-owned companies, i.e. 830 bill DKK compared to 1000 bill DKK in 2019. This is because foundation-owned company assets are financed both by equity (of which a large part is owned by the foundations) and by debt. Moreover, part of the equity in foundation-owned companies are owned by outside investors.

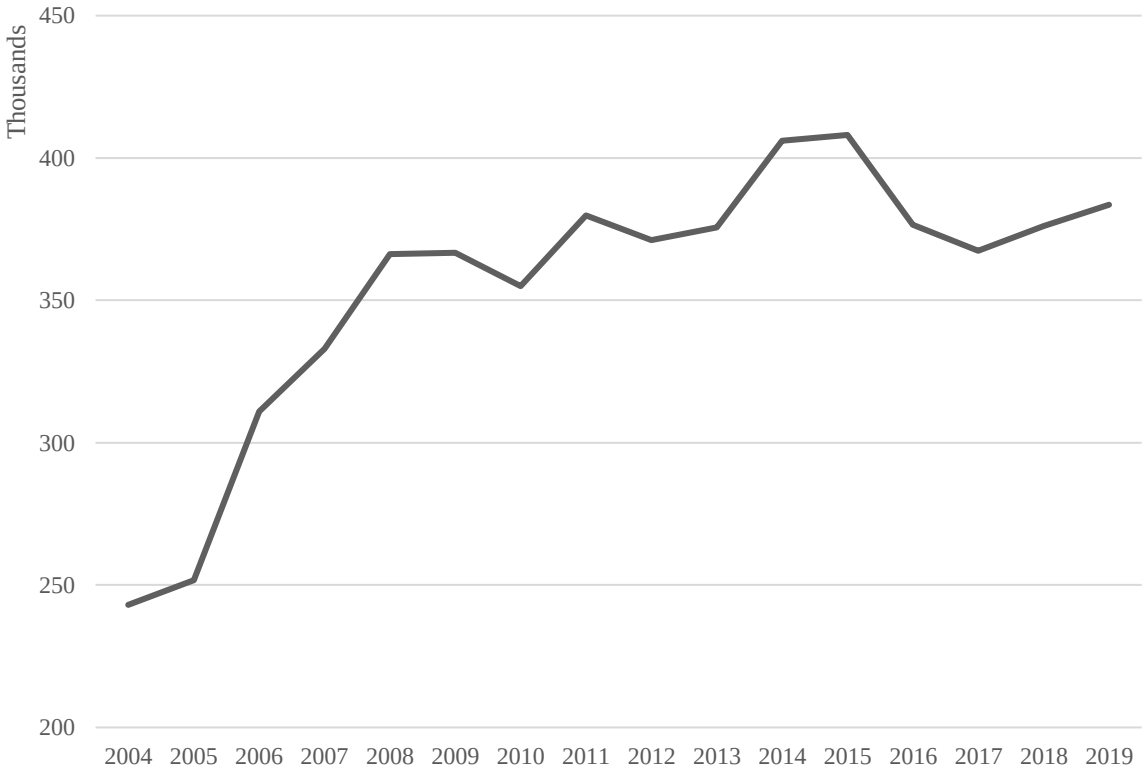
As far as the growth pattern is concerned, enterprise foundation assets grew by 119% in the first part of the period up to 2012 and by 77% in the second half of the period. This means that growth was much slower after 2011 which remains impressive but is much less dramatic than the drop in company assets. One explanation is that many large enterprise foundations diversified during the period, which made them less dependent on the growth of their core companies.

7. Alternative Growth Indicators

Employment

In figure 7 we track total employment in the largest Danish foundation-owned companies since 2004. We observe the now familiar pattern of growth up to 2012-2014 after which stagnation set in. The spike in 2014-2015 may be a coincidence, but may also reflect a delayed response to changing business circumstances

Figure 7: 120 Largest Foundation-Owned Companies, Total Employment



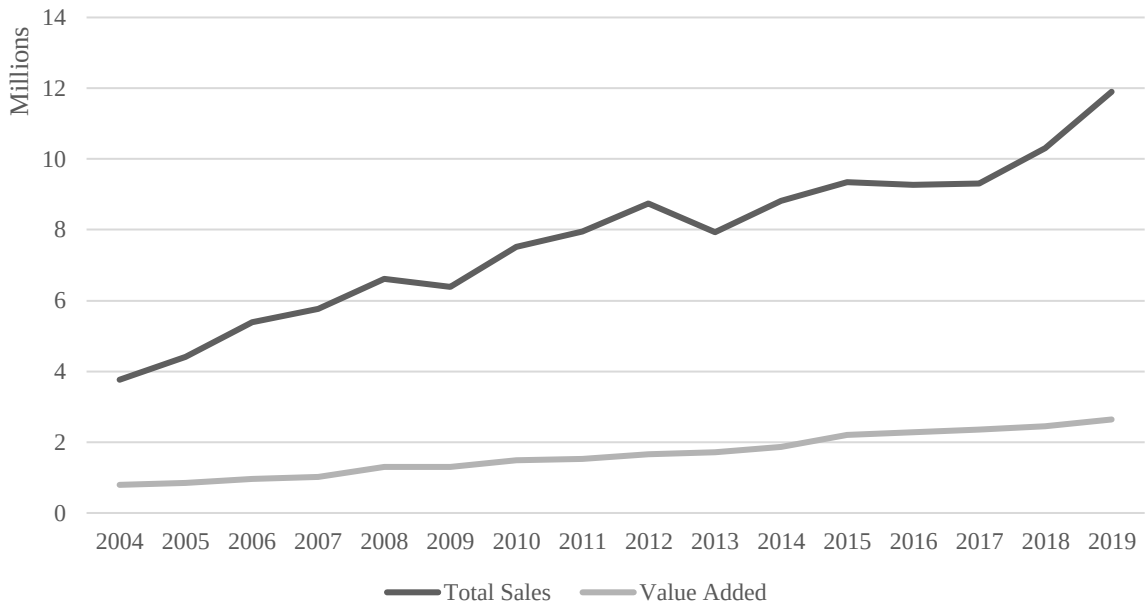
Over the period employment in these companies grew from 250.000 to about 400.000, most of which (about 300.000) were employed outside Denmark, whereas 100.000 people were employed in Denmark.

Sales and value added

In figure 8 we track the evolution of total sales and value added in the largest foundation-owned companies. Here we do not see the breakpoint observed in previous data. In contrast both sales and value added appear to grow steadily over time. Both have more than doubled

over the 2004-2012 period and continued to grow after 2012 although at about half the previous rate.

Figure 8: 120 Largest Foundation-Owned Companies, Total Sales and Value Added

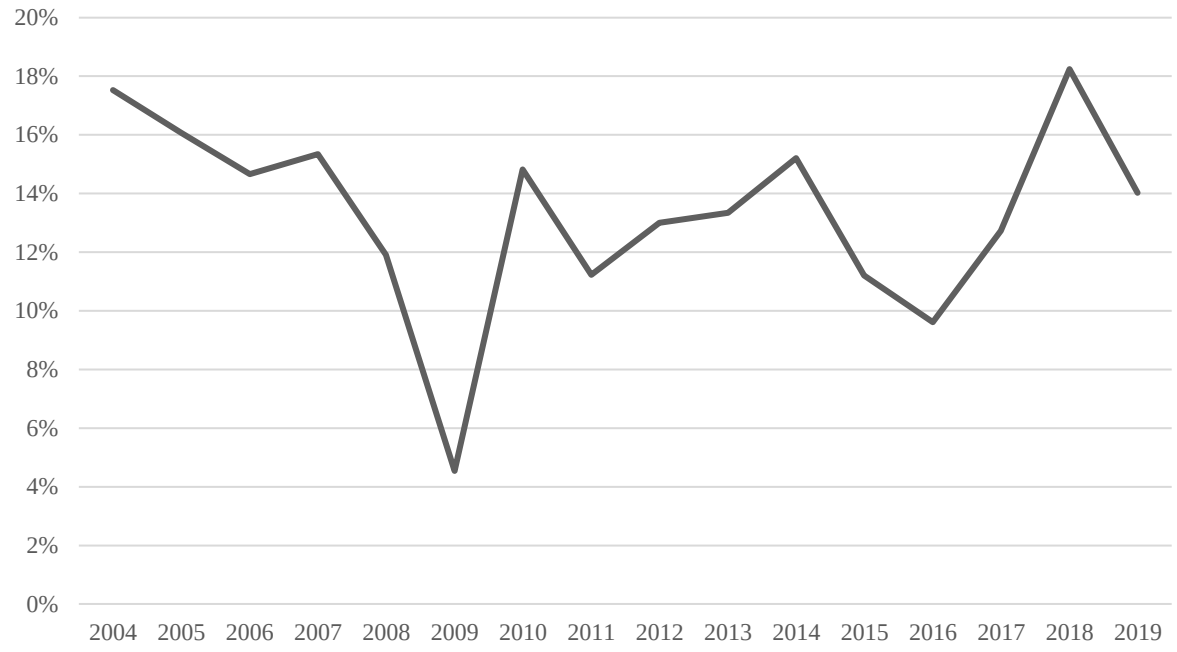


Since the employment figures indicate that employment has been constant or declining at the end of the period, while company assets grew very little, the continuous growth of sales and value added indicate that productivity increased at the end of the period, which may reflect the restructuring and cost cutting that many of the largest companies have undertaken.

Profitability

Finally, we examine the evolution of profitability (Return on Equity) in the largest foundation-owned firms over the period in figure 9. To avoid outlier bias we measure ROE as total profits dived by total equity in all foundation-owned firms which is equivalent to a size-weighted average. Average ROE is a respectable 13% in line with previous research.

Figure 9: Total Return on Equity in the 120 Largest Foundation-Owned Companies



We observe that profitability in the foundation-owned firms took a hit in 2009 at the depth of the financial crisis but recovered quickly. We also see a decline from 2014 to 2016 which may be related to breakpoint observed in the previous graphs. However, profitability then improved markedly in 2017-2018 and is in 2019 decreased to somewhat reasonable level (compared to 2018) of 14%.

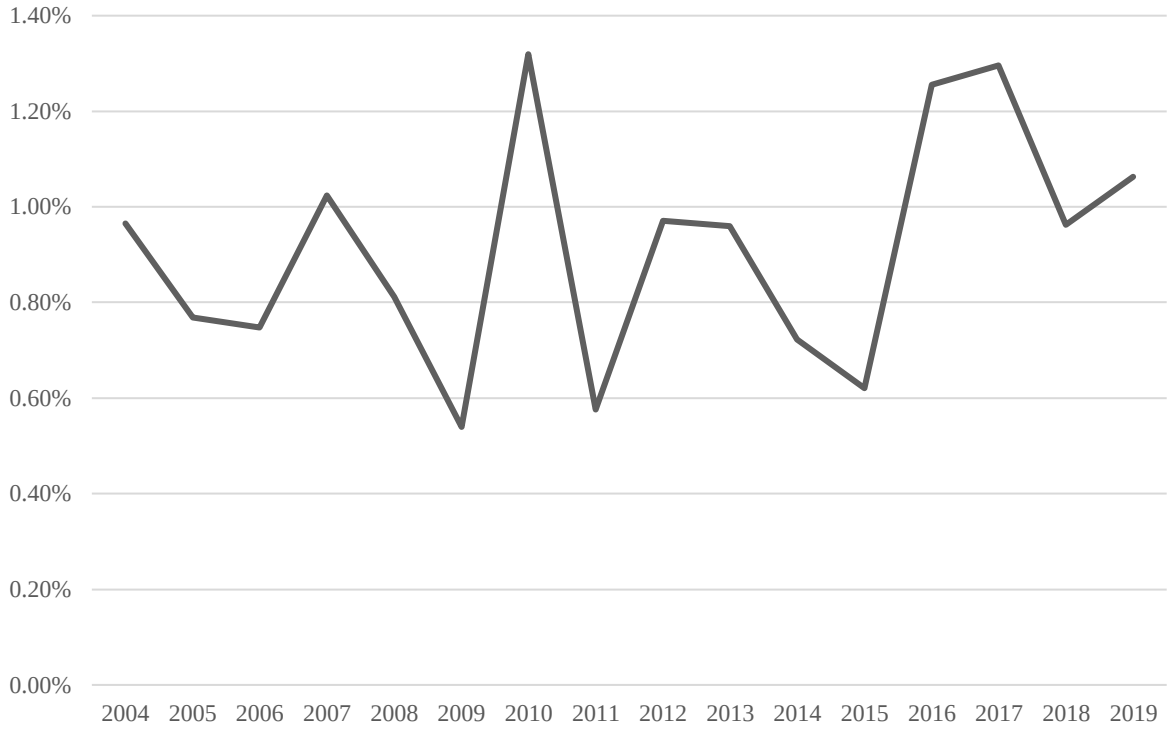
Altogether, the profitability figures are consistent with a challenging transition period 2014-2016 which has now been overcome.

Donations

Danish enterprise foundations donate part of their income to philanthropy, and it is known that donations have increased considerably in recent years. Donations from the largest enterprise foundations have almost doubled from 2.9 bill DKK over the 2004-2011 period to 5.7 bill DKK during the 2012-2018 period. It seems worth considering therefore whether lower growth is attributable to higher payout ratios

However, as a percentage of foundation assets, donations by the largest Danish enterprise foundations have only increased slightly from 0.84% 2004-2011 to 0.98% during 2012-2019. Figure 10 shows that the donation rate has fluctuated around 0.9% during the period with no clear trend.

Figure 10: Donations by the Largest Danish Enterprise Foundations (% of Assets)



It seems that the increase in philanthropic donations is mostly attributable to continuing foundation growth and that the decline in foundation growth rates is not attributable to a higher payout ratio.

8. Comparative Evolution

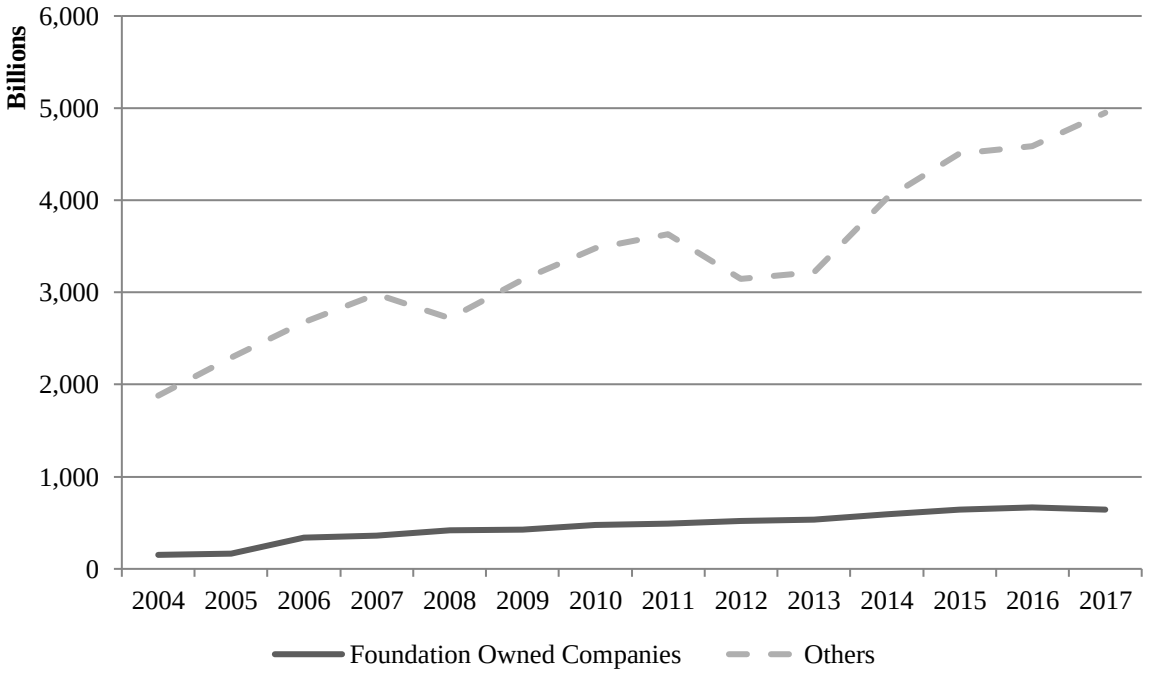
This section examines how foundation-owned companies perform compared to other business companies. For this purpose we rely on data from Statistics Denmark (DST) which contain accounting data up to 2016. By identifying foundation-owned companies in this dataset we can compare the evolution of foundation-owned and non-foundation-owned companies.

In this dataset we do not find the breakpoint in foundation-owned company assets that we observed in figures 9 or 11, but rather the linear expansion observed in figure 10 and 13. See figure 16 below. This linear growth pattern still involves a slowdown in growth rates consistent with the main hypothesis in this paper, but the difference between the two graphs remains puzzling and in need of an explanation.

We note first that the two datasets are in fact somewhat different. We were unable to match all the large foundation-owned companies in the Statistics Denmark data and the total asset volume recorded by Statistics Denmark is about 20% smaller. We speculate that at least some of the DST data is based on unconsolidated parent company accounts, which does not include all of the sizable international assets of the companies in question.

We restrict the sample to companies with assets greater than 10 million DKK. This leaves 100-120 annual observations of foundation-owned companies compared with around 23,000 annual observations for companies with other ownership. However, the foundation owned companies account for 13% of total assets.

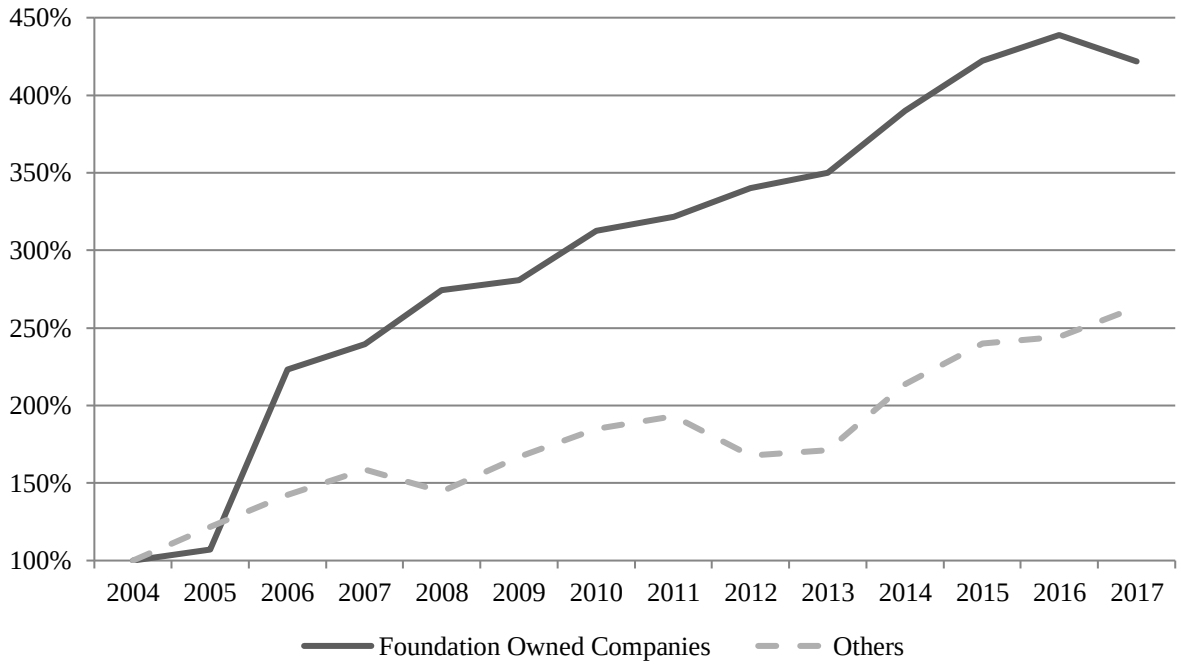
Figure 11: Total assets (bill DKK) 2004-2016, Statistics Denmark DST (2020)



In figure 11 we see the aggregate assets in foundation owned companies and companies of other ownership respectively over the period 2004-2016. We observe a stable almost linear growth pattern in the foundation-owned companies which is indicative of their steady mode of operation, while the other company assets fluctuate much more.

In figure 12, we index the two curves (2004=100) to compare the growth patterns. We find that the foundation-owned companies' total assets grow more than companies with other ownership do. Since 2004, the total assets of foundation owned companies are more than quadrupled while the total assets of companies with other ownership are just doubled.

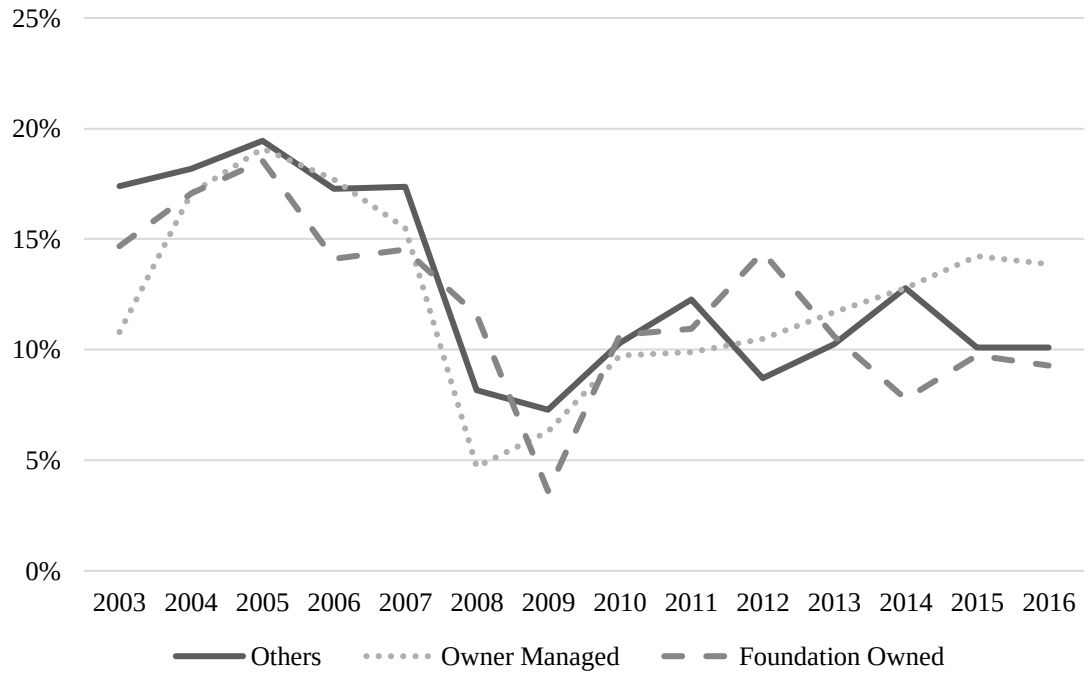
Figure 12: Index of Total Assets 2004-2016, Statistics Denmark DST (2020)



Profitability

In figure 13 we compare the profitability of the foundation-owned companies to profitability of companies with other ownership structure, i.e. owned managed companies and companies with other ownership structures (including investor ownership). Unfortunately this data is only available up to 2016, which means that we miss the upturn in the profitability of the foundation-owned companies after 2016. We observe that profit rates are rather similar across the different ownership forms

Figure 13: Average Return on Equity in Foundation-Owned, Owner-Managed and Other Companies, Statistics Denmark DST (2020)



Matching

Finally, to facilitate a fair comparison we match the foundation-owned companies with similar (non-foundation owned) companies in the same industry and size group.

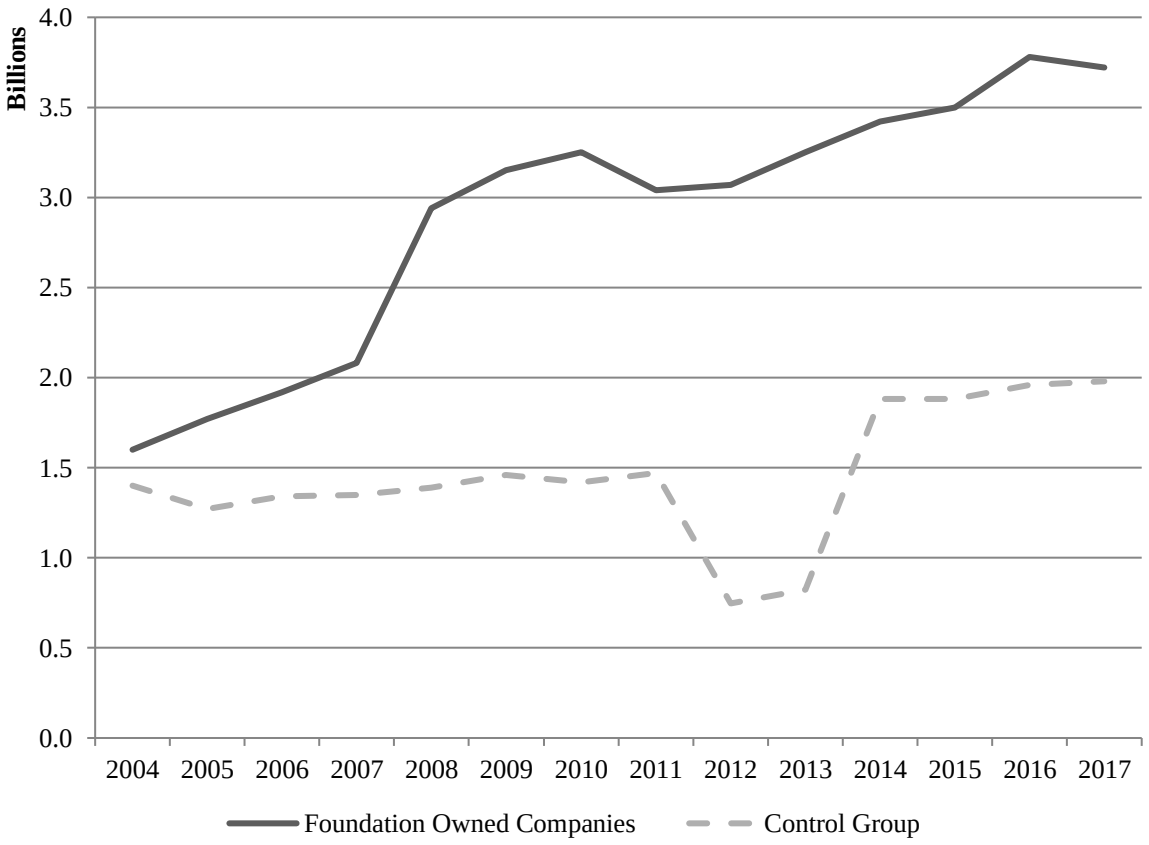
Technically, we create the control group through propensity score matching with the nearest neighbor conditional on size of the company measured by total assets and on industry defined by Dansk Statistik (DST), founded on NACE[6] industry code. The database on Danish companies at DST provides a sufficiently large base of companies to attain a robust control group. The matching is implemented in 2004 where we have 95 unique matches. As a robustness check we conduct the matching where we limit the maximum distance for the conditional controls. We define limitations of 25% and 10% and even with the limits we obtain 95 unique matches.

From 2004-2017 we use the same treatment and control group defined from 2004, which implies that some of the observations drop out of our dataset due to insolvency, acquisitions, mergers etc. From the treatment group we lose 6 observations over the period, whereas we lose 37 observations of the control group. The number of observations in the control group falls relatively constantly from 2007 to the end of the period. Hence, we do not suspect that the dropouts from the control group will have a significant impact on the numbers presented in figure 19 and 20.

[6] The Statistical Classification of Economic Activities in the European Community

Figure 14 illustrates the evolution of average total assets for the foundation-owned companies and the control group respectively. We note that the foundation-owned companies have grown considerably more over the period. We also observe that the foundation owned companies grew at a steady pace, whereas the control group experienced more fluctuations. In 2012 the total assets of the control group dropped by about half a billion DKK, but had more than recovered two years later.

Figure 14: Average Total Assets (bill DKK), Statistics Denmark DST (2020)

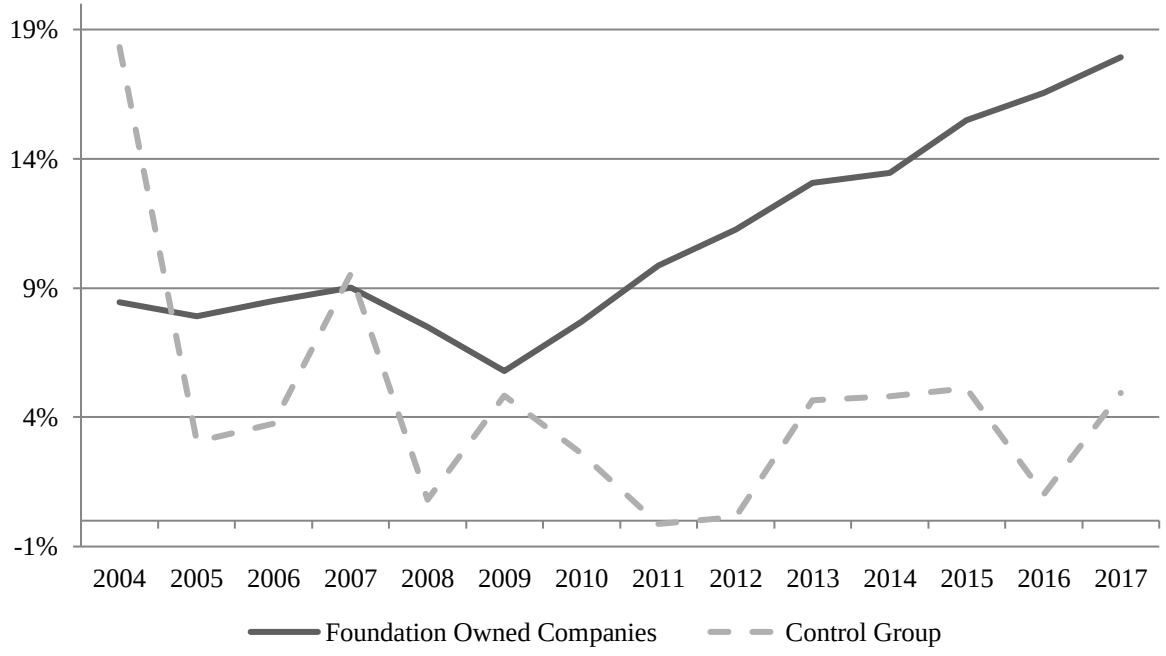


The weighted return of assets is displayed in figure 15 and is measured as the sum of profits after tax divided by the sum of total assets in all firms of the respective group in the given year and thereby equivalent to a size-weighted average. We observe that the foundation-owned companies are more profitable than the control group and that their profitability has grown over the period whereas we see little change in the control group. After a dent in 2009, assumed to be a consequence of the financial crisis in 2008, the foundation owned companies have increased their profitability through to 2017. Furthermore, we observe that the profitability of the foundation owned companies seem to have recovered better from the crisis compared to the control group. The profitability of the foundation owned companies seemed to be stagnating up to the financial but the effect of the financial crisis was minor. After the

financial crisis the profitability of the control group fluctuated over the interval 0-5% and the level was lower compared to the foundation owned companies.

Neither the lower level nor the greater variation in the control group appear to be attributable to attrition effects since we do not observe a positive correlation between attrition and increasing profitability.[7]

Figure 15: Weighted Average Return of Assets, Statistics Denmark DST (2020)



9. Conclusion on enterprise foundation trends

Altogether we find evidence of a breakpoint – or at least a slowdown - in the Danish enterprise foundations around 2010. In the 2010s growth in the number of enterprise foundations ceased, and their share of the Danish stock market has declined. Employment and assets in the foundation-owned companies grew up till 2009, but has remain constant since then. Sales and value added continued to grow, but at lower growth rates. Enterprise foundation assets also continued to grow, which presumably reflects diversification to multiple companies and asset classes.

However, these trends are not unique to foundation-owned companies which appear grown faster and to be as profitable or more compared to non-foundation-owned businesses matched by industry and size (assets). Thus we find no evidence of less agility or more disruption in foundation-owned companies.

[7] The same observation applies to years where the profitability drops significantly

Next we turn to potential explanations of the observed trends.

10. Explanations

Why did business growth slow down in the decade following the financial crisis? In this section we turn to the explanations that we proposed at the beginning of the paper.

Deglobalization. One hypothesis is that the growth slowdown was caused by deglobalization. Below we chart the evolution of world trade (figure 16) and world foreign direct investment (figure 17). We see that global trade peaked about 2007 (just before the financial crisis) and has been flat since then. Foreign direct investment has been much more uneven since the millennium (2000) but peaked in 2008 and has fallen considerably since then.

Figure 26: World Trade (exports % of GDP), World Bank: World Development Indicators 2020

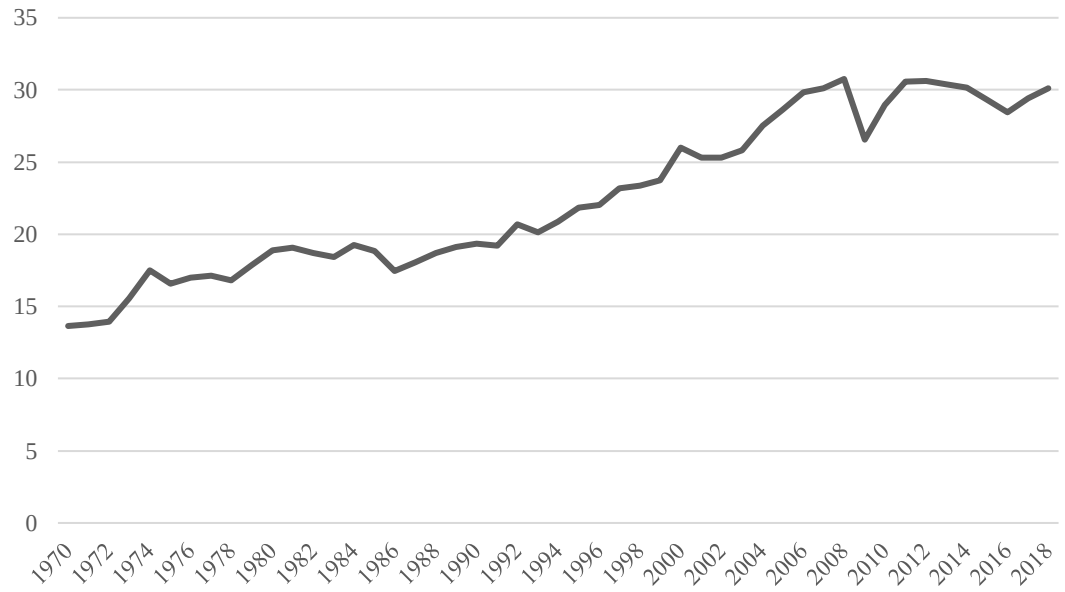
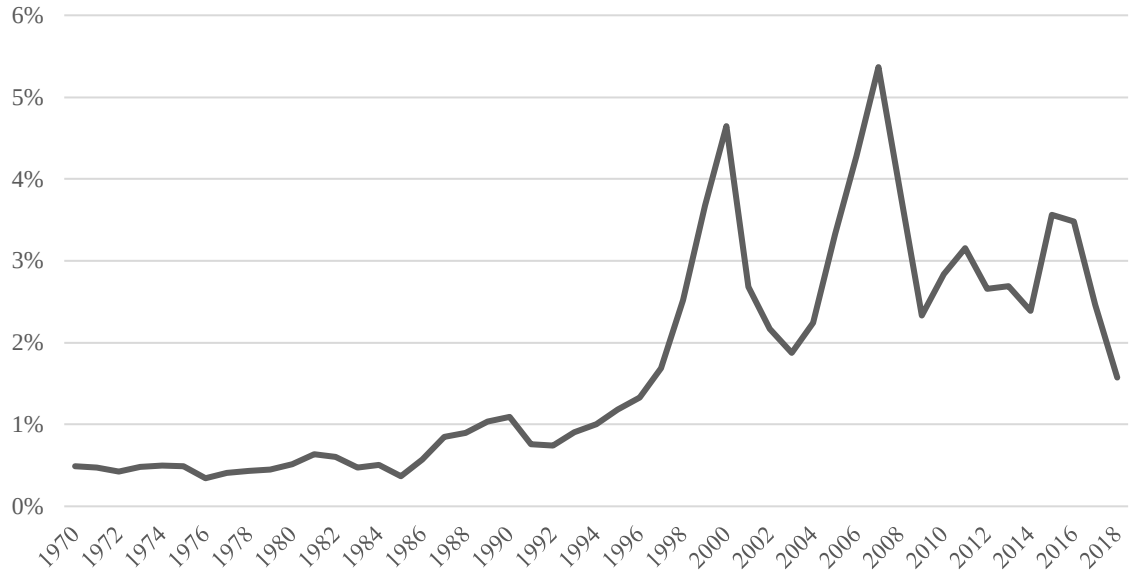
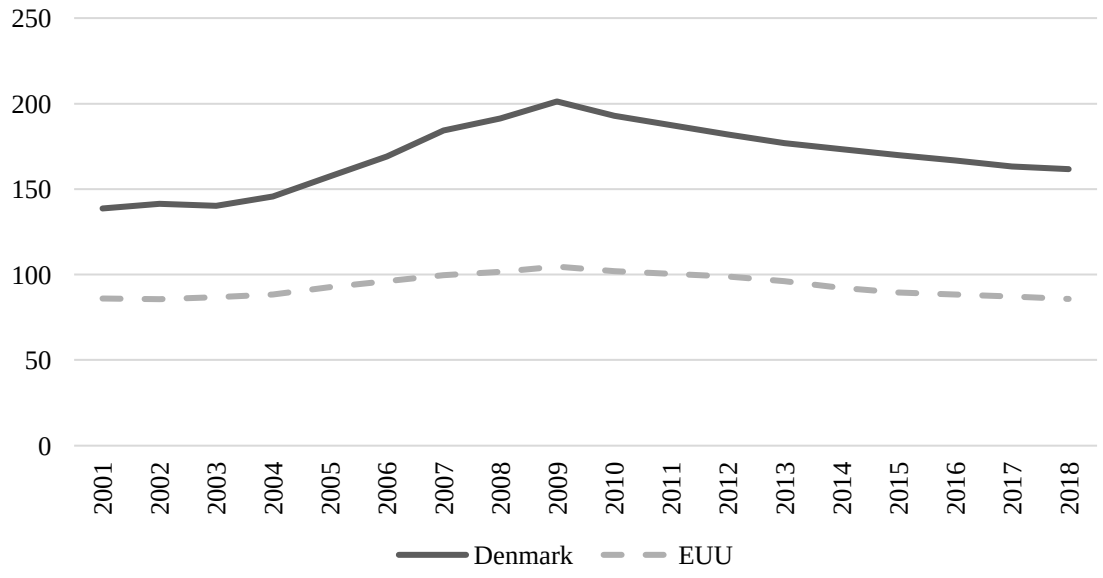


Figure 17: Foreign Direct Investment (Global Inflow % of GDP), World Bank: World Development Indicators 2020



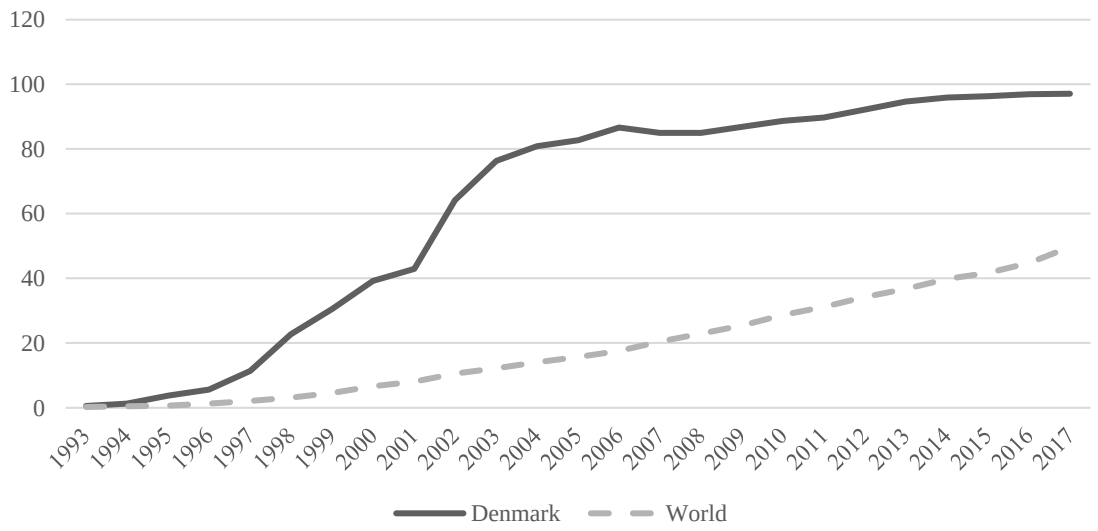
Credit Contraction. Another important trend in global capitalism is the changing role of banks before and after the financial crisis in 2008-2009. As we document in figure 18, bank credit to business grew up to 2008 and has fallen continuously since when both in Denmark and in the European Union. This could reduce business expansion, particularly in foundation-owned companies, which are often reluctant to issue new share capital that could the foundation's ownership share.

Figure 18: Domestic Credit to Private Sector by Banks (% of GDP), World Bank: World Development Indicators 2020



Technology disruption. As an indicator of the increasing importance of information technology we chart in figure 19 the percentage of the population who use the internet in Denmark (where it is now almost 100%) and in the rest of the worlds, where it is steadily growing, so that more than half of the world's people now use the internet.

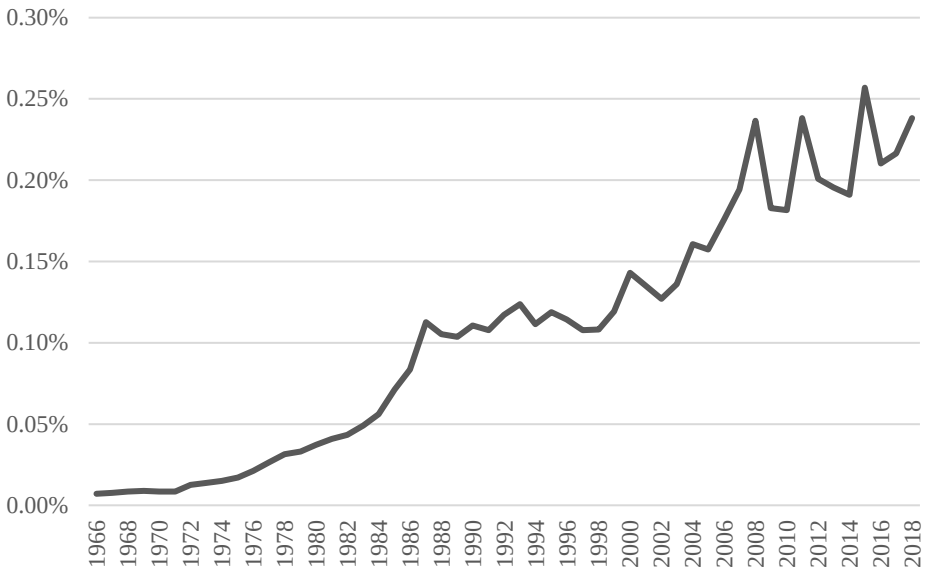
Figure 19: Individuals Using the Internet (% of Population), World Bank: World Development Indicators 2020



It is interesting that technology disruption has not led to underperformance in foundation-owned companies as one might expect. One reason may be that most Danish firms – regardless of ownership structure – are technology takers compared to US technology giants. However, it is also noteworthy that the disrupters - like Amazon or Google – are often characterized by patient long-term ownership (including dual class shares) that resembles foundation ownership, so it seems possible that enterprise foundations can turn the technology shift to their advantage.

Taxation. A fourth factor, which needs to be taken into consideration is taxation, which influences the incentives to establish foundations. All things equal, lower relative taxation of enterprise foundations compared to other ownership forms should be associated with higher growth. For example, many enterprise foundations were established during the 1970s and 1980s when wealth taxes (including capital gains and inheritance taxes) were high. In figure 20 below we focus on gift and inheritance taxes, which successful entrepreneurs can avoid by establishing foundations.

Figure 20: Estate, Inheritance and Gift Tax (% of Danish GDP), OECD & Statistics Denmark, DST (2020)



We can see that inheritance taxes rose steadily up to 1986, remained flat during the 1990s and then started rise after the millennium. Since 2008 there have been large fluctuations but little obvious trend. Thus we can perhaps say that the tax incentive to create foundations have abated somewhat since the financial crisis.

11. Conclusion

Altogether, we find a slowdown in the growth of the Danish enterprise foundations and the companies that they own beginning around 2009 with the financial crisis. Fewer new enterprise foundations are being created, and growth in the assets and employment of foundation-owned companies has virtually ceased. However, the slowdown is not unique to the foundation-owned companies which have done better than comparable companies in terms of growth and profitability. Instead it seems to be attributable to a challenging business environment characterized by deglobalization, credit contraction, technological disruption and tax trends.

The average profitability of foundation-owned companies is about the same as in other ownership forms and has picked up in recent years following restructuring and cost cutting which has led to increasing productivity. However, their size-weighted profitability has increased, while we have experienced stagnation in comparable companies. Thus, it seems that the enterprise foundations have been able to adapt their business models to changing circumstances and to compete efficiently in the new era of deglobalization and disruption. Moreover, the enterprise foundations seem well positioned to respond to the challenges of climate change, inequality and corporate responsibility which have become more forceful in recent years.

However, going forward, the future of the Danish foundation model depends critically on the creation of new enterprise foundations, which has ceased in recent years, in part because of an onerous tax regime.

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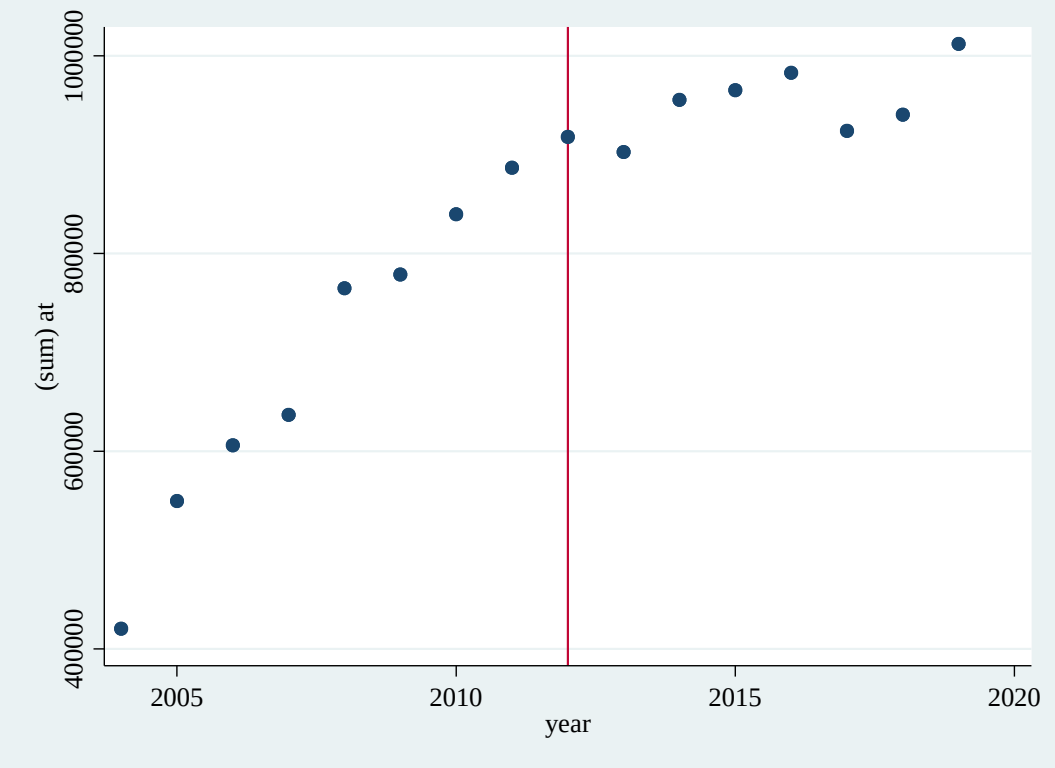
Appendix. Testing for a Regression Kink.

Before conducting an analysis of the growth in aggregated, total assets of foundation owned companies, we start with a simple graphical inspection. We use the breakpoint observed in 2012-2014 as a starting point.

Figure 3



By graphical inspection of figure 21, it definitely looks as if there is a kink in 2012. Moreover, we observe some apparent discontinuity and non-linearity in 2008-2009 possibly connected to the financial crisis.
We do not find a significant effect of 2012 on total assets of the foundations despite the graphical indication. The effect of 2012 is tested by considering 2012 and the following year as treated, implying that the growth in total assets of the foundation owned companies should be affected differently before and after the cut. The suggested effect is tested by a simple OLS in order to locate a local treatment effect,

$$assets_t = \varphi_0 + \varphi_1 1(year > 2011) + \varphi_2 year + \varepsilon_t.$$

Moreover, the graphical inspection could imply that there is a non-linear relationship in total assets over the period chosen. Later we include both a squared and a cubic term the sign of the effect of the 'treatment' of 2012 and the subsequent years, thus, we should not worry about the non-linearity in the effect from the regression above

Testing the non-linearity by simple OLS regressions of the following models

$$assets_t = \theta_0 + \theta_1 1(year > 2011) + \theta_2 year^2 + \varepsilon_t$$

and

$$assets_t = \Theta_0 + \Theta_1 1(year > 2011) + \Theta_2 year^2 + \Theta_3 year^3 + \varepsilon_t$$

The results of the 3 proposed regressions as tests are presented in table 1.

Table 1. Total Foundation Assets Regression on Year

VARIABLES	(1) OLS	(2) OLS	(3) OLS
$1(year > 2011)$	-27,261	-26,694	-26,820
	(82,440)	(22,922)	(22,976)
$year$	36,507***	1.349e+07***	-
	(10,266)	(1.845e+06)	-
$year^2$		-3,345***	3,362***
		(459.1)	(458.1)
$year^3$			-1.111***
			(0.152)
Constant	-7.260e+07***	-1.361e+10***	-4.558e+09***
	(2.062e+07)	(1.853e+09)	(6.163e+08)
Observations	16	16	16
R-squared	0.841	0.977	0.977

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In order to exploit the discontinuities in the first derivatives of aggregated assets around the breakpoint we conduct a regression kink design where the following equation is of interest

$$assets = \delta + \rho\, D + \phi\, year + \varepsilon$$

Whereas the continuous treatment indicator is expressed as

$$D = \alpha_0 + \alpha_1(year - 2012) + \alpha_2 1(year > 2012)(year - 2012)$$

Combining the two expressions above, we get the following expression

$$assets = \beta_0 + \beta_1(year - 2012) + \beta_2 1(year > 2012)(year - 2012) + \varepsilon$$

Note that $\frac{\beta_2}{\alpha_2} = \frac{\rho\alpha_2}{\alpha_2} = \rho$, which implies that we can estimate ρ from the deterministic rule from the expression of the continuous treatment indicator. The results from the above regressions are presented in table 2.

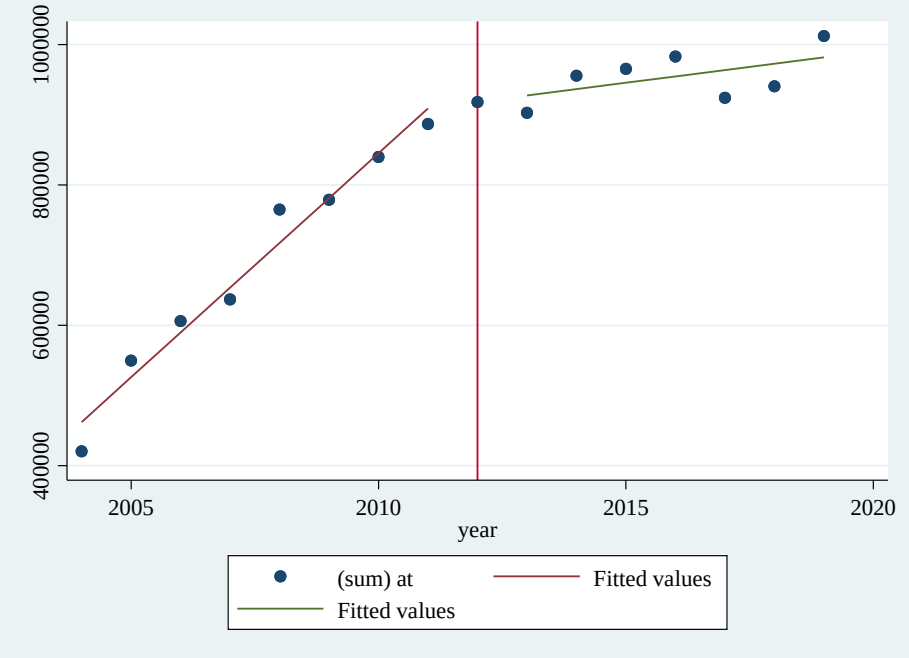
Table 2

VARIABLES	(1) Regression Kink Design	(2) Continuous Treatment
$year - 2012$	63,836***	0.105**
	(4,920)	(0.0355)
$1(year > 2011) \times (year - 2012)$	-54,773***	-0.0233
	(6,627)	(0.0731)
$1(year > 2011)$	-54,330**	
	(24,694)	
Constant	972,649***	0.593**
	(20,622)	(0.197)
Observations	16	16
R-squared	0.976	0.756

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The treatment effect is significant, just as all other estimates of the regression kink design are highly significant. We notice that α_2 is not statistically significant and we cannot reject that the estimate equals zero, hence, the parameter of interest, ρ, defining the effect we propose could be zero.

Figure 4. Linear fit of foundation-owned company assets over time

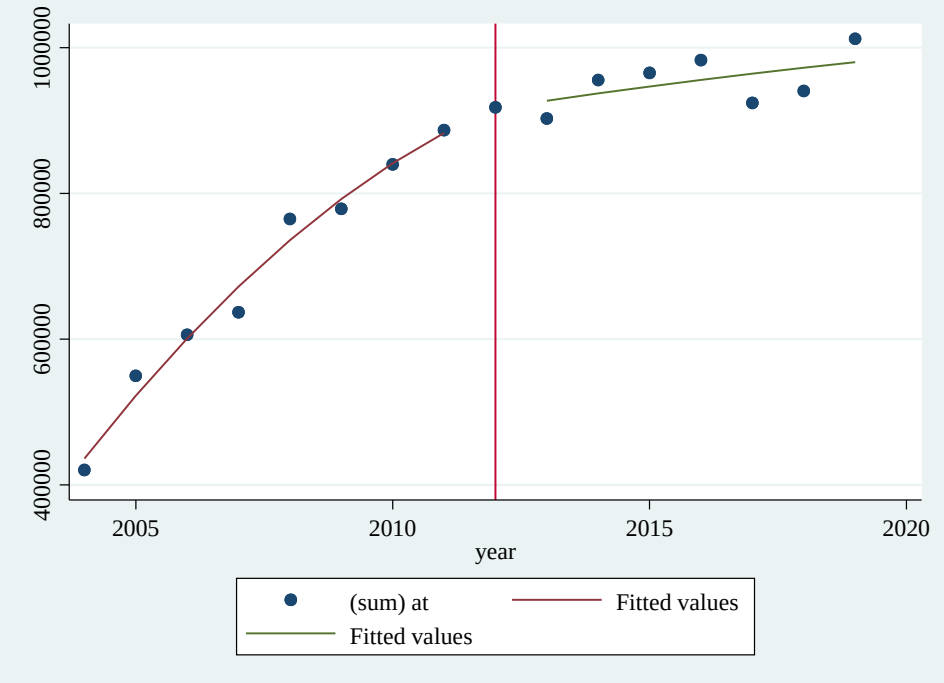


The graphical inspection of figure 21 suggested non-linearity why we choose to test non-linearity in the kink by including squared terms of the explanatory variables but the treatment, $1(year > 2011)$.

$$assets_t = \theta_0 + \theta_1(year - 2012) + \theta_2(year - 2012)^2 + \theta_3 1(year > 2011)(year - 2012) + \theta_4 1(year > 2011)(year - 2012)^2 + \varepsilon_t$$

From graphical inspection of figure 23, we cannot exclude the possibility of non-linearity in foundation company assets, which would correspond to a gradual saturation. However, post 2012 it is not obvious that the relationship should be non-linear.

Figure 5. Non-Linear Fit of Foundation Company Assets



The interpretation of the non-linearity could be that the foundation-owned companies have run out of steam rather than experiencing a definite break point – an interpretation we cannot reject. When estimating a non-linear Kink design in table 3 we find a couple of significant parameters which suggest that non-linearity is not the complete explanation of the decreasing growth in total assets of foundation owned companies.

Table 3

VARIABLES	(1) Non-Linear Kink Design
$(year - 2012)$	30,024**
	(11,106)
$(year - 2012)^2$	-3,053**
	(1,095)
$D \times (year - 2012)$	-2,515
	(3,291)
$D \times (year - 2012)^2$	-
$year$	-36,458
	(35,945)
Constant	957,613***
	(25,117)
Observations	15
R-squared	0.988

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4 shows the local effect of the different years around the cut-off as a test of whether it is a coincidence that we find an effect of 2012. Before 2012, there is an effect in 2009, which we also observed during the graphical inspection and explained by the financial crisis in 2008. The sign of the local effect on aggregated assets shift sign in 2012 and in the two following years the local effect is borderline significant, in 2015 and 2016 the effect is still negative and becomes "more" significant. The significance of the effect should not lead to a conclusion of an effect because the significance could increase as the observations after the cut is decreasing. However, the negative tendency after 2012 is hard to reject.

In general, the analysis is conducted on the limited number of annual observations because we use the aggregated total assets of the 120 largest foundation owned companies. If we conduct the analysis on the disaggregated data, we find no immediate change effect of 2012 controlling for company size, location and age.

Table 4. Year effect on Foundation-Owned Company Assets

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	22,156***	23,484***	28,726***	36,698***	44,133***	45,591***	47,138***	46,169***
	(5,024)	(6,739)	(9,337)	(10,297)	(8,437)	(7,057)	(5,439)	(4,935)
2009	146,194**							
	(54,875)							
2010		119,111*						
		(58,877)						
2011			57,154					
			(75,392)					
2012				-28,141				
				(82,318)				
2013					-108,735			
					(67,925)			
2014						-130,868*		
						(64,825)		
2015							-162,235**	
							(55,761)	
2016								-172,699***
								(51,265)
Constant	-4.385e+07***	-4.649e+07***	-5.700e+07***	-7.299e+07***	-8.791e+07***	-9.084e+07***	-9.395e+07***	-9.201e+07***
	(1.008e+07)	(1.353e+07)	(1.874e+07)	(2.068e+07)	(1.695e+07)	(1.418e+07)	(1.093e+07)	(9.921e+06)
Observations	16	16	16	16	16	16	16	16
R-squared	0.895	0.873	0.847	0.841	0.866	0.880	0.908	0.923

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1