Development Opportunities of Micro-Entrepreneurs: Evidence from Kenya

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Abstract

This paper sheds light onto differences in micro-enterprise profits between several business sectors. The investigated dataset contains a randomized controlled trial among micro-enterprises in Kenya that receive either class training, mentoring or neither. To the best of my knowledge this paper is the first that aims to explain differences between treatment effects in micro-enterprises with a link to macroeconomic theory. Thereby mentees have been found to yield the highest profits among the treatment groups. Especially, mentees in the street-food sector respond sensitive to changes in economic activity and achieve on average 91.4% higher profits than the control group. In contrast, retailers are established as stable even under circumstances of low economic activity where otherwise strong subgroups perform poorly. Beyond, evidence of even negative treatment effects have been found in the service sector thus either treatment group yields lower profits than the control group.

1. Introduction

"Understanding the reason that these firms[1] have low profits and why they generate so little employment is key for designing policy to improve the welfare of the urban poor." (Brooks, Donovan & Johnson 2018: 197)

The World Bank (2012) and Mead and Liedholm (1998) elaborated that small enterprises make up a large fraction of the employment in developing countries. Dua et al. (2012) predominantly determine women as founders of micro-enterprises. An approach in the manufacturing sector of Chile shows that about 40% of employees are engaged in micro-enterprises of an employment size 0-5 whereas the majority of micro-enterprises in African and Latin American countries consist of 1-3 person businesses (World Bank,2012).

[1] Micro-enterprises in third-world countries

Moreover this cluster is not only responsible for large shares in job creation (70%) but also job destruction (69%) (See Appendix A). According to Pollin (2009), the employment sector is differentiated in three categories. First the agricultural sector, including every self-employed and wage worker, that makes up half of the employment in Kenya. Second, the formal sector contains the public sector, registered micro-enterprises and wage-workers of formal enterprises who make up a fraction of only 14%. Third, the informal sector has a share of 36% and consists of unregistered enterprises such as well as wage-workers. Micro-enterprises in the informal sector are more frequently faced with constraints like crime, high competitiveness, and lacking access to finance, electricity, land as well as transportation possibilities (Groota et al., 2017). Implementing informal micro-enterprises in the formal sector may therefore be superior for establishing higher employment rates and long-term growth. Mead and Liedholm (1998) find many micro-enterprises failing in their early hours, especially in Kenya, the average micro-enterprise fails after 1 and 2 years. This further emphasizes the major role of policy evaluation for micro-enterprises in developing countries to increase welfare, establish new jobs and adjust gender gaps.

This paper aims to shed light on differences between business sectors to investigate target audiences for specific development approaches. Furthermore it elaborates whether micro-enterprises of different business sectors vary in their growth probabilities and profits while receiving either class training or mentoring. Beyond it explains possible differences on the macroeconomic level. Therefore the research question is specified as follows:

> Research Question:
>
> To what extent do micro-enterprises of individual business sectors in developing countries benefit differently if they receive either class training or mentoring?

To answer the research question an investigation of the gathered data during the development study conducted by Brooks et al. (2018) has been made. At the end of 2014, they assigned female micro-entrepreneurs from Kenya to groups that receive class training, mentoring or neither to elaborate differences in profits over the next 17 months after the treatment.

2. Literature Review

Sohns and Revilla Diez (2018) split micro-enterprises into two motivational groups: opportunity-driven[2] and necessity-driven[3]. Fulton et al. (2012) determined female street-food vendors in the informal sector as necessity-driven micro-entrepreneurs who lack education and possibilities to work for wage. Tinker (2003) mentioned polygamous[4] men as one reason for women to be self-employed in the informal sector whereby the focus stays on feeding children instead of achieving business growth. In addition, four-fifth of street-food micro-enterprises are owned by women. Roy and Wheeler (2006) state the street-food and retail sector as highly competitive and therefore highlight unique features as salient factor to separate the own business from competitors. However since most micro-enterprises lack in money supply local street-food stalls often try to minimise risk by supplying the same products as other local vendors, though such behaviour leads to even higher competition.

Acho-Chi (2002), Tinker (2003) and Groota et al. (2017) provide common problems like a poorly developed infrastructure that cannot ensure access to clean water and electricity as well as the appropriate storage of foods. This has negative effects in terms of hygiene, germs and food quality. Especially Acho-Chi (2002) emphasizes 32% of customers choose their food stall due to its quality.

Klapper and Richmond (2011) have shown evidence of lower exit rates of micro-enterprises in the service sector compared to other sectors in Africa. Further the fraction of employment in the service sector in Africa is estimated to be 37%.

A series of studies also highlight the importance of non-financial factors like motivation and local expertise. Bruhn and Zia (2013) indicated that training programs particularly provide motivation to female businesses. More recently, Lafortune et al. (2018) studied the impact of role models on the effectiveness of training programs in Chile and found significant non-financial barriers like motivational factors, faced by female businesses who lack experience.

One possibility to transfer knowledge to entrepreneurs is given by assigning them to business classes. Bruhn and Zia (2013) have shown improved business practices

[2] Opportunity-driven micro-entrepreneurs are operating by free choice
[3] Necessity-driven micro-entrepreneurs are operating to survive
[4] More likely in the culture of African and South East Asian countries

combined with higher sales. In contrast, De Mel et al. (2014) measured the impact of the most common business training[5] on female entrepreneurs in Sri Lanka. In fact, a change in business practices was noticed but they did not translate into higher profits or improved business performances. The latter goes in line with results of Brooks et al. (2018) who found evidence of constant profits despite changes in business practices. Additionally however, De Mel et al. (2014) highlighted limited impacts on business practices of participants who already owned a business for several years. McKenzie and Puerto (2017) conducted a market-level experiment in Kenya and detected increased profits for female entrepreneurs three years after the participation in a business training. Further they mention a growing market instead of spill-over effects, e.g. stealing sales from competitors within the market, as a reason for the latter effect. Similar results are shown by Brooks et al (2018) who found lower costs as driving factor for higher profits, but not spill-over effects. Higuchi et al. (2019) also experienced an increased business performance coupled with improved business practices three years after assigning small and micro-enterprises to a training program in Tanzania that features the Kaizen[6] approach.

McKenzie and Woodruff (2017) determined a positive correlation between the quality in business practices and growth in business performances such as firm survival rates. Therefore they criticise current business programs and their modest impact on business practices. Moreover they claim for more intensive business programs as well as a specified target audience to raise effects on business performance.

Another possibility to transfer information might be achieved by introducing micro-entrepreneurs to mentors. Dennis et al. (2003) assigned mentors to small- and medium-sized retailers in London and explored significant increases in sales. Cai and Szeidl (2017) conducted inter-firm meetings between managers from 2,820 firms and found permanent increased revenues in the treatment group of monthly meetings. This effect is enhanced by networking activities during meetings since managers provide business relevant information if they are non-competitors (peer-to-peer). In contrast, Brooks et al. (2018) simultaneously indicated a flow benefit provided by mentors to their mentees.

[5] Start-and-Improve Your Business (SIYB) program
[6] Kaizen (Japanese) translated to English “continuous improvement” is a productivity approach

The effect diminished once matches started to dissolve. Further they indicated the major role of local expertise on business performance provided by mentors.

Lastly, McKenzie and Woodruff (2013) evaluated previous studies in terms of set-up and measurement methods of experiments. They demanded a raise of sample sizes from 100-500 (previous studies) up to several thousands. Further an extension of time periods in studies might be reasonable to interpret treatment effects over time in the right manner. Heterogeneity of the data also seems to be a problem. Researchers should be able to divide the sample into subsets with identical characteristics to create more homogeneity and further examine more detailed effects.

3. Descriptive Statistics

3.1. Micro-Enterprises and Treatment Characteristics

"Dandora is a dense, urban slum to the northeast of Nairobi. It is approximately four square kilometers and, as of the 2009 census, contained 151,046 residents." (Brooks et al. 2018: 200). 368 of the total 1094 inexperienced, female business owners participated in the follow-up surveys which generated time series data of variables that may correlate with business performance. A number of follow-ups allow to understand the dynamics of treatment effects and ease the conduction of ANCOVA.[7]

The field experiment was conducted from end of 2014 to April 2016 while the treatment period lasted one month in November 2014. For this micro-enterprises were randomly assigned into three groups.

First mentorship, within this group each micro-entrepreneur is paired with an experienced mentor, who has been operating in the same business sector for at least 5 years or is older than 40 years. Second class training, formal business classes are provided to micro-entrepreneurs to improve knowledge in business practices. Third, the control group who receives neither.

Table 1 reproduces baseline profits of micro-enterprises in each business sector, grouped by their assigned treatment group. Each group has a fraction of approximately one-third. The control group includes 117 observations. Approximately, 67% of micro-enterprises operate in the retail sector. Services as well as street-food have a fraction of 14.5% each

[7] The ANCOVA Regression is specified in section 4.1

while manufacturers represent 4%. The class group is composed as follows: retail sector 53%, street-food sector 19%, service sector 22%, manufacturing sector 5% and other sectors that are not further defined make up less than 1%. The Mentor group is divided into 65% retailers, 22% service suppliers, 12% street-food stalls and 1% manufacturers. Since the manufacturing sector is not highly represented in this dataset their results are not discussed in detail. Additionally the sector defined as “Other” makes up only a marginal fraction and is only included in the class group thus it is also not considered. Further the three groups control, class and mentor have average weekly profits of 1942 KSh ($18.67 USD), 1733 KSh ($16.66 USD) and 1816 KSh ($17.46 USD), respectively. From now on, the term weekly profits is only said as profits in this paper whereas this is measured in Kenyan Shillings (KSh).

Table 1 Descriptive Statistics of Micro-Enterprises among Business Sectors

Treatment	Business Sector	N	Cum. in %	mean	Std. dev.	min	max
Control	Retail	78	66.67	2049.23	1696.60	160	7200
	Manu	5	70.94	3000.00	3005.83	800	7200
	Service	17	85.47	1829.41	987.27	300	3600
	StreetFood	17	100.00	1254.71	727.02	150	2400
	Other	0	100.00	0	0	0	0
	Pooled	**117**	**31.79**	1942.48	1598.95	150	7200
Class	Retail	67	52.76	1638.36	1198.54	120	4800
	Manu	6	57.48	1716.67	722.265	900	3000
	Service	28	79.53	2310.00	2132.024	120	9000
	StreetFood	25	99.22	1341.44	895.00	300	3600
	Other	1	100.00	1800.00	0	1800	1800
	Pooled	**127**	**66.30**	1732.96	1417.39	120	9000
Mentor	Retail	80	64.52	1806.38	1357.85	120	6400
	Manu	1	65.33	240.00	0	240	240
	Service	28	87.91	1785.29	1603.47	180	6000
	StreetFood	15	100.00	2028.00	1349.51	600	6000
	Other	0	100.00	0	0	0	0
	Pooled	**124**	**100.00**	1815.79	1407.77	120	6400
Pooled	Total	**368**	**100.00**	1827.48	1472.89	120	9000

Table 2 discloses the average micro-enterprise of each sector. First, the average retailer yields an initial profit of 1841 KSh, is 29.71 years old and has been operating in the business for 2.28 years. Half of the retailers have secondary education and 12 employ workers. Second, a manufacturer yields the highest initial profit at 2128 KSh.

Salient is the high exit rate of 8.3% among manufacturers. Further 58% have secondary education and 8% employ workers. Third, a micro-entrepreneur who offers services is on average 27.57 years old and has been operating for 3.11 years. The initial profit is slightly above-average at 1997 KSh. Notable is the high likelihood of employment that is equal to 51%. Additionally, 64% received secondary education. The Exit Probability after treatment is the lowest at somewhat 1%. Finally, the average micro-enterprise within the street-food sector yields the lowest initial profit of 1496 KSh. Further the average owner is the oldest at 30 years. Though they have the least experience of 2 years. Moreover this sector has the lowest fraction of micro-entrepreneurs with secondary education that is equal to 36%. The exit probability at the end of treatment is equal to 7.5%.

In the next section differences among micro-enterprises with and without any workers are described to understand the importance of employment and its salient correlation with profits and growth.

Table 2 Average Micro-Enterprise within each Business Sector

Business sector	N	Cum. in %	Profit at baseline	Age	Bage	Exit	Secondary education	If any empl.
Retail	225	61.14	1841	29.71	2.28	0.043	0.48	0.12
Manufacturing	12	64.40	2128	29.58	3.25	0.083	0.58	0.08
Services	73	84.24	1997	27.57	3.11	0.014	0.64	0.51
Street-Food	57	99.73	1496	30.05	2.02	0.075	0.36	0.24
Other	1	100.00	1800	20.00	5.00	0.000	0.00	0.00
Total	368	100.00	1827	29.30	2.45	0.042	0.50	0.22

3.2. Employment Activity of Micro-Enterprises

As described in section 1 micro-enterprises have high shares in employment activities of developing countries and therefore play a major role in designing policies. In the underlying dataset 289 micro-enterprises are one-person businesses with average weekly profits of 1700 . In contrast, those who employ at least one person reach on average profits of 2294 KSh. Beyond, insights of the individual business sectors disclose that retailers and street-food stalls seem to benefit the most from employees since the average means increase by nearly 1000 KSh in each sector. The retail sector increases from 1712 KSh to 2784 KSh while the street-food sector changes from average profits of 1216 KSh to 2357 KSh. Surprisingly, micro-enterprises in the service sector who employ workers have lower average profits than those who have no employees. (See Table 3)

The mentioned differences in profits do not allow to draw conclusions per se since significance cannot be determined at this time but it indicates a relation between the number of employees and average profits in the dataset of Dandora that may be relevant for the further evaluation of policy development.

Table 3 Micro-Enterprises among Business Sectors with and without Employees

Employees?	Business Sector	N	Cum. in %	Mean	Std. dev.	Min	Max
Employees = 0	Retail	198	68.51	1711.92	1359.88	120	7200
	Manu	11	72.32	2158.18	2168.23	240	7200
	Service	36	84.78	2068.56	1719.24	120	6000
	StreetFood	43	99.66	1215.95	712.84	150	3000
	Other	1	100.00	1800.00	0	1800	1800
	Pooled	**289**	**78.53**	1699.84	1386.22	120	7200
Employees = 1	Retail	27	34.18	2783.70	1717.93	160	6000
	Manu	1	35.45	1800.00	0	1800	1800
	Service	37	82.28	1927.03	1735.27	180	9000
	StreetFood	14	100.00	2357.14	1356.30	900	6000
	Other	0	100.00	0	0	0	0
	Pooled	**79**	**21.47**	2294.43	1682.52	160	9000
Pooled	Total	**368**	**100.00**	1827.48	1472.885	120	9000

3.3. Cycling Profits among Business Sectors

In the following section the average profits of each business sector are described to show off some evidence of economic cycles in Dandora, Kenya. Unfortunately the observed period only has a length of 17 months thus a delimitation of high and low economic cycles is only valid to a limited extent.

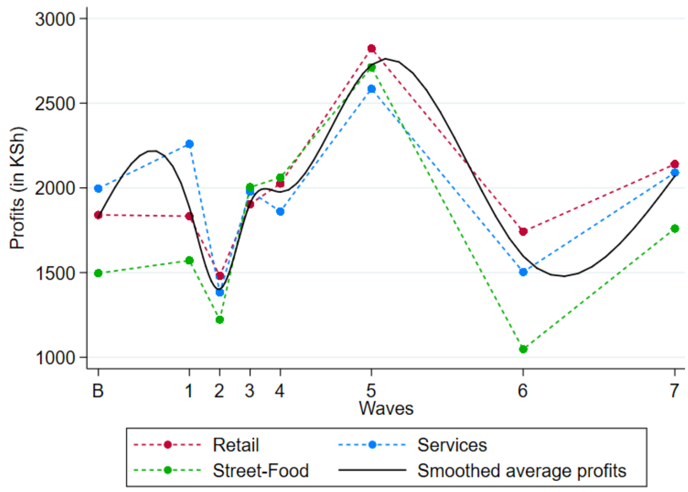


Figure 1 Micro-Enterprise Profits among Business Sectors

Hence the follow-up waves in terms of months as t ∈ {1, 2, 3, 4, 7, 12, 17}. The economic cycle is assumed to "start" in wave 2 (End of January 2015) with low economic activity with increases in profits until the end of February. In March the economic activity somewhat stagnates and reaches maximum profits at the end of July.

Until December/January 2016 the economic activity drops again which suggests this to be a low economic period. Wave 7 is established in April 2016 which is determined as a period with rising economic activity in the next economic cycle (See Figure 1).

Overall differences among business sectors can be detected. The retail sector seems to be less affected by the level of economic activity. On average it has significantly higher profits compared to the service (350.7 KSh, 1% level) and street-food sector (207.3 KSh, 10% level) (See Table 4).

Table 4 Pooled Treatments: Difference in Profits between Business Sectors

Sector	(1) Pooled	(2) Wave 1	(3) Wave 2	(4) Wave 3	(5) Wave 4	(6) Wave 5	(7) Wave 6	(8) Wave 7
Services	-350.7***	276.9	-351.7	-445.4	-612.4*	-551.4	-428.5*	-397.5
	(112.2)	(230.8)	(234.3)	(306.2)	(317.9)	(386.7)	(237.1)	(313.8)
Street-Food	-207.3*	-300.6	-201.1	125.3	77.62	-270.3	-583.5**	-401.0
	(118.6)	(237.4)	(247.4)	(323.1)	(329.1)	(400.0)	(250.2)	(360.0)
Observations	2,211	345	311	312	316	302	318	307
R-squared	0.037	0.051	0.037	0.070	0.054	0.047	0.121	0.048
Control	YES	YES	YES	YES	YES	YES	YES	YES
Retail Mean	1984	1833	1480	1904	2026	2824	1742	2140
H0: F = S	0.321	0.0485	0.623	0.149	0.0883	0.567	0.612	0.994

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

3.4. Evidence of Kenya's Economic Cycle

[8]Figure 2 gives an overview of Kenya's GDP at constant prices (2009) from 2012 - 2019. Indeed, the aggregated profit of Dandora delivers a similar pattern as described previously (See Figure 1). Since the GDP includes more determinants than just profits of micro-enterprises in selected business sectors the months of both figures do not match exactly. Especially the agricultural sector, that is not

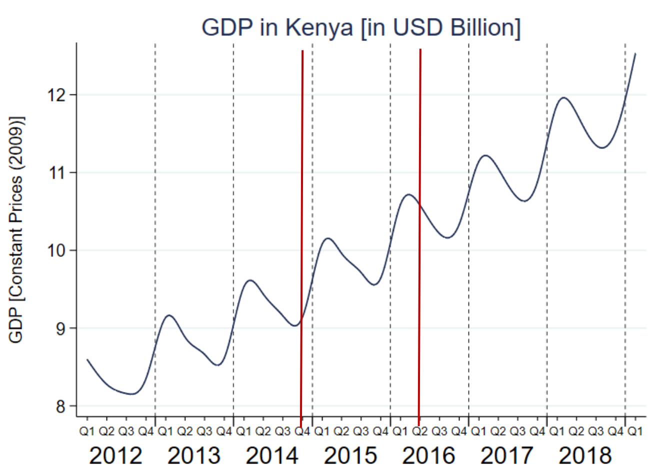


Figure 2 GDP in Kenya [in USD Billion]
Source: "Kenya National Bureau of Statistics: Gross Domestic Product and Balance of Payments - First Quarter 2019"

[8]The investigated period in the study of Brooks et al. (2018) is marked by red lines in Figure 2

included in the dataset of Dandora's micro-enterprises, makes up one-fourth of Kenya's GDP. Further this sector is of high activity in the first months of the year which may drive up the graph in the overall GDP but not in the dataset of Dandora (Kenya National Bureau of Statistics, 2019). However, Figure 1 is still a suitable approximation.

4. Methodology

4.1. ANCOVA Regression

Particularly small datasets (as the underlying dataset of Dandora) often suffer from non-normality what may cause heteroscedasticity of the error term. Van Breukelen (2006) suggests to receive unbiased estimates in randomized studies with ANOVA and ANCOVA, whereas the latter has more statistical power. Especially if the dependent variable correlates highly with any baseline values it is recommended to prefer ANCOVA. This goes in line with Rheinheim and Penfield (2001) who also determined the inclusion of highly correlated covariates (with the dependent variable) as possibility to minimise non-normality. According to Harwell and Serlin (1988) such as Rheinheimer and Penfield (2001) the ANCOVA Regression is robust even under circumstances of non-normality and therefore type I error rates do not increase particularly in equal sample sizes and even with unequal sample sizes the type I error does not inflate.

4.1.1. Pooled Regression

$$y_i = \beta_0 + \beta_1 M_i + \beta_2 C_i + \beta_3 V_i + \beta_4 y_{i0} + \varepsilon_{it} \quad (1.1)$$

The basic ANCOVA Regression used in this paper estimates the differences in the average treatment effect among three groups whereby the control treatment serves as comparison group. In other words, the coefficients of M_i and C_i indicate the change in the dependent variable y_{it} (micro-enterprise profits) in relation to the control group. V_i isa vector of baseline values that serves as control variable including age, secondary education, employees, outstanding loans and business experience. y_{i0} is a determinant of the baseline profit of micro-enterprise i.

This equation is adapted for several approaches that change only in the factor variables (M_i and C_i). Further this equation is a measure of the average effect over the entire observation period of 17 months since it pools all waves.

4.1.2. Wave-by-Wave Regression

$$y_{it} = \beta_0 + \beta_1 M_{it} + \beta_2 C_{it} + \beta_3 V_{it} + \beta_4 y_{i0} + \varepsilon_i \ \text{ for } t \ \geq \ 1 \qquad (1.2)$$

Subsequently to the pooled regression a wave-by-wave approach is conducted to estimate profits of micro-enterprises over time. It enables to cut the average effect into individual components to discover more accurate results.

Regarding to McKenzie (2012) statistical power is increased by conducting several follow-up surveys. Further it is possible to receive higher statistical power with a smaller sample combined with two follow-up rounds instead of a bigger sample size combined with only one follow-up. Especially, in the case of micro-enterprises in developing countries an ANCOVA Regression with multiple follow-ups strengthens the statistical power since profits have less autocorrelation and sample sizes are relatively small.

4.1.3. Logistic Regression

$$average\_growth_i = \beta_0 + \beta_1 M_i + \beta_2 C_i + \beta_3 V_i + \beta_4 y_{i0} + \varepsilon_i \qquad (2.1)$$

$$point\_growth_i = \beta_0 + \beta_1 M_i + \beta_2 C_i + \beta_3 V_i + \beta_4 y_{i0} + \varepsilon_i \qquad (2.2)$$

The dependent variable is a binary dummy variable that takes on values [0, 1] and therefore determines if the average profit recorded from wave 1 until wave 6 is higher than the initial profit. $M_i = 1$ if the micro-enterprise i is in the mentor treatment and $C_i = 1$ if i is in the class treatment. V_i is a vector of baseline values that contains the same variables as mentioned in section 4.1.1. y_{i0} is a determinant of i's baseline profit.

4.1.4. Covariates

By reason of ANCOVA the correlation between the covariate and dependent variable is measured to remove the covariates variance of the error term to increase the statistical power of the estimates. (Rutherford 2011)

In the estimation model used in this paper a vector of variables is included that is expected to highly correlate with the dependent variable. Additionally to the control vector, profits of t ≥ 1 also correlate with the initial value hence baseline profits are also included to control for their impact.

5. Results

In this section certain approaches are conducted to elaborate differences among micro-enterprises. First, differences among business sectors within each treatment group are worked out to emphasize business sectors that benefit more or less from certain approaches. Second, every individual business sector is considered in detail to quantify differences between treatment groups within each business sector. Moreover, particular properties are highlighted to get to know the dynamics of treatments. Third, the received results are put into the context of economic activity to take possible externalities into account. Fourth, growth probabilities are determined in two different approaches. Fifth, an analysis of baseline profits is conducted to ensure accuracy of the initial collected profit values.

Table 5 Difference in Profits between Business Sectors

	(1)	(2)	(3)
Sector:	Control Pooled	Class Pooled	Mentor Pooled
Manufacturing	-485.6*	-233.8	-591.9
	(292.0)	(303.8)	(809.5)
Services	206.6	-669.7***	-356.2
	(195.1)	(180.8)	(217.7)
Street-Food	-403.2**	-480.0***	672.2**
	(183.2)	(181.4)	(268.7)
Observations	718	776	717
R-squared	0.059	0.088	0.038
Control	YES	YES	YES
Retail Mean	1841	1981	2138
H0: M = S = F = R	0.022	0.001	0.007

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

5.1. Differences among Business Sectors within each Treatment

In this section a first overview of possibly different average treatment effects among business sectors is given.

> Hypothesis 1:
>
> Average Treatment Effects of micro-enterprises within either the class, mentor or control group vary between different business sectors.

The retail sector serves as control group. In each group, all business sectors have significantly different profits from each other at the 5% level. Further the retail mean is lowest at 1841 KSh in the control group, 1981 KSh in the class treatment and reaches its highest mean in the mentor treatment at 2138 KSh. This is however not interpreted as statistically significant per se. (See Table 5)

5.1.1. Control Group

[9]Micro-enterprises assigned to the control group yield the highest profits if they are operating in the retail sector. Those in the service sector seem to experience even higher profits but not significantly since profits fluctuate. In contrast, average profit means of the manufacturing and street-food sector are significantly lower than 485.6 KSh (= 1355.4 KSh) and 403.2 KSh (= 1437.8 KSh), respectively.

(See Table 5, Column (1))

5.1.2. Class Treatment

The signs of coefficients in the class treatment are similar to the control group excepting the service sector which recorded a highly significant decrease of 669.7 KSh in profits relative to the retail sector (= 1311.3 KSh). The street-food sector experienced significantly lowered profits by 480 KSh (= 1501 KSh). (See Table 5, Column (2))

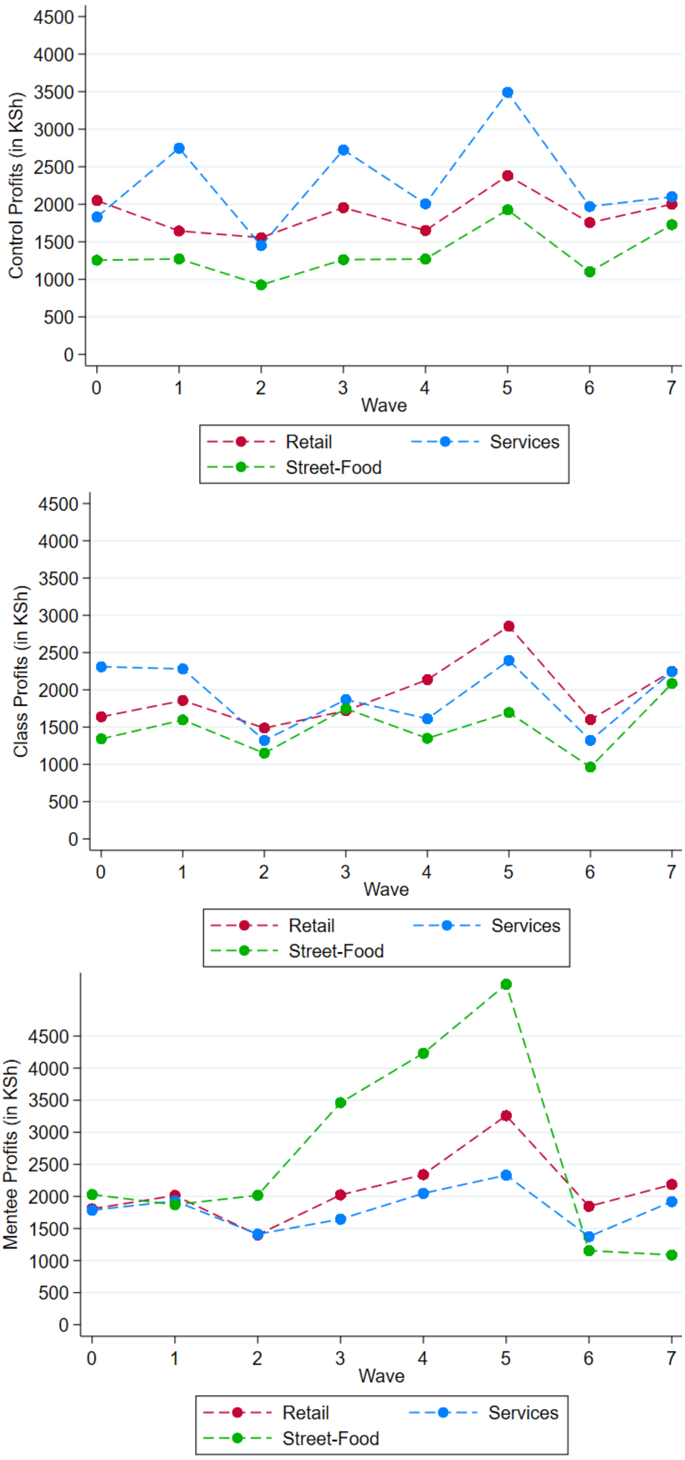


Figure 3 Micro-Enterprise Profits among Business Sectors for each Treatment

[9]Figure 3 plots micro-enterprise profits among business sectors for each treatment group separately. In this context, the plot shows the profits over time from wave 0 (baseline) to wave 7 but not the average profits that are described in the sections.

5.1.3. Mentor Treatment

In addition to the highest mean of retailers compared to the other treatment groups, mentees who operate in the street-food sector reach 672.2 KSh higher profits than those who operate as retailers and therefore yield average profits of 2810 KSh. This effect is significant at the 5% level. The manufacturing as well as the service sectors, both, have negative signs but not enough evidence has been found to interpret them as causal. (See Table 5, Column (3))

5.1.4. Key findings

To confirm the first hypothesis the data delivers slight evidence of ascending profits of the control group, the class and mentor treatment, respectively. Further the data suggests that street-food micro-enterprises benefit particularly from mentoring. Determinants and characteristics that differentiate this sector from others like high competition and the relevance of having a unique market position could be interpreted as driver of this effect as determined by Roy and Wheeler (2006). According to Brooks et al. (2018), successful entrepreneurs deliver local information to mentees who therefore achieve a better market position in contrast to participants of class trainings offered by a local university. With regard to changes in the coefficient sign between the control and treatment groups, micro-enterprises in the service sector are suggested to even benefit negatively from a class treatment. In the mentor treatment the sign is also negative but its profit mean settles around the same values as it does in the control group thus it cannot be interpreted as significantly different.

5.2. Insights of Business Sectors

Subsequent to the comparison of profit differences among business sectors within treatment groups a more detailed view will follow in the next section. Further insights of the profit compositions over time are given for each business sector since sufficient evidence has been shown to assume them differently. Moreover, the profits are disaggregated by treatment groups to discover average treatment effects within each business sector over time.

> Hypothesis 2:
>
> Average treatment effects over time vary among each individual business sector, especially in the street-food sector.

The differences are examined by means of ANCOVA added up with a wave-by-wave approach as described in Section 4.1.2.

Table 6 Profits: Retail Sector

Treatment:	(1) Pooled	(2) Wave 1	(3) Wave 2	(4) Wave 3	(5) Wave 4	(6) Wave 5	(7) Wave 6	(8) Wave 7
Class	233.2*	280.9	-29.88	-85.50	592.9*	465.3	-6.822	378.2
	(127.2)	(271.5)	(290.8)	(308.5)	(353.6)	(433.3)	(253.3)	(413.7)
Mentor	451.6***	462.4*	-38.21	305.6	833.3**	981.1**	291.6	334.5
	(123.5)	(252.3)	(248.7)	(345.3)	(353.4)	(414.6)	(281.3)	(356.2)
Observations	1,354	209	195	194	191	185	194	186
R-squared	0.059	0.079	0.061	0.131	0.086	0.062	0.115	0.072
Control	YES	YES	YES	YES	YES	YES	YES	YES
Control Mean	1841	1644	1556	1955	1651	2382	1754	2000
H0: C = M	0.107	0.542	0.975	0.272	0.542	0.251	0.311	0.914

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

5.2.1. Retail Sector

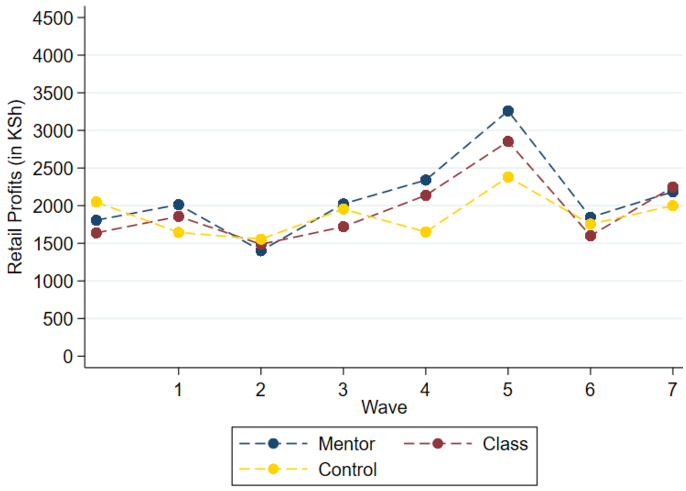


Figure 4 Profits over time: Retail Sector

The Retail sector experienced average profits of 1841 KSh over the period of 17 months after the treatment. Whereas the class group reaches 233.2 KSh higher profits (= 2074.2 KSh) (significant at 10% level) and the mentor group reaches 451.6 KSh higher profits (= 2292.6 KSh) (significant at 1% level). Both treatment groups do not differ significantly from each other. In the wave-by-wave approach the mentees have significantly higher profits than the control group in wave 1 (2106.4 KSh, 10% level), wave 4 (2484.3 KSh, 5% level) and wave 5 (3363.1 KSh, 5% level). A substantial rise in profits of mentees is noticed from wave 2 until wave 5. The class group rises in the same manner as the mentor group but on a lower level in each wave. Hence, other than mentoring, it is not significantly different from the control group in wave 5. Between wave 3 and wave 4 are contradictory trends of the treatments and the control group. The control group declines in profits by 15.5%. In contrast, the treatment groups incline significantly by 10% (Mentees) and 20% (Class). This dynamic effect delivers first evidence of positive treatment effects of both, class training and mentoring, on profits of micro-enterprises in the retail sector. (See Table 6 and Figure 4)

5.2.2. Manufacturing Sector

The amount of observed micro-enterprises in the dataset is very small thus with only 10 observations per wave they are not representative to conclude any implications of a sector that makes up one-tenth of Kenya's GDP. Therefore this sector will not be discussed in detail in this paper. (See Appendix B)

Table 7 Profits: Service Sector

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment:	Pooled	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7
Class	-513.7**	-388.5	-325.3	-1,115**	-235.6	-1,399*	-593.9	127.8
	(238.6)	(499.7)	(465.9)	(532.6)	(515.3)	(735.6)	(532.5)	(820.4)
Mentor	-445.0*	-485.7	-277.4	-1,192*	177.5	-1,352*	-404.4	-290.6
	(234.9)	(418.8)	(483.7)	(616.0)	(630.3)	(692.2)	(529.6)	(818.1)
Observations	449	71	60	60	63	60	66	69
R-squared	0.040	0.166	0.088	0.409	0.084	0.090	0.120	0.055
Control	YES	YES	YES	YES	YES	YES	YES	YES
Control Mean	2324	2747	1449	2725	2007	3492	1971	2100
H0: C = M	0.721	0.807	0.921	0.857	0.524	0.939	0.654	0.407

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

5.2.3. Service Sector

The control group in the service sector records a pooled profit mean of 2324 KSh over the period of 17 months after the treatment. Contrary to expectations both treatment groups on average have significantly lower profits of about 20% (Class: 5% significance level, Mentees: 10% significance level). Furthermore profits are found to be strikingly volatile with high standard deviations that complicate the rejection of the hypothesis of equal profits

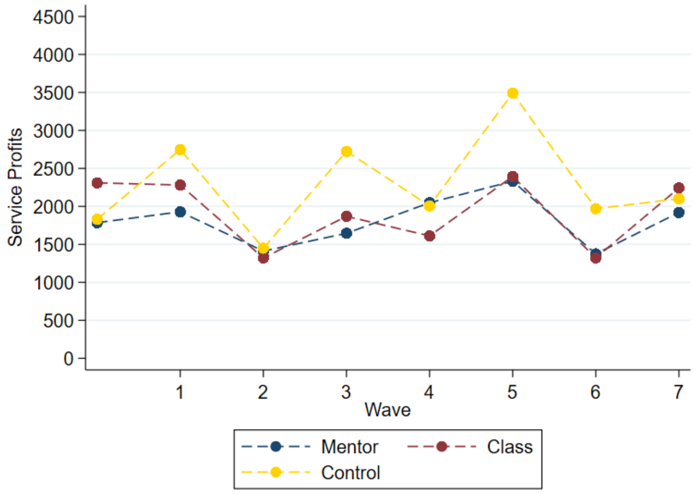


Figure 5 Profits over time: Service Sector

between the groups. After each month of inclining profits a month of declining profits follows. Significant differences between the treatment groups and the control group are found in wave 3 and wave 5 which are both driven by substantially higher profits of micro-enterprises in the control group rather than any particular treatment effects. To the best of my knowledge there is no certain interpretation approach in the recent literature that could explain the unexpected difference in profits between both treatments and the control group. Thus the results suggest a negative impact of both, mentor treatment and class treatment, in the service sector. However, further data of micro-enterprise characteristics in the service sector have to be collected to finally conclude this effect as ubiquitous. (See Table 7 and Figure 5)

Table 8 Profits: Street-Food Sector

Treatment	(1) Pooled	(2) Wave 1	(3) Wave 2	(4) Wave 3	(5) Wave 4	(6) Wave 5	(7) Wave 6	(8) Wave 7
Class	-24.46	-185.5	21.90	812.8	-587.4	-54.81	-155.2	-7.681
	(172.5)	(276.3)	(323.6)	(744.7)	(390.8)	(510.2)	(361.9)	(599.6)
Mentor	1,236***	32.13	982.1	2,431*	2,023**	3,171***	12.93	-933.9*
	(359.5)	(471.1)	(649.5)	(1,365)	(977.0)	(1,018)	(331.6)	(530.9)
Observations	319	52	44	45	49	45	45	39
R-squared	0.154	0.270	0.191	0.184	0.512	0.528	0.184	0.201
Control	YES	YES	YES	YES	YES	YES	YES	YES
Control Mean	1352	1272	925.6	1263	1270	1925	1101	1728
H0: C = M	0.000	0.677	0.185	0.173	0.005	0.005	0.569	0.0163

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

5.2.4. Street-Food Sector

The control group in the street-food sector has average pooled profits of 1352 KSh over the period of 17 months after the treatment. These are not significantly different from the class group but from mentees. The latter achieve on average 1236 KSh higher profits at a 1% significance level which is equal to an average treatment effect of 91.4% higher profits.

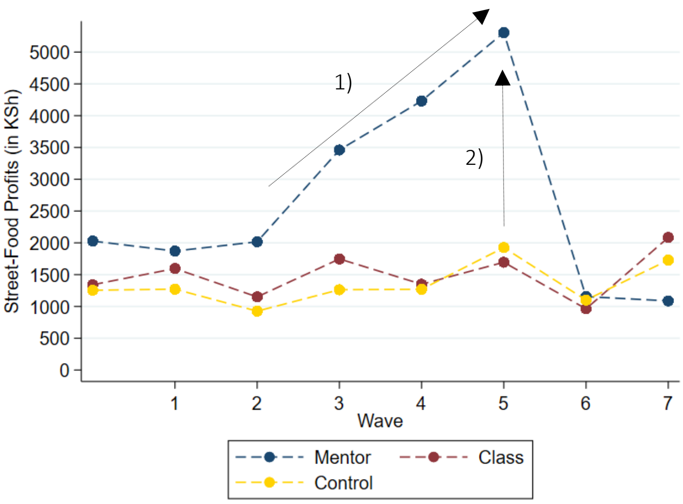


Figure 6 Profits over time: Street-Food Sector

This doubling effect is predominantly caused by a sharp rise of profits beginning in wave 2 that is interrupted at the maximum value of 5096 KSh in wave 5. First, this implies a growth of about 3188 KSh since wave 2 which equals a growth rate of 2.64 (See Figure 6 (1)). Second, mentees yield 3171 KSh significantly higher profits than the control group which is equal to higher profits of 164.7%. (See Figure 6 (2)) The growing period lasts 5 months and is assumed to be a high economic cycle (as described in Section 3.3 and 3.4) during which the street-food sector is able to benefit in great parts. Between wave 5 and wave 6 a sharp decline from 5096 KSh to only 1113 KSh occurred such that mentee profits settle around the control and class mean again. This contradictory trend delivers evidence that mentees in the street-food sector respond particularly sensitive to changes in the economic activity. In wave 7 mentor profits stay on the same level whereas both other groups increase by 650 KSh (= 50-60%). Thus mentees yield significantly lower profits than participants of the class and control group at the end of the observation period. (See Table 8)

5.2.5. Implications of Elasticities

The latter results have shown evidence of a sharp decrease in profits in the street-food sector. Especially the subgroup of mentees shrinks in profits extremely and settles around values of the same level as the class and control group in wave 6 (12 months after treatment) (See Figure 6). Beyond, an overall decline in profits is recorded in the period between December and February as shown in Section 3.3 and 3.4. Hence, this period is suggested to be a low economic cycle, during which a reduction of consumer spending would be expected. However, this remarkable effect cannot solely be explained by lower spending behaviours. To further provide an interpretation approach for shrinking profits in the street-food sector at a higher degree compared to the retail and service sectors it is made use of income and price elasticities. According to Andreyeva et al. (2010) take-away food in the US is characterised by the highest positive price elasticity among all food categories. More detailed they concluded

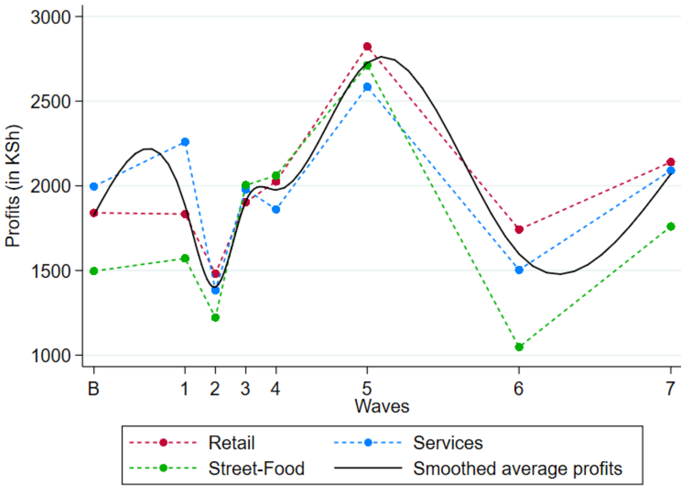


Figure 7 Micro-Enterprise Profits among Business Sectors

the elasticity to be equal to 0.82 while the elasticities of basic food is approximately half as high. In other words, if the price increases (decreases) by 1%, the demand of take-away food increases (decreases) by 0.82%. Moreover, Meade et al. (2011) concluded low-income countries rather than high-income countries to react more sensitively in their food consumption, to changes in income or food prices. In addition this responsiveness varies among different types of food whereas take-away food also records for the highest and basic food for the lowest price elasticity. Further they quantify the income elasticity of food for the US equal to 0.35 while the income elasticity in Kenya is suggested to be twice as high. Beyond, Aladejimokun et al. (2015) determine take-away food consumption in developing countries as a luxury good.

In other words, a good is defined as a luxury good if the consumption of this good increases (decreases) over-proportionally in response to a marginal increase (decrease) in consumer income (Breyer, 2004). Therefore, especially in low economic cycles the consumption of take-away food is going to decrease due to their higher elasticity of demand. In contrast, normal goods like basic foods have lower elasticities thus the consumer demand increased (decreased) by a lower degree during high economic activity (low economic activity).

Recent studies deliver evidence that suggests high income elasticities of take-away food in developing countries as partial drivers of the sharp decline in profits of street-food micro-enterprises. In contrast, retailers in Kenya experienced declines by a lower degree since they supply basic food rather than take-away food. As mentioned above basic food is characterised by a lower income elasticity thus consumers rather avoid the consumption of take-away food than the consumption of basic food, this has also been observed in the data. (See Figure 7)

5.3. Growth Probabilities at the End of one Business Cycle

By reason of the latter findings the likelihood of an average growth in profits is assumed to vary highly between all three groups. Thus it may be interesting to determine a micro-enterprise's probability to generate a profit growth within one economic cycle. Furthermore, related to previous evidence, mentees are expected to reach the highest likelihood of profit growth.

The logistic regression is conducted to investigate differences in the likelihood of a grown profit among treatment groups. As examined in section 3.3 and 3.4 an economic cycle is suggested to be 12 months in length. First, the investigation aggregates all business sectors to determine average differences. Second, each sector is investigated separately to further specify possible drivers of the previously quantified average effect.

5.3.1. Average Growth of Profits within one Business Cycle

The average growth is defined by the difference between the profits at baseline and the average yield profits from wave 1 until wave 6, this is equal to a period of 12 months after the treatment.

> Hypothesis 3:
>
> The likelihood of micro-enterprises to achieve an average profit growth varies between treatment groups within each individual business sector.

Recap the estimation model as specified in section 4.1.3.

$$average\_growth_i = \beta_0 + \beta_1 M_i + \beta_2 C_i + \beta_3 V_i + \beta_4 y_{i0} + \varepsilon_i \qquad (2.1)$$

Table 9 Probability of an Average Profit Growth after 12 months

	(1)	(2)	(3)	(4)
Treatment:	Base	Retail	Service	Street-Food
Class	0.001	0.004	-0.009	0.004
	(0.015)	(0.019)	(0.035)	(0.051)
Mentor	0.064***	0.056***	0.059	0.084*
	(0.014)	(0.017)	(0.035)	(0.047)
Observations	1,920	1,179	384	281
Control	YES	YES	YES	YES
Control Pr. Mean	0.587	0.562	0.412	0.615
H0: C = M	0.000	0.003	0.026	0.082

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

5.3.1.1. Aggregation of Business Sectors (Base)

The control group's profit has grown at a probability of 58.7%. While the class treatment's probability is not significantly different, mentees reach a significantly higher probability with additional 6.4 percentage points at the 1% level which is equal to 65.1%. (See Table 9 (1))

5.3.1.2. Retail Sector

Whereas the control group of retailers has grown at a likelihood of 56.2%, the mentor group has a significantly higher likelihood with additional 5.6 percentage points (= 61.8%). Similar to the base approach, the class group does not differ significantly which should be caused by the large fraction of retailers who make up 61.5% of the aggregated sample. (See Table 9 (2))

5.3.1.3. Service Sector

The control group is characterised by a salient low probability mean of 41.2%. As previously, the mentor group's probability is about 5.9 percentage points higher but not significant. This is caused by the higher standard error that is relative to the retail sector nearly doubled, with only marginal deviation in the coefficient. Additionally, the class group does also not differ significantly from the control group. (See Table 9 (3))

5.3.1.4. Street-Food Sector

The control group's probability mean of micro-enterprises in the street-food sector is the highest among the observed business sectors (=61.5%). Moreover, mentees have a significantly higher probability mean with additional 8.4 percentage points at least at the 10% level which equals 69.9%. Again, the class group does not differ significantly from the control group. (See Table 9 (4))

5.3.2. Point Growth of Profits exactly at the End of one Economic Cycle

The same analysis is conducted again but narrowed in the definition of profit growth. Thus it investigates the likelihood of profit growth after exactly 12 months instead of the average value within this period. The procedure stays the same as previously. First, the differences among the aggregated business sectors are examined. Second, the approach is applied on the individual level.

> Hypothesis 4:
>
> The likelihood of micro-enterprises to achieve a profit growth exactly one year after the treatment varies between treatment groups within each individual business sector.

Recap the estimation model as specified in section 4.1.3.

$$point\_growth_i = \beta_0 + \beta_1 M_i + \beta_2 C_i + \beta_3 V_i + \beta_4 y_{i0} + \varepsilon_i \qquad (2.2)$$

Table 10 Probability of a Profit Growth exactly 12 Months after the Treatment

	(1)	(2)	(3)	(4)
Treatment:	Base	Retail	Service	Street-Food
Class	-0.0455*	0.0161	-0.128**	-0.198***
	(0.0263)	(0.0325)	(0.0617)	(0.0531)
Mentor	0.0141	0.128***	-0.213***	-0.317***
	(0.0271)	(0.0322)	(0.0575)	(0.0610)
Observations	1,723	1,053	351	243
Control	YES	YES	YES	YES
Control Pr. Mean	0.425	0.403	0.500	0.538

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

5.3.2.1. Aggregation of Business Sectors (Base)

The growth probability mean exactly one year after the treatment within the control group is equal to 42.5% in the base regression. Mentees do not have significantly different probabilities but class participants do. They experience a lower likelihood with 4.6 percentage points less which is equal to a probability mean of 37.9%. (See Table 10 (1))

5.3.2.2. Retail Sector

The control group in the retail sector has a chance of 40.3% to achieve grown profits exactly one year after the treatment whereas the class group does not differ significantly. In contrast, mentees have a higher probability with additional 12.8 percentage points such that their profits after one year have grown at a likelihood of 53.1%. (See Table 10 (2))

5.3.2.3. Service Sector:

As previously examined the service sector neither benefits from a class treatment nor from mentoring. Both treatments yield significantly lower probabilities than the control group, this has grown by a likelihood of 50%. The class group therefore has a chance of 37.2% while the mentees reach only 28.7%. (See Table 10 (3))

5.3.2.4. Street-Food Sector:

In this approach this sector delivers the most salient results. The control group reaches a probability mean of 53.8%. The class group has grown at a lower probability by

19.8 percentage points less than the control group which is equal to 34%. Mentees actually only have a chance of 22.1% to achieve a growth exactly 12 months after the treatment. (See Table 10 (4))

5.3.3. Overview of Probabilities

Table 11 summarises the likelihoods of groups within each sector. According to the "average" values, mentees are most successful with exception of the mentees in the service sector where no evidence of significant different probabilities have been found. Nearly 70% of mentees who operate in the street-food sector record growths in average profits and therefore establish as the salient subgroup of micro-enterprises. In contrast, this subgroup only reaches a probability of 22% with respect to the point approach. Furthermore this validates the drawn conclusions about pro-cyclically fluctuating profits in relation to the state of economy as explained in section 5.2.5 since wave 6 is a period of low economic activity.

The probability of mentees in the retail sector is equal to 62% in the average-approach while 53% of mentees still experience a growth in the point approach (see above, street-food sector =22%). This provides evidence that the retail sector indicates as stable even under circumstances where otherwise strong sectors perform poorly.

Table 11 Overview of Growth Probabilities within one Economic Cycle

	Retail Sector		Service Sector		Street-Food Sector	
Group:	Average	Point	Average	Point	Average	Point
Control	56.2%	40.3%	41.2%	50.0%	61.5%	53.8%
Class	56.6%	41.9%	40.3%	37.2%**	61.9%	34.0%***
Mentor	61.8%***	53.1%***	47.1%	28.7%***	69.9%*	22.1%***

[Average: Average profit between month 1 and month 12 - Profit at baseline > 0]
[Point: Profit in month 12 - Profit at baseline > 0]
*** 1% level, ** 5% level, * 10% level

5.4. Analysis of Baseline Value Reliability

The following section investigates differences between the baseline profits and yield profits after the treatment. Therefore micro-enterprises were assigned into six groups defined on the basis of their initial profits. It is important to collect reliable data, as the construction of studies often is based on these values. Also in the case of Brooks et al. (2018) the further study execution was built up on the baseline survey.

> Hypothesis 5:
>
> Micro-enterprise profits do not differ significantly and negatively from their assigned baseline profit group.

This hypothesis implies two main points that should apply if the surveyed baseline profits of this sample are reliable. First, profits of micro-enterprises after treatment are assumed to not differ significantly from their baseline value. Second, micro-enterprises are expected to reach at least the same profit as their initial value. In this section the terms baseline and initial are used interchangeably.

5.4.1. Detection Approach of unreliable Baseline Values

In this section an ANCOVA Regression is specified to detect possible differences between profits at baseline in relation to average profits after treatment.

Recap the pooled ANCOVA Regression specified in section 4.1.1:

$$y_i = \beta_0 + \beta_1 BP_{i0} + \beta_2 ATP_i + \beta_3 V_i + \beta_4 y_{i0} + \varepsilon_{it} \tag{1.3}$$

Whereas $BP_{i0} = 1$ if profits are baseline values and $ATP_i = 1$ if profits are average profit yields after the treatment. As mentioned in the methodology section 4.1.1 only the factor-variables are changed like in the previous ANCOVA approaches.

Table 12 Difference between Baseline Profit and Average Profits after the Treatment

	(1) Pooled 1	(2) Pooled 2	(3) Pooled 3	(4) Pooled 4	(5) Pooled 5	(6) Pooled 6
(7) Profit Range in KSh	≤ 1000	1001-2000	2001-3000	3001-4000	4001-5000	5001-6000
Baseline profit	-953.8*** (145.0)	-486.8*** (174.3)	518.8** (242.3)	661.0 (538.4)	2,198*** (495.1)	4,152*** (450.1)
Observations	899	888	463	91	110	127
R-squared	0.079	0.037	0.069	0.210	0.184	0.429
Control	YES	YES	YES	YES	YES	YES
Profit mean subsequent	1531	2002	2241	2872	2289	2141
Profit mean at baseline	577	1515	2760	3533	4487	6293

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

The profit mean after treatment captures the average profit between wave 1 and wave 7 of the aggregated treatment groups within each profit group. The baseline profit equals the mean of aggregated profits in wave 0. The positive (negative) signs of the coefficients indicate whether the baseline profit is higher (lower) than the average profits achieved within the next 17 months after treatment.

In groups 1-2 the baseline profit is significantly lower than the pooled mean at a 1% significance level. In groups 3-6 the sign is positive and significant in group 3 (5% level), group 5 and group 6 (both at the 1%level). (See Table 12)

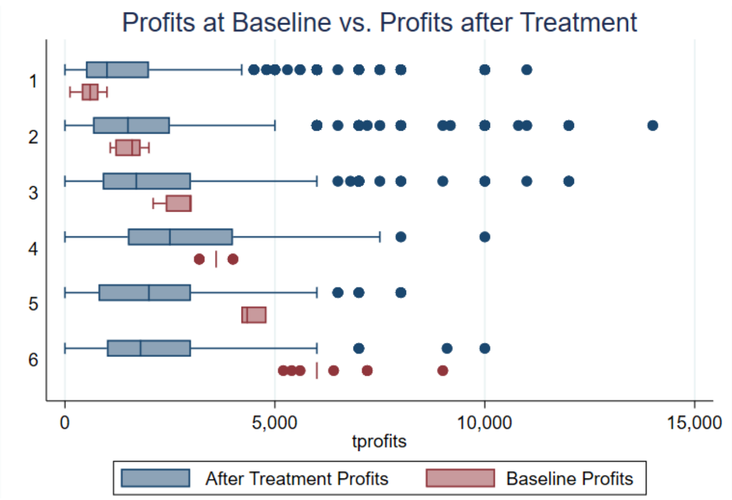


Figure 8 Distribution of initial Values vs. after the Treatment

Obviously, micro-enterprises with low baseline profits seem more likely to be underestimated while micro-enterprises with extreme high baseline profits might be overestimated. Figure 8 visualizes the gaps between baseline and subsequent values that previously have been found to be significantly different (See Table 12). The outcome is first evidence suggesting the baseline values as biased in their minima and maxima.

The hypothesis of achieving subsequent profits of the same level as the initial profits is only confirmed partially. Indeed, micro-enterprises with baseline profits between the thresholds of 1000 KSh up to 4000 KSh experience average profits settled around their baseline profit group range (See Table 12 (7)). Beyond the threshold of 4000 KSh (Group 5 and 6) the hypothesis is rejected since subsequent profits are significantly lower than the baseline value. In group 5 profits after treatment (2289 KSh) equal only one-half of the baseline profits (4487 KSh) whereas in group 6 subsequent profits (2141 KSh) are equivalent to only one-third of baseline profits (6293 KSh). Conclusions about extreme outliers in both, group 5 and group 6, can be drawn. The latter result is also disclosed for each treatment group separately in Appendix D.

Further the hypothesis gets rejected for baseline values below the threshold of 1000 KSh since micro-enterprises who recorded baseline profits lower than 1000 KSh on average reach profits equal to 1500 KSh after treatment. These lie outside the baseline profit range of 0-1000 KSh that is determined for this group (See Table 12 (7)). This effect might be triggered by an underestimation of baseline values. Otherwise the substantial rise might be caused by high treatment effects. To prove this, pooled profits are regressed separately to show off individual effects of mentoring and class treatment within each baseline profit group (See Appendix 2). The appendix tables deliver slight evidence of higher profit means especially for control and mentor groups. However, the control mean is not significantly different from both treatment groups, mentoring and class training. Thus, particularly high treatment effects in profits of micro-enterprises with low baseline values are ruled out. Therefore conclusions can be drawn that micro-enterprises in Kenya with low initial values generally experience higher growth-rates than those with medium or high initial values. However, underestimated micro-enterprises at baseline are not ruled out to be partial driver of this effect. (See discussion in Appendix E)

Table 13 Profit Growth Rates among Baseline Profit Groups

Group assignment	(1) Control	(2) Class	(3) Mentor
Medium baseline profits	-2.418***	-2.420***	-2.346***
[1000 < X ≤ 3000 KSh]	(0.122)	(0.154)	(0.155)
High baseline profits	-3.026***	-3.008***	-3.091***
[X > 3000 KSh]	(0.168)	(0.258)	(0.239)
Observations	722	782	723
R-squared	0.425	0.329	0.344
Control	YES	YES	YES
Growth rate mean (CONTROL) [bprofit: X ≤ 1000 KSh]	2.534	2.666	2.795
Growth rate mean [bprofit: 1000< X ≤ 3000 KSh]	0.115	0.246	0.449
Growth rate mean [bprofit: X > 3000 KSh]	-0.493	-0.341	-0.296
H0: High = Med:	0.000	0.018	0.000

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

To further prove the drawn suggestion an ANCOVA regression was conducted to compare growth rates of micro-enterprises with low baseline profits [X ≤ 1000 KSh] to those who achieved medium [1000 < X ≤ 3000 KSh] and high [X > 3000 KSh] profits at baseline within each treatment group.

$$growth\_rate_i = \beta_0 + \beta_1 MBP_{i0} + \beta_2 HBP_{i0} + \beta_3 V_i + \beta_4 y_{i0} + \varepsilon_{it} \qquad (1.4)$$

The dependent variable determines the growth rate change relative to micro-enterprises with low baseline profits for those who recorded either medium baseline profits ($MBP_{i0} = 1$) or high baseline profits ($HBP_{i0} = 1$).

The results confirm high growth rates in micro-enterprises with low initial profits. More precisely, the average growth rate of micro-enterprises in the control group with low baseline profits is equal to 2.534 whereas those with medium baseline profits achieve an average growth rate of 0.115. Further micro-enterprises with high baseline profits even have a negative average growth rate of -0.493. These results are highly significant at the 1% level. (See Table 13)

As already mentioned some micro-enterprises are assumed to be underestimated at baseline. To correct for extreme low outliers the analysis is conducted again while dropping the lower 50th percentile of the observations that do not exceed an initial value of 1000 KSh. Figure 9 shows that only boxplots of group 1 ("low baseline profits") have changed. In order to not consider treatment effects, only the control groups are compared with each other in the next step. Thus the coefficients after the correction are estimated as follows:

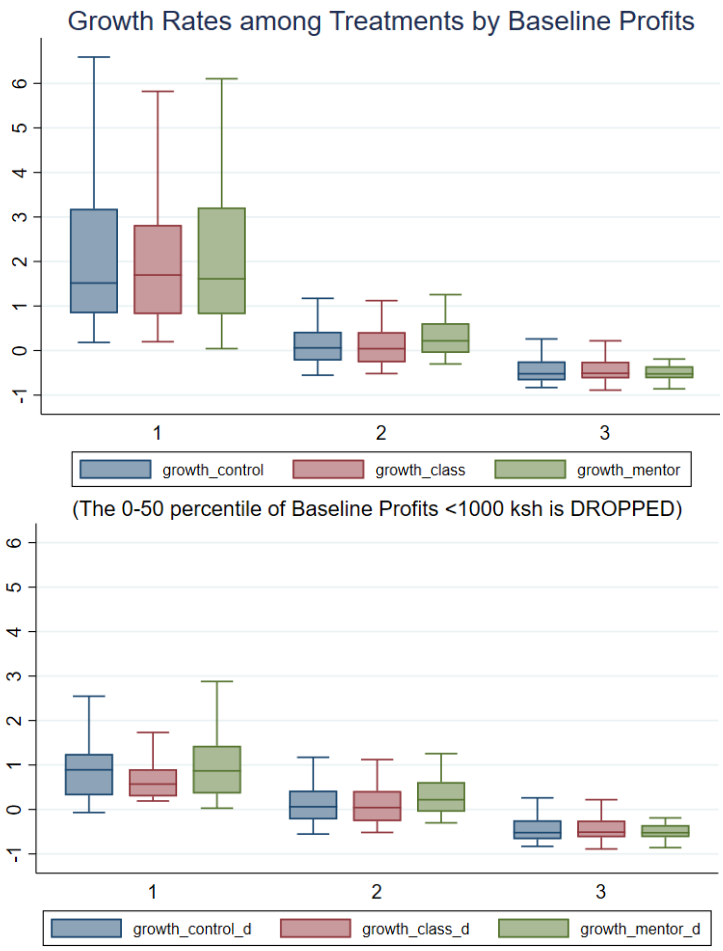


Figure 9 Growth Rates among Treatment Groups within Baseline Profit Groups [1=low, 2=medium, 3=high]

The average growth rate of micro-enterprises in the control group with low baseline profits is now estimated to be equal to 0.914 instead of 2.534, whereas those with medium baseline profits achieve an average growth rate of 0.0958. Further micro-enterprises with high baseline profits, again, record for a negative average growth rate of -0.454 (See Appendix 8). Average growth rates in the second and third group with the drop are nearly equal to the previous approach without the drop. The average growth rate of the first group ("low baseline profits") decreased by nearly two-thirds from 2.534 to 0.914 and is still highly significant at the 1% level.

However, caution is required when dropping observations. Especially in the underlying dataset treatment groups are very small thus it is not advisable to drop data without unambiguous evidence, due to the assumption of random sampling. In conclusion the observations are kept in the data to not further decrease the sample size what might result in biased estimates.

6. Discussion

The preceded analysis of micro-enterprise profit variations in Kenya raises interest in some major topics that should affect policy development.

Many women in developing countries have problems to find work for wage, are forced to earn money or simply try to increase living standards of their children. (World development report, 2012) Therefore a distinction of women's motivation to start a micro-enterprise in developing countries should have been made. Sohn and Diez (2018) divided micro-enterprises into two groups: necessity-driven and opportunity-driven. Whereas necessity-driven entrepreneurs are more likely to operate in the informal sector. According to the World Development Report (2019) micro-enterprises in the informal sector are more likely faced with problems like crime and poor infrastructure what might negatively impact the efficiency in terms of lacking access to clean water and electricity as well as transportation possibilities. Therefore the implementation of the just mentioned standards should play a key role in policy making to revoke restrictions of micro-enterprises in developing countries. Abdo and Kerbage (2012) find NGO's (Non-Governmental Organisations) like the WED (Women's Entrepreneurship Development) initiatives in Lebanon already provide assistance to narrow the gap between the formal and informal sector but often cannot keep promises that have been made. Nevertheless much work has to be done here. The scope of development aid should rather lie in formalizing the informal sector instead of only offering support programmes. Chen (2012) investigated advantages of formalizing the informal sector and lists not only infrastructure benefits like access to electricity and clean water but also possibilities to transmit know-how like formal business associations and further business security aspects. According to Pollin (2009) employment subsidies in the formal sector have positive spill-over effects on the competitiveness since less micro-enterprises compete with each other because necessity-driven female micro-entrepreneurs often prefer to work for wage. Plus micro-enterprises with at least one worker might be more flexible in future. Further Pollin investigated the marginal and the general type of subsidies concerning employment. The former supports only new workers of an enterprise whereas the latter is applied for any worker what seems to be very costly but more efficient. Micro-enterprises who employ at least one worker are found to yield higher profits. In other words, Mead and Liedholm (1998) found adding one worker increases a micro-enterprises' likelihood to survive. The dataset of Dandora offers similar results. The service sector's chance to employ workers is equal to 51% at an exit rate after treatment of only 1.4% whereas retailers only have a chance of 12% to employ workers at an exit rate of 4.3%. Regarding to further results, mentees in the street-food sector yield the highest profits followed by mentees in the retail sector. However, overall, the retail sector performs stable even under circumstances in which the otherwise strong street-food sector performs poorly, especially in low economic cycles. Therefore the retail sector might be a suitable target group for approaches by the use of employment subsidies that may cause a pull effect for micro-enterprise vendors to shift from the informal to the formal sector. As a result they may be faced with less constraints to expand their business more sustainably. In this context, the street-food sector might also be a suitable target group since major problems in this sector like lacks in storage possibilities and clean water access are closely associated with disadvantages of the informal sector.

7. Conclusion

Finally, this paper adds some new insights to the existing literature of micro-enterprises in developing countries.

Mentoring has high average treatment effects in the retail as well as in the street-food sector, while mentees in the service sector seem to benefit even negatively. However, the driver of this effect cannot be interpreted unambiguously thus further research should focus on this business sector to possibly validate the provided evidence of this paper regarding negative treatment effects in the service sector. The salient group of mentees in the street-food sector on average yields the highest profits. On the one hand, they highly benefit from local expertise provided by mentors as examined by

Brooks et al. (2018) and therefore yield maximum average profits of 5096 KSh (165% higher profits than the control group in the same sector) in periods with high economic activity. On the other hand, they experience a sharp decline in periods of low economic activity. High income elasticities of take-away food have been interpreted as partial driver of the contradictory effects. Since the underlying dataset only contains one economic cycle it should be ensured that future research observes several cycles to confirm the pro-cyclical variation of micro-enterprise profits. Despite, first evidence of an ever repeating economic cycle has been elaborated in this paper.

In contrast, the retail sector establishes as stable even under circumstances where otherwise strong sectors perform poorly. Other than street-food stalls, retailers sell basic food with an income elasticity only half as high as that of take-away food. Hence profits of retailers also decrease in periods of low economic activity but at a lower degree.

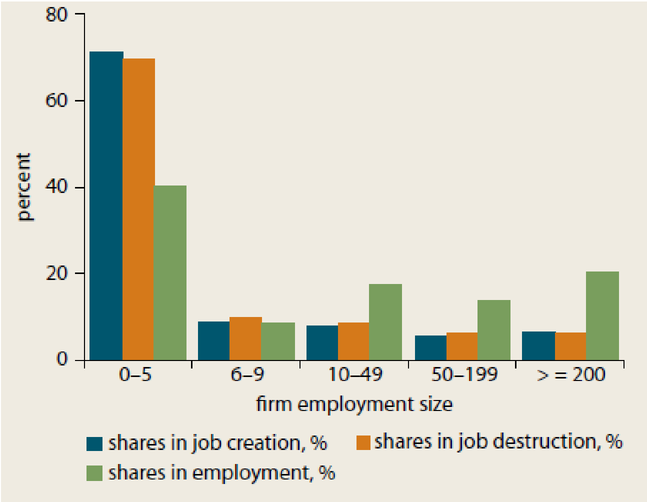
As already described by Brooks et al. (2018) the class treatment on average does not record any particularly significant effects in profits among micro-enterprises. However, in the subgroup of retailers an average increase in profits equal to 12.6% has been detected but only at the 10% significance level while the effects are even negative within the service sector.

Beyond the quantified absolute profits, retailers have the highest chance to achieve profit growth at the end of an economic cycle. At the same time this sector also still has pending potentials due to low level employment thus it is suggested to be an appropriate recipient of development aid.

Recent literature investigated social learning in various contexts like mentoring or class trainings. However, still unknown are possible effects by the transmission of information within networks composed of differently treated micro-entrepreneurs. A variation in the composition of treated participants may be interesting to indicate the effects of possible self-aid associations on the development of micro-enterprises and determine the most efficient composition of those.

I. Appendix

A. Employment Properties in Chile



(Source: World Bank. 2012. "World Development Report 2013: Jobs". p.106)

B. Manufacturing Sector

The amount of observed micro-enterprises in the dataset is very small thus with only 10 observations per wave they are not representative to conclude any implications of a sector that makes up one-tenth of Kenya's GDP even if they indicate significant values in the sample. Therefore this sector is not discussed in detail in this paper.

Appendix 1 Profits: Manufacturing Sector

Treatments:	(2) Wave 1	(3) Wave 2	(4) Wave 3	(5) Wave 4	(6) Wave 5	(7) Wave 6	(8) Wave 7
Class	2,023*	758.6	2,207	628.0	2,838**	3,484**	1,463
	(652.2)	(667.8)	(1,027)	(1,134)	(463.0)	(666.0)	(1,594)
Mentor	3,335***	1,603***	2,751*	1,602	71.48	2,339**	1,318
	(412.6)	(200.2)	(1,013)	(1,069)	(518.9)	(720.0)	(1,281)
Observations	12	11	12	12	11	12	12
R-squared	0.954	0.822	0.851	0.816	0.981	0.978	0.807
Control	YES	YES	YES	YES	YES	YES	YES
Control Mean	1110	920	670	1080	2125	2240	1880
H0: C = M	0.209	0.226	0.608	0.355	0.0397	0.0891	0.912

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

C. Differences of Treatment Effects in the Baseline Profit Group 1 [X < 1000 KSh]

To rule out any particularly high treatment effects in the first baseline profit group with initial values lower than 1000 KSh, an ANCOVA regression is conducted to detect significantly different estimates. However, as disclosed in Appendix 2 neither coefficient is significantly different from the control mean. Therefore it suggests all groups yield on average the same level of profits which makes it is possible to rule out any particular treatment effects in micro-enterprises with very low initial profits. Conclusions are drawn about generally high growth rates of small micro-enterprises. But again, it is not possible to rule out underestimated micro-enterprises at baseline as driver of the large gap between initial profits and profits after treatment in this group.

Appendix 2 POOLED: Average Profits (after Treatment) among Treatment Groups

Treatment:	(1) [Baseline Profit: X ≤ 1000 KSh]
Class	55.36
	(148.1)
Mentor	190.2
	(153.5)
Observations	770
R-squared	0.040
Control	YES
Control mean after treatment	1448

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

D. Differences between Profits at Baseline and after Treatment

This section proofs significant differences between baseline profits and profits after the treatment within each treatment group. Appendix 3 pools all treatments whereas Appendix 4, Appendix 5 and Appendix 6 show differences in the control, class and mentor group, respectively. Highly significant differences at the 1% level are observed in group 1 (initial values lower than 1000 KSh), group 5 (initial values between 4001 KSh and 5000 KSh) and group 6 (initial values between 5001 KSh and 6000 KSh) as well as changes in coefficient signs from group 2 to group 3 are noticed within all treatment groups. (See Appendix 4-6) Therefore the data suggests micro-enterprises with initial values lower than 2001 KSh more likely to grow, whereas micro enterprises with initial values higher than 2001 KSh seem to shrink in future profits. Especially in group 5-6 this effect is observed in great measure. That evidence strengthens the hypothesis of over-/underestimated baseline values in the sample.

Appendix 3 POOLED: Difference between Profits at Baseline and after Treatment

VARIABLES	(1) Pooled 1	(2) Pooled 2	(3) Pooled 3	(4) Pooled 4	(5) Pooled 5	(6) Pooled 6
(7) Profit Range in KSh	≤ 1000	1001-2000	2001-3000	3001-4000	4001-5000	5001-6000
Baseline Profit	-953.8***	-486.8***	518.8**	661.0	2,198***	4,152***
	(145.0)	(174.3)	(242.3)	(538.4)	(495.1)	(450.1)
Observations	899	888	463	91	110	127
R-squared	0.079	0.037	0.069	0.210	0.184	0.429
Control	YES	YES	YES	YES	YES	YES
Pooled mean after treatment	1531	2002	2241	2872	2289	2141

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

Appendix 4 Control Group: Difference between Profits at Baseline and after Treatment

VARIABLES	(1) Pooled 1	(2) Pooled 2	(3) Pooled 3	(4) Pooled 4	(5) Pooled 5	(6) Pooled 6
(7) Profit Range in KSh	≤ 1000	1001-2000	2001-3000	3001-4000	4001-5000	5001-6000
Baseline Profit	-860.9***	-352.7	773.9**	704.7	1,976**	4,185***
	(220.5)	(264.5)	(361.1)	(702.6)	(773.0)	(536.5)
Observations	278	282	133	47	38	57
R-squared	0.154	0.043	0.085	0.471	0.337	0.596
Control	YES	YES	YES	YES	YES	YES
Control mean after treatment	1448	1825	1956	2784	2535	2002

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

Appendix 5 Class Group: Difference between Profits at Baseline and after Treatment

VARIABLES	(1) Pooled 1	(2) Pooled 2	(3) Pooled 3	(4) Pooled 4	(5) Pooled 5	(6) Pooled 6
(7) Profit Range in KSh	≤ 1000	1001-2000	2001-3000	3001-4000	4001-5000	5001-6000
Baseline Profit	-895.0***	-508.6	715.5**	605.7	2,386***	5,257***
	(234.2)	(320.4)	(338.1)	(917.4)	(854.0)	(651.5)
Observations	338	277	203	29	32	23
R-squared	0.087	0.153	0.185	0.061	0.275	0.785
Control	YES	YES	YES	YES	YES	YES
Class mean after treatment	1436	2056	2018	3196	2198	1963

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

Appendix 6 Mentor Group: Difference between Profits at Baseline and after Treatment

VARIABLES	(1) Pooled 1	(2) Pooled 2	(3) Pooled 3	(4) Pooled 4	(5) Pooled 5	(6) Pooled 6
(7) Profit Range in KSh	≤ 1000	1001-2000	2001-3000	3001-4000	4001-5000	5001-6000
Baseline Profit	-1,108***	-571.0*	-168.1	941.8	2,305***	3,541***
	(286.5)	(301.4)	(537.8)	(1,279)	(802.5)	(895.3)
Observations	283	329	127	15	40	47
R-squared	0.100	0.030	0.093	0.240	0.406	0.392
Control	YES	YES	YES	YES	YES	YES
Mentor mean after treatment	1731	2109	2912	2519	2124	2488

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

E. Baseline Value Reliability Discussion

In Section 5.4.1 baseline profits are compared to the profits after the treatment to detect possible over-/underestimated baseline values that might have biased the results of previous discussions in section 5. Indeed, baseline values lower than 1000 KSh and higher than 4000 KSh are suggested as possible outliers. But since this cannot be determined unambiguously the data is not dropped but kept in the sample due to the random sampling assumption that may be particularly important in small datasets to receive unbiased values. However, the estimated model has been conducted with a drop of the lower 50^{th} percentile of observations below the baseline value of 1000 KSh. The result of the drop of observations is an aligned average growth rate of 0.914 instead of 2.534 which was received without the drop. This growth rate is still high but seems more reasonable since firms with lower profits are generally expected to achieve higher growth rates than firms with high profits.

Beyond the control group (in the case without drop), higher growth rates are notable in the treatment groups. In the low profit group growth rates increase from 2.534 (control) to 2.666 in the class and to 2.795 in the mentor group. Whereas the medium profit group increases in the average growth rate from 0.115 to 0.246 in the class group and to 0.449 in the mentor group. Finally, the high profit group achieves less negative growth rates in the treatment groups relative to the control group.

Appendix 7 Profit Growth Rates among Baseline Profits Groups

	(1) Control	(2) Class	(3) Mentor
Medium baseline profits	-2.418***	-2.420***	-2.346***
[1000 < X ≤ 3000 KSh]	(0.122)	(0.154)	(0.155)
High baseline profits	-3.026***	-3.008***	-3.091***
[X > 3000 KSh]	(0.168)	(0.258)	(0.239)
Observations	722	782	723
R-squared	0.425	0.329	0.344
Control	YES	YES	YES
Growth rate mean (CONTROL) [bprofit: X ≤ 1000 KSh]	2.534	2.666	2.795
Growth rate mean [bprofit: 1000< X ≤ 3000 KSh]	0.115	0.246	0.449
Growth rate mean [bprofit: X > 3000 KSh]	-0.493	-0.341	-0.296
H0: High = Med:	0.000	0.018	0.000

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

Appendix 8 With Drop: Profit Growth Rates among Baseline Profits Groups

	(1) Control	(2) Class	(3) Mentor
Medium baseline profits	-0.819***	-0.585***	-0.705***
[1000 < X ≤ 3000 KSh]	(0.0501)	(0.0576)	(0.0520)
High baseline profits	-1.368***	-1.206***	-1.519***
[X > 3000 KSh]	(0.0634)	(0.0784)	(0.0728)
Observations	580	575	619
R-squared	0.499	0.332	0.443
Control	YES	YES	YES
Growth rate mean (CONTROL) [bprofit: X ≤ 1000 KSh]	0.914	0.738	1.032
Growth rate mean [bprofit: 1000< X ≤ 3000 KSh]	0.0958	0.152	0.327
Growth rate mean [bprofit: X > 3000 KSh]	-0.454	-0.468	-0.487
H0: High = Med:	0.000	0.000	0.000

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

F. Stata Do-File

```
// Development Opportunities of Micro Entrepreneurs: Evidence from Kenya
// Bachelor-Thesis by Lucas Hagelstein
// Stata Do-File
clear all
set more off
set matsize 800
cd " ... "

use "datasets\BDJ_Dandora_Data.dta", clear

xtset id wave
gen bsec = 1 if sec0_b ==1
replace bsec = 2 if sec1_b ==1
replace bsec = 3 if sec2_b ==1
replace bsec = 4 if sec3_b ==1
replace bsec = 5 if sec4_b ==1
tab bsec
gen bprofits_bsec1 = tprofits_b if bsec == 1 & wave ==0
gen bprofits_bsec2 = tprofits_b if bsec == 2 & wave ==0
gen bprofits_bsec3 = tprofits_b if bsec == 3 & wave ==0
gen bprofits_bsec4 = tprofits_b if bsec == 4 & wave ==0
gen bprofits_bsec5 = tprofits_b if bsec == 5 & wave ==0
gen tprofits_w0 = tprofits_b if wave==0

*>>>> 1. Descrptive Statistics <<<<*

// 6 Baseline Profit groups
gen tprofitscut = 1 if tprofits_b <=1000
replace tprofitscut = 2 if tprofits_b >1000 & tprofits_b <=2000
replace tprofitscut = 3 if tprofits_b >2000 & tprofits_b <=3000
replace tprofitscut = 4 if tprofits_b >3000 & tprofits_b <=4000
replace tprofitscut = 5 if tprofits_b >4000 & tprofits_b <=5000
replace tprofitscut = 6 if tprofits_b >5000
tab tprofitscut
//age
forvalues x=1/5{
gen age_bsec`x' = age_b if bsec == `x' & wave ==0
}
gen age_w0 = age_b if wave==0
//Business age
forvalues x=1/5{
gen businessage_bsec`x' = businessage_b if bsec == `x' & wave ==0
}
gen businessage_w0 = businessage_b if wave==0
//Exit until w7
forvalues x=1/5{
gen exit_bsec`x' = exit if bsec == `x'
}
gen exit_w7 = exit
//Secondary Edu
forvalues x=1/5{
gen secondaryedu_b_bsec`x' = secondaryedu_b if bsec == `x' & wave ==0
}
gen secondaryedu_b_w0 = secondaryedu_b if wave==0
//if emp
forvalues x=1/5{
gen I_emp_b_bsec`x' = I_emp_b if bsec == `x' & wave ==0
}
gen I_emp_b_w0 = I_emp_b if wave==0
```

```
//SumTable Profits of micro-enterprises among business sectors with and without any employees
tabstat bprofits_bsec1 bprofits_bsec2 bprofits_bsec3 bprofits_bsec4 bprofits_bsec5 tprofits_w0, by(l_emp_b) statistic(N mean sd min max) long notot column(statistic)
tabstat tprofits_w0 ,statistic(N mean sd min max) long column(statistic)
//SumTable Profits of ME among business sectors by treatment
tabstat bprofits_bsec1 bprofits_bsec2 bprofits_bsec3 bprofits_bsec4 bprofits_bsec5 tprofits_w0, by(treat2) statistic(N mean sd min max) long notot column(statistic)
tabstat tprofits_w0 ,statistic(N mean sd min max) long column(statistic)
count if tprofits_w0 !=. & wave==0
//Average micro-enterprise in each sector
tabstat bprofits_bsec1 bprofits_bsec2 bprofits_bsec3 bprofits_bsec4 bprofits_bsec5 tprofits_w0, statistic(N mean sd min max) long column(statistic)
tabstat businessage_bsec1 businessage_bsec2 businessage_bsec3 businessage_bsec4 businessage_bsec5 businessage_w0, statistic(N mean) long column(statistic)
tabstat exit_bsec1 exit_bsec2 exit_bsec3 exit_bsec4 exit_bsec5 exit_w7, statistic(N mean) long column(statistic)
tabstat secondaryedu_b_bsec1 secondaryedu_b_bsec2 secondaryedu_b_bsec3 secondaryedu_b_bsec4 secondaryedu_b_bsec5 secondaryedu_b_w0, statistic(N mean) long column (statistic)
tabstat l_emp_b_bsec1 l_emp_b_bsec2 l_emp_b_bsec3 l_emp_b_bsec4 l_emp_b_bsec5 l_emp_b_w0, statistic(N mean) long column(statistic)

*>>>> 2. Average Sector Profits <<<<*

******************************************************************************
*-------- Avg. Profit of Business Sectors by Treatment Groups ------*
******************************************************************************
sum tprofits if wave >=1 & wave <=7 & bsec ==1
local cmpooled =r(mean)
reg tprofits i.bsec $controlsbsec tprofits_b if wave>=1 & wave<=7
qui test _b[4.bsec] = _b[3.bsec]
display in red "Ho: FoodPrep = Services pvalue: `r(p)'"
forvalue x=2/4{
display in red "Difference Bsec `x' vs. Retail: " (_b[`x'.bsec]*100)/`cmpooled' " % | Only Interpretable if significant!"
}
forvalue ii=1/7{
sum tprofits if wave == `ii' & bsec ==1
local cmpooled =r(mean)
reg tprofits i.bsec $controlsbsec tprofits_b if wave==`ii'
qui test _b[4.bsec] = _b[3.bsec]
display in red "Ho: FoodPrep = Services pvalue: `r(p)'"
forvalue x=2/4{
display in red "Difference Bsec `x' vs. Retail: " (_b[`x'.bsec]*100)/`cmpooled' " % | Only Interpretable if significant!"
}}
*****************************************************************************************
* ------- Figure 1: Avg profit in Business Sectors for each Treatment -------- *
*****************************************************************************************
sort wave
forvalues x=1/4{
by wave: egen avg_profits_bsec`x' = mean(tprofits) if bsec == `x'
}
by wave: egen avg_profits = mean(tprofits)
sort wave
twoway /*
*/ (connected avg_profits_bsec1 months_since_treat if bsec == 1, lpattern(shortdash) msize (1) color(cranberry)) /*
*/ (connected avg_profits_bsec3 months_since_treat if bsec == 3, lpattern(shortdash) msize (1) color(midblue)) /*
*/ (connected avg_profits_bsec4 months_since_treat if bsec == 4, lpattern(shortdash) msize (1) color(midgreen)) /*
```

```
*/ (mspline avg_profits months_since_treat, lpattern(solid) color(black)),/*
*/ xlabel(-2(2)17)ytitle("Profits (in KSh)") ylabel(1000(500)3000, angle(0)) graphregion(color(white) ilwidth(none)) xscale(r(-2 17)) xlabel( -2 "B" 1 "1" 2 "2" 3 "3" 4 "4" 7 "5" 12 "6" 17 "7") xtitle("Waves") /*
*/ legend(order(1 2 3 4) col(2) label(1 "Retail") label(2 "Services") label (3 "Street-Food") label(4 "Smoothed average profits ")) name(Figure_bsecs_Pooled,replace)

*>>>> 3. Kenya's GDP PLOT <<<<*
//FIGURE 2
use "datasets\GDP for Plot.dta", clear
//Set Time variable
tsset time
//Format Numbers
gen activity_USD = activity * 0.0097
gen activity_USD_Bi = activity_USD / 1000
//Plot
sort time
twoway mspline activity_USD_Bi time, bands(36) lpattern(solid) color(dknavy),, /*
*/ ytitle("GDP [Constant Prices (2009)]") title("GDP in Kenya [in USD Billion]") graphregion(color(white)ilwidth(none)) ylabel(8(1)12.5, angle(0)) xline(19310 19675 20043 20407 20772 21137 21502, lpattern(shortdash) lwidth(0.15) lcolor(black)) xmticks(19310 19675 20043 20407 20772 21137 21502 , tlength(2) tposition(outside) tlwidth(0.25)) xlabel( 18993 19084 19175 19267 19359 19449 19540 19632 19724 19814 19905 19997 20089 20179 20270 20362 20454 20545 20636 20728 20820 20910 21001 21093 21185 21275 21366 21458 21550, valuelabel angle(0) labsize(2.5) tlength(0.8)) xmlabel(19128 "2012" 19493 "2013" 19858 "2014" 20223 "2015" 20588 "2016" 20953 "2017" 21318 "2018", labsize(large) labgap(5) angle (0) tlength(0)) xtitle("") /*
*/name(Figure_Economic_Cycle_Kenya,replace)

*>>>> 4. Sectors with pooled Treats <<<<*

use "datasets\BDJ_Dandora_Data.dta", clear
xtset id wave
gen bsec = 1 if sec0_b ==1
replace bsec = 2 if sec1_b ==1
replace bsec = 3 if sec2_b ==1
replace bsec = 4 if sec3_b ==1
replace bsec = 5 if sec4_b ==1
tab bsec
global controls "lage_b secondaryedu_b l_emp_b bsec businessage_b"
global controlsbsec "lage_b secondaryedu_b l_emp_b businessage_b"
global controlsbsec1 "lage_b secondaryedu_b l_emp_b sec0_b sec1_b sec2_b businessage_b"
global controlsbsec2 "lage_b secondaryedu_b l_emp_b sec0_b sec1_b sec2_b businessage_b"
global controlsbsec3 "lage_b secondaryedu_b l_emp_b sec0_b sec1_b sec2_b businessage_b"
global controlsbsec4 "lage_b secondaryedu_b l_emp_b sec0_b sec1_b sec2_b businessage_b"
*****************************************************************************
*-------- Avg. Profit of Business Sectors by Treatment Groups ------*
*****************************************************************************
sum tprofits if wave >=1 & wave <=7 & bsec ==1
local cmpooled =r(mean)
reg tprofits i.bsec $controlsbsec tprofits_b if wave>=1 & wave<=7
qui test _b[4.bsec] = _b[3.bsec] = _b[2.bsec] = _b[1.bsec]
display in red "Ho: FoodPrep = Services = Manufacturing = Retail p-value = `r(p)'"
forvalue x=2/4{
display in red "Difference Bsec `x' vs. Retail: " (_b[`x'.bsec]*100)/`cmpooled' " % | Only Interpretable if significant!"
}
```

```
********************************************************************************
* --------- Figure 3: Avg profit in Business Sectors for each Treatment ---------- *
********************************************************************************
sort wave
forvalues x=1/4{
by wave: egen avg_profits_bsec`x' = mean(tprofits) if bsec == `x'
}
sort wave
twoway/*
*/ (connected avg_profits_bsec1 wave if bsec == 1, lpattern(dash) color(cranberry)) /*
*/ (connected avg_profits_bsec3 wave if bsec == 3, lpattern(dash) color(midblue)) /*
*/ (connected avg_profits_bsec4 wave if bsec == 4, lpattern(dash) color(midgreen)),/*
*/ xlabel(0(1)7)ytitle("Profits (in KSh)") ylabel(1500(500)3000, angle(0)) graphregion( color(white) ilwidth(none)) xscale(r(0 6)) xtitle("Wave") /*
*/ legend(order(1 2 3) col(2) label(1 "Retail") label(2 "Services") label (3 "Street-Food" )) name(Figure_Sectors_treatments,replace)

*>>>> 5. Sectors grouped by Treats <<<<*

*****************************************************************************
*----------- Profits of Business Sectors groupedby Treatment ---------*
*****************************************************************************
forvalue x=2/4{
sum tprofits if wave >=1 & wave <=7 & treat==`x' & bsec ==1
local cmpooled`x' =r(mean)
}
reg tprofits i.bsec $controlsbsec tprofits_b if wave>=1 & wave<=7 & treat == 2
qui test _b[4.bsec] = _b[3.bsec] = _b[2.bsec] = _b[1.bsec]
display in red "Ho: FoodPrep = Services = Manufacturing = Retail p-value = `r(p)'"
forvalue x=2/4{
display in red "Difference Bsec `x' vs. Retail: " (_b[`x'.bsec]*100)/`cmpooled2' " % | Only Interpretable if significant!"
}
forvalues ii = 3/4 {
reg tprofits i.bsec $controlsbsec tprofits_b if wave>=1 & wave<=7 & treat == `ii'
qui test _b[4.bsec] = _b[3.bsec] = _b[2.bsec] = _b[1.bsec]
display in red "Ho: FoodPrep = Services = Manufacturing = Retail p-value = `r(p)'"
forvalue x=2/4{
display in red "Difference Bsec `x' vs. Retail: " (_b[`x'.bsec]*100)/`cmpooled`ii'' " % | Only Interpretable if significant!"
}}
*********************************************************************************
* -------------- Profits of Business Sectors groubedby Treatment ----------------*
*********************************************************************************
sort treat2 wave
forvalues ii=2/4{
by treat2 wave: egen avg_profits_bsec1_TREAT`ii' = mean(tprofits) if treat2 == `ii' & bsec == 1
by treat2 wave: egen avg_profits_bsec2_TREAT`ii' = mean(tprofits) if treat2 == `ii' & bsec == 2
by treat2 wave: egen avg_profits_bsec3_TREAT`ii' = mean(tprofits) if treat2 == `ii' & bsec == 3
by treat2 wave: egen avg_profits_bsec4_TREAT`ii' = mean(tprofits) if treat2 == `ii' & bsec == 4
}
```

```
sort wave
************************************************
*------------- PLOT Control Group ---------*
************************************************
twoway/*
*/ (connected avg_profits_bsec1_TREAT2 wave if treat2 == 2 & bsec == 1, lpattern(dash) color(cranberry)) /*
*/ (connected avg_profits_bsec3_TREAT2 wave if treat2 == 2 & bsec == 3, lpattern(dash) color(midblue)) /*
*/ (connected avg_profits_bsec4_TREAT2 wave if treat2 == 2 & bsec == 4, lpattern(dash) color(midgreen)),/*
*/ xlabel(0(1)7)ytitle("Control Profits (in KSh)") ylabel(0(500)4500, angle(0)) graphregion(color(white) ilwidth(none)) xscale(r(0 6)) xtitle("Wave") /*
*/ legend(order(1 2 3) col(2) label(1 "Retail") label(2 "Services") label (3 "Street-Food" )) name(Figure_Control_Bsec,replace)
************************************************
*------------- PLOT Class Group ------------*
************************************************
twoway/*
*/ (connected avg_profits_bsec1_TREAT3 wave if treat2 == 3 & bsec == 1, lpattern(dash) color(cranberry)) /*
*/ (connected avg_profits_bsec3_TREAT3 wave if treat2 == 3 & bsec == 3, lpattern(dash) color(midblue)) /*
*/ (connected avg_profits_bsec4_TREAT3 wave if treat2 == 3 & bsec == 4, lpattern(dash) color(midgreen)),/*
*/ xlabel(0(1)7)ytitle("Class Profits (in KSh)") ylabel(0(500)4500, angle(0)) graphregion(color(white) ilwidth(none)) xscale(r(0 6)) xtitle("Wave") /*
*/ legend(order(1 2 3) col(2) label(1 "Retail") label(2 "Services") label (3 "Street-Food" )) name(Figure_Class_Bsec,replace)
***************************************************
*------------- PLOT Mentor Group -------------*
***************************************************
twoway/*
*/ (connected avg_profits_bsec1_TREAT4 wave if treat2 == 4 & bsec == 1, lpattern(dash) color(cranberry)) /*
*/ (connected avg_profits_bsec3_TREAT4 wave if treat2 == 4 & bsec == 3, lpattern(dash) color(midblue)) /*
*/ (connected avg_profits_bsec4_TREAT4 wave if treat2 == 4 & bsec == 4, lpattern(dash) color(midgreen)),/*
*/ xlabel(0(1)7)ytitle("Mentee Profits (in KSh)") ylabel(0(500)4500, angle(0)) graphregion(color(white) ilwidth(none)) xscale(r(0 6)) xtitle("Wave") /*
*/ legend(order(1 2 3) col(2) label(1 "Retail") label(2 "Services") label (3 "Street-Food" )) name(Figure_Mentor_Bsec,replace)

*>>>> 6. Retail Sector Profits <<<<*

*******************************************************************************************
*----------- Profit of Treatment Groups in bsec ==1 (RETAIL SECTOR) -------------*
*******************************************************************************************
sum tprofits if wave >=1 & wave <=7 & treat==2 & bsec == 1
local cmpooled =r(mean)

reg tprofits i.treat $controlsbsec1 tprofits_b if wave>=1 & wave<=7 & bsec == 1, robust
qui test _b[4.treat] = _b[3.treat]
display in red "Ho: mentor = class p-value = `r(p)'"
forvalues x=3/4{
display in red "Difference Treatment `x' (abs.): " (_b[`x'.treat]*100)/`cmpooled' " | Only Interpretable if significant!"
}
forvalues ii = 1/7 {
sum tprofits if wave == `ii' & treat ==2 & bsec == 1
local cm`ii' =r(mean)
```

```
display in red "----- VARIABLE: tprofits ... WAVE = `ii' ... CONTROLS = YES -----"
reg tprofits i.treat $controlsbsec1 tprofits_b if wave == `ii' & bsec == 1, robust
qui test _b[4.treat] = _b[3.treat]
display in red "Ho: mentor = class p-value = `r(p)'"
forvalues x=3/4{
display in red "Difference Treatment `x' vs. Control: " (_b[`x'.treat]*100)/ `cm`ii'' " % | Only Interpretable if significant!"
}}
***********************************************************************************
* ---------------- Figure 4: avg profit in bsec == 1 (RETAIL SECTOR) ---------------*
***********************************************************************************
sort wave
twoway/*
*/ (connected avg_profits_bsec1_TREAT4 wave if treat2 == 4 & bsec == 1, lpattern(dash) color(navy)) /*
*/ (connected avg_profits_bsec1_TREAT3 wave if treat2 == 3 & bsec == 1, lpattern(dash) color(maroon)) /*
*/ (connected avg_profits_bsec1_TREAT2 wave if treat2 == 2 & bsec == 1, lpattern(dash) color(gold)), /*
*/ xlabel(1(1)7)ytitle("Retail Profits (in KSh)") ylabel(0(500)4500, angle(0)) graphregion (color(white) ilwidth(none)) xscale(r(1 6)) xtitle("Wave") /*
*/ legend(order(1 2 3) col(2) label(1 "Mentor") label(2 "Class") label(3 "Control")) name( Figure_Retail,replace)

*>>>> 7. Manufact. Sector Profits <<<<*

*********************************************************************************************
*----------- Profit of Treatment Groups in bsec ==2 (MANUFACTURING SECTOR) ------*
*********************************************************************************************
sum tprofits if wave >=1 & wave <=7 & treat==2 & bsec == 2
local cmpooled =r(mean)
reg tprofits i.treat $controlsbsec2 tprofits_b if wave>=1 & wave<=7 & bsec == 2, robust
qui test _b[4.treat] = _b[3.treat]
display in red "Ho: mentor = class p-value = `r(p)'"
forvalues x=3/4{
display in red "Difference Treatment `x' vs. Control: " (_b[`x'.treat]*100)/ `cmpooled' " % | Only Interpretable if significant!"
}
forvalues ii = 1/7 {
sum tprofits if wave == `ii' & treat ==2 & bsec == 2
local cm`ii' =r(mean)
display in red "----- VARIABLE: tprofits ... WAVE = `ii' ... CONTROLS = YES -----"
reg tprofits i.treat $controlsbsec2 tprofits_b if wave == `ii' & bsec == 2, robust
qui test _b[4.treat] = _b[3.treat]
display in red "Ho: mentor = class p-value = `r(p)'"
forvalues x=3/4{
display in red "Difference Treatment `x' vs. Control: " (_b[`x'.treat]*100)/ `cm`ii'' " % | Only Interpretable if significant!"
}}
************************************************************************************************
* ----------- Figure X: Avg. Profit in bsec == 2 (MANUFACTURING SECTOR) ---------------- *
************************************************************************************************
sort wave
twoway/*
*/ (connected avg_profits_bsec2_TREAT4 wave if treat2 == 4 & bsec == 2, lpattern(dash) color(navy)) /*
*/ (connected avg_profits_bsec2_TREAT3 wave if treat2 == 3 & bsec == 2, lpattern(dash) color(maroon)) /*
*/ (connected avg_profits_bsec2_TREAT2 wave if treat2 == 2 & bsec == 2, lpattern(dash) color(gold)), /*
*/ xlabel(1(1)7)ytitle("Manufacturing Profits (KSh)") ylabel(0(500)4500, angle(0)) graphregion(color(white) ilwidth(none)) xscale(r(1 6)) xtitle("Wave") /*
```

```
*/ legend(order(1 2 3) col(2) label(1 "Mentor") label(2 "Class") label(3 "Control")) name(Figure_Manufacturing,replace)

*>>>> 8. Service Sector Profits <<<<*

*******************************************************************************************
*----------- Profit of Treatment Groups in bsec ==3 (SERVICE SECTOR) -------------*
*******************************************************************************************
sum tprofits if wave >=1 & wave <=7 & treat==2 & bsec == 3
local cmpooled =r(mean)
reg tprofits i.treat $controlsbsec3 tprofits_b if wave>=1 & wave<=7 & bsec == 3, robust
qui test _b[4.treat] = _b[3.treat]
display in red "Ho: mentor = class p-value = `r(p)'"
forvalues x=3/4{
display in red "Difference Treatment `x' vs. Control: " (_b[`x'.treat]*100)/ `cmpooled' " % | Only Interpretable if significant!"
}
forvalues ii = 1/7 {
sum tprofits if wave == `ii' & treat ==2 & bsec == 3
local cm`ii' =r(mean)
display in red "----- VARIABLE: tprofits ... WAVE = `ii' ... CONTROLS = YES -----"
reg tprofits i.treat $controlsbsec3 tprofits_b if wave == `ii' & bsec == 3, robust
qui test _b[4.treat] = _b[3.treat]
display in red "Ho: mentor = class p-value = `r(p)'"
forvalues x=3/4{
display in red "Difference Treatment `x' vs. Control: " (_b[`x'.treat]*100)/ `cm`ii'' " % | Only Interpretable if significant!"
}}
*************************************************************************************************
* ---------- Figure 5: Avg. Profit in bsec == 3 (SERVICE SECTOR) each Treat -------------*
*************************************************************************************************
sort wave
twoway/*
*/ (connected avg_profits_bsec3_TREAT4 wave if treat2 == 4 & bsec == 3, lpattern(dash) color(navy)) /*
*/ (connected avg_profits_bsec3_TREAT3 wave if treat2 == 3 & bsec == 3, lpattern(dash) color(maroon)) /*
*/ (connected avg_profits_bsec3_TREAT2 wave if treat2 == 2 & bsec == 3, lpattern(dash) color(gold)), /*
*/ xlabel(1(1)7)ytitle("Service Profits") ylabel(0(500)4500, angle(0)) graphregion(color( white) ilwidth(none)) xscale(r(1 6)) xtitle("Wave") /*
*/ legend(order(1 2 3) col(2) label(1 "Mentor") label(2 "Class") label(3 "Control")) name( Figure_Service,replace)

*>>>> 9. Street-Food Sector Profits <<<<*

*******************************************************************************************
*----------- Profit of Treatment Groups in bsec ==4 (Street-Food SECTOR) ----------*
*******************************************************************************************
sum tprofits if wave >=1 & wave <=7 & treat==2 & bsec == 4
local cmpooled =r(mean)
reg tprofits i.treat $controlsbsec4 tprofits_b if wave >= 1 & wave <=7 & bsec == 4, robust
qui test _b[4.treat] = _b[3.treat]
display in red "Ho: mentor = class p-value = `r(p)'"
forvalues x=3/4{
display in red "Difference Treatment `x' vs. Control: " (_b[`x'.treat]*100)/`cmpooled' " % | Only Interpretable if significant!"
}
forvalues ii = 1/7 {
display in red "----- VARIABLE: tprofits ... WAVE = `ii' ... CONTROLS = YES -----"
sum tprofits if wave == `ii' & treat ==2 & bsec == 4
local cm`ii' =r(mean)
reg tprofits i.treat $controlsbsec4 tprofits_b if wave == `ii' & bsec == 4, robust
```

```
qui test _b[4.treat] = _b[3.treat]
display in red "Ho: mentor = class p-value = `r(p)'"
forvalues x=3/4{
display in red "Difference Treatment `x' vs. Control: " (_b[`x'.treat]*100)/`cm`ii'' " % | Only Interpretable if significant!"
}}
**********************************************************************************
* --- Figure 6: Avg profit in bsec == 4 (Street-Food SECTOR) each Treat ------*
**********************************************************************************
sort wave
twoway/*
*/ (connected avg_profits_bsec4_TREAT4 wave if treat2 == 4 & bsec == 4, lpattern(dash) color(navy)) /*
*/ (connected avg_profits_bsec4_TREAT3 wave if treat2 == 3 & bsec == 4, lpattern(dash) color(maroon)) /*
*/ (connected avg_profits_bsec4_TREAT2 wave if treat2 == 2 & bsec == 4, lpattern(dash) color(gold)), /*
*/ xlabel(1(1)7)ytitle("Street-Food Profits (in KSh)") ylabel(0(500)5000, angle(0)) graphregion(color(white) ilwidth(none)) xscale(r(1 6)) xtitle("Wave") /*
*/ legend(order(1 2 3) col(2) label(1 "Mentor") label(2 "Class") label(3 "Control")) name( Figure_Street_Food ,replace)

*>>>> 10. Logit Growth Prob. Discussion <<<<*

**********************************************************************************
*----- Probability that Profit after 12 months is higher than baseline profit--------*
**********************************************************************************
//Calculate the average profit between wave1 and wave6
sort treat2 wave
by treat2 wave: egen avg_profits_w6 = mean(tprofits) if wave >=1 & wave<=6
//Generate Baseline Profit value
sort id wave
gen tprofits_w0 = tprofits if wave == 0
bysort id: replace tprofits_w0 = tprofits_w0[_n-1] if tprofits_w0==.
//Determine if average profit has grown (=1) or not (=0)
gen avg_profit_growth_w6 =.
replace avg_profit_growth_w6 = 1 if avg_profits_w6 > tprofits_w0
replace avg_profit_growth_w6 = 0 if avg_profits_w6 <= tprofits_w0
replace avg_profit_growth_w6 =. if avg_profits_w6 ==. | tprofits_w0 ==.
//Assign profit of wave 6 to each wave
gen tprofits_w6 = tprofits if wave == 6
bysort id: replace tprofits_w6 = tprofits_w6[_N-1] if tprofits_w6==.
bysort id: replace tprofits_w6 = tprofits_w6[_n+1] if tprofits_w6==.
bysort id: replace tprofits_w6 = tprofits_w6[_n+1] if tprofits_w6==.
bysort id: replace tprofits_w6 = tprofits_w6[_n+1] if tprofits_w6==.
bysort id: replace tprofits_w6 = tprofits_w6[_n+1] if tprofits_w6==.
bysort id: replace tprofits_w6 = tprofits_w6[_n+1] if tprofits_w6==.
//Determine if profit in wave 6 is higher than the baseline profit (=1) or not (=0)
gen profit_growth_w6 =.
replace profit_growth_w6 = 1 if tprofits_w6 > tprofits_w0
replace profit_growth_w6 = 0 if tprofits_w6 <= tprofits_w0
replace profit_growth_w6 =. if tprofits_w6 ==. | tprofits_w0 ==.
************************************************************************************
*------ Probability of growth in average profits between wave 1 and wave 6 -------*
************************************************************************************
//BASE (Sectors pooled)
sum avg_profit_growth_w6 if wave >=1 & wave <=6 & treat2==2
local cm = r(mean)
logit avg_profit_growth_w6 i.treat2 $controlsgrowth tprofits_b if wave >=1 & wave <=6 // TREAT2 because we only work with baseline values now
margins, dydx(treat2) post
qui test _b[4.treat2] = _b[3.treat2]
display in red "F = S = M :" `r(p)'
```

```
//Retail Sector
sum avg_profit_growth_w6 if wave == 6 & treat2==2 & bsec==1
local cm = r(mean)
logit avg_profit_growth_w6 i.treat2 $controlsgrowth tprofits_b if wave >=1 & wave <=6 & bsec == 1 // TREAT2 because we only work with baseline values now
margins, dydx(treat2) post
qui test _b[4.treat2] = _b[3.treat2]
display in red "F = S = M :" `r(p)'
//Service Sector
sum avg_profit_growth_w6 if wave == 6 & treat2==2 & bsec == 3
local cm = r(mean)

logit avg_profit_growth_w6 i.treat2 $controlsgrowth tprofits_b if wave >=1 & wave <=6 & bsec == 3 // TREAT2 because we only work with baseline values now
margins, dydx(treat2) post
qui test _b[4.treat2] = _b[3.treat2]
display in red "F = S = M :" `r(p)'
//Street-Food Sector
sum avg_profit_growth_w6 if wave == 6 & treat2==2 & bsec == 4
local cm = r(mean)
logit avg_profit_growth_w6 i.treat2 $controlsgrowth tprofits_b if wave >=1 & wave <=6 & bsec == 4 // TREAT2 because we only work with baseline values now
margins, dydx(treat2) post
qui test _b[4.treat2] = _b[3.treat2]
display in red "F = S = M :" `r(p)'
*********************************************************************************
*---------------------- Probability of growth Baseline to Wave6 ----------------------*
*********************************************************************************
//Base (Sectors Pooled)
sum profit_growth_w6 if wave == 6 & treat2==2
local cm = r(mean)
logit profit_growth_w6 i.treat2 $controlsgrowth tprofits_b if wave >=1 & wave <= 6 // TREAT2 because we only work with baseline values now
margins, dydx(treat2) post
qui test _b[4.treat2] = _b[3.treat2]
display in red "F = S = M :" `r(p)'
//Retail Sector
sum profit_growth_w6 if wave == 6 & treat2==2 & bsec==1
local cm = r(mean)
logit profit_growth_w6 i.treat2 $controlsgrowth tprofits_b if wave >=1 & wave <= 6 & bsec == 1 // TREAT2 because we only work with baseline values now
margins, dydx(treat2) post
qui test _b[4.treat2] = _b[3.treat2]
display in red "F = S = M :" `r(p)'
//Service Sector
sum profit_growth_w6 if wave == 6 & treat2==2 & bsec == 3
local cm = r(mean)
logit profit_growth_w6 i.treat2 $controlsgrowth tprofits_b if wave >=1 & wave <= 6 & bsec == 3 // TREAT2 because we only work with baseline values now
margins, dydx(treat2) post
qui test _b[4.treat2] = _b[3.treat2]
display in red "F = S = M :" `r(p)'
//Street-Food Sector
sum profit_growth_w6 if wave == 6 & treat2==2 & bsec == 4
local cm = r(mean)
logit profit_growth_w6 i.treat2 $controlsgrowth tprofits_b if wave >=1 & wave <= 6 & bsec == 4 // TREAT2 because we only work with baseline values now
margins, dydx(treat2) post
qui test _b[4.treat2] = _b[3.treat2]
display in red "F = S = M :" `r(p)'

```

```
*>>>> 11. Boxes Profits Baseline vs. Treat <<<<*

//Gen Control Group (After Treatment and Baseline)
gen profitmean2 =.
replace profitmean2 = 1 if wave >= 1 & wave <=7 & treat2 == 2
replace profitmean2 = 2 if wave == 0 & treat2 == 2
//Gen Control Group (After Treatment and Baseline)
gen profitmean3 =.
replace profitmean3 = 1 if wave >= 1 & wave <=7 & treat2 == 3
replace profitmean3 = 2 if wave == 0 & treat2 == 3
//Gen Control Group (After Treatment and Baseline)
gen profitmean4 =.
replace profitmean4 = 1 if wave >= 1 & wave <=7 & treat2 == 4
replace profitmean4 = 2 if wave == 0 & treat2 == 4
//Gen Factor-Variable (After Treatment and Baseline)
gen profitmean =.
replace profitmean = 1 if wave >= 1 & wave <=7
replace profitmean = 2 if wave == 0
*****************************************************************
*------- Control: Differences in profit groups Pooled --------*
*****************************************************************
//Group by Baseline Profits
gen tprofitscut = 1 if tprofits_b <=1000
replace tprofitscut = 2 if tprofits_b >1000 & tprofits_b <=2000
replace tprofitscut = 3 if tprofits_b >2000 & tprofits_b <=3000
replace tprofitscut = 4 if tprofits_b >3000 & tprofits_b <=4000
replace tprofitscut = 5 if tprofits_b >4000 & tprofits_b <=5000
replace tprofitscut = 6 if tprofits_b >5000
tab tprofitscut
sum tprofits if wave >=1 & wave <=7 & treat ==2 & tprofitscut ==1
local cmpooled =r(mean)
reg tprofits i.profitmean2 $controls tprofits_b if wave>=0 & wave<=7 & tprofitscut == 1 & treat2 ==2
forvalues ii = 2/6 {
sum tprofits if wave >=1 & wave <=7 & treat ==2 & tprofitscut ==`ii'
local cmpooled =r(mean)
reg tprofits i.profitmean2 $controls tprofits_b if wave>=0 & wave<=7 & tprofitscut == `ii' & treat2 ==2
}
*******************************************************************
*--------- Class: Differences in profit groups Pooled-----------*
*******************************************************************
sum tprofits if wave >=1 & wave <=7 & treat ==3 & tprofitscut ==1
local cmpooled =r(mean)
reg tprofits i.profitmean3 $controls tprofits_b if wave>=0 & wave<=7 & tprofitscut == 1 & treat2 ==3
forvalues ii = 2/6 {
sum tprofits if wave >=1 & wave <=7 & treat ==3 & tprofitscut ==`ii'
local cmpooled =r(mean)
reg tprofits i.profitmean3 $controls tprofits_b if wave>=0 & wave<=7 & tprofitscut == `ii' & treat2 ==3
}
********************************************************************
*--------- Mentor: Differences in profit groups Pooled----------*
********************************************************************
sum tprofits if wave >=1 & wave <=7 & treat ==4 & tprofitscut ==1
local cmpooled =r(mean)
reg tprofits i.profitmean4 $controls tprofits_b if wave>=0 & wave<=7 & tprofitscut == 1 & treat2 ==4
forvalues ii = 2/6 {
sum tprofits if wave >=1 & wave <=7 & treat ==4 & tprofitscut ==`ii'
local cmpooled =r(mean)
reg tprofits i.profitmean4 $controls tprofits_b if wave>=0 & wave<=7 & tprofitscut == `ii'
```

```
}
*************************************************************************
*--------- POOLED: Differences in profit groups Pooled ---------*
*************************************************************************
sum tprofits if wave >=1 & wave <=7 & tprofitscut ==1
local cmpooled =r(mean)
reg tprofits i.profitmean $controls tprofits_b if wave>=0 & wave<=7 & tprofitscut == 1
forvalues ii = 2/6 {
sum tprofits if wave >=1 & wave <=7 & tprofitscut ==`ii'
local cmpooled =r(mean)
reg tprofits i.profitmean $controls tprofits_b if wave>=0 & wave<=7 & tprofitscut == `ii'
}
************************************************************************
*------- PLOT Profit after Treatment vs. Baseline Profit --------*
************************************************************************
gen avg_profits_1 = tprofits if profitmean == 1
gen avg_profits_2 = tprofits if profitmean == 2
graph hbox avg_profits_1 avg_profits_2, over(tprofitscut) ytitle("tprofits") title( "Profits at Baseline vs. Profits after Treatment") graphregion(color(white) ilwidth(none)) legend(order(1 2) col(2) label(1 " After Treatment Profits") label(2 "Baseline Profits")) name(Figure_Baseline_AfterTreat,replace)
*****************************************************************************************
*------- Proof of equal profits of the treatment groups within profitcut 1 ------*
*****************************************************************************************
sum tprofits if wave >=1 & wave <=7 & tprofitscut ==1 & treat2 == 2
local cmpooled =r(mean)
reg tprofits i.treat $controls tprofits_b if wave>=1 & wave<=7 & tprofitscut == 1 & profitmean == 1 // do not include wave 0 since the basline values are not of interest in this case
qui test _b[4.treat] = _b[3.treat]
display in red "H0: Mentor = Class `r(p)'"


*>>>> 12. Discussion of Growth Rates <<<<*

//Generate Average profits for each treatment
forvalue x=1/6{
sort treat2 wave
by treat2 wave: egen avg_profits_`x'_2 = mean(tprofits) if wave >=1 & wave<=7 & tprofitscut == `x' & treat2 == 2
by treat2 wave: egen avg_profits_`x'_3 = mean(tprofits) if wave >=1 & wave<=7 & tprofitscut == `x' & treat2 == 3
by treat2 wave: egen avg_profits_`x'_4 = mean(tprofits) if wave >=1 & wave<=7 & tprofitscut == `x' & treat2 == 4
}
//Generate Growth Rates
sort id wave
bysort id: replace tprofits_w0 = tprofits_w0[_n-1] if tprofits_w0==.
forvalue x=1/6{
gen growth_rate_g`x' =.
forvalue ii=2/4{
replace growth_rate_g`x' = (avg_profits_`x'_`ii' - tprofits_w0) / tprofits_w0 if growth_rate_g`x' ==.
}}
//Generate groups to compare growth rates
gen growth_rate =.
forvalue x=1/6{
replace growth_rate = growth_rate_g`x' if growth_rate ==.
}
//Merge groups: 1=[1]; 2=[2+3]; 3=[4+5+6]
gen growth_rate_cat =.
replace growth_rate_cat = 1 if growth_rate_g1 !=.
replace growth_rate_cat = 2 if growth_rate_g2 !=. | growth_rate_g3 !=.
replace growth_rate_cat = 3 if growth_rate_g4 !=. | growth_rate_g5 !=. | growth_rate_g6 !=.
```

```
*****************************************************************************
*------- PLOT Growth Rates for Treatment by baseline Profit ------*
*****************************************************************************
gen growth_control = growth_rate if treat2 == 2
gen growth_class = growth_rate if treat2 == 3
gen growth_mentor = growth_rate if treat2 == 4
graph box growth_control growth_class growth_mentor, over(growth_rate_cat) title("Growth Rates among Treatments by Baseline Profits") legend(rows(1)) legend(size(*0.8)) ylabel(-1(1)6) nooutsides yscale(range(-1 6)) name(Growth_rates_by_bProfits)
***********************************
*--------- Control Group ---------*
***********************************
sum growth_rate if growth_rate_cat == 1 & treat2 ==2
local cm = r(mean)
reg growth_rate i.growth_rate_cat $controls if treat2 == 2
qui test _b[2.growth_rate_cat] = _b[3.growth_rate_cat]
display in red "H0: High Bprofits = Med Bprofits: `r(p)'"
local g2m = `cm' +_b[2.growth_rate_cat]
local g3m = `cm' +_b[3.growth_rate_cat]
***********************************
*--------- Class Group ----------*
***********************************
sum growth_rate if growth_rate_cat == 1 & treat2 ==3
local cm = r(mean)
reg growth_rate i.growth_rate_cat $controls if treat2 == 3
qui test _b[2.growth_rate_cat] = _b[3.growth_rate_cat]
display in red "H0: High Bprofits = Med Bprofits: `r(p)'"
local g2m = `cm' +_b[2.growth_rate_cat]
local g3m = `cm' +_b[3.growth_rate_cat]
***********************************
*--------- Mentor Group ---------*
***********************************
sum growth_rate if growth_rate_cat == 1 & treat2 ==4
local cm = r(mean)
reg growth_rate i.growth_rate_cat $controls if treat2 == 4
qui test _b[2.growth_rate_cat] = _b[3.growth_rate_cat]
display in red "H0: High Bprofits = Med Bprofits: `r(p)'"
local g2m = `cm' +_b[2.growth_rate_cat]
local g3m = `cm' +_b[3.growth_rate_cat]
*********************************************************************************************************
*--- DROP of lower 50th percentile of profitscut 1 [assumed to be undererstimated firms]---*
*********************************************************************************************************
//Drop firms that are suggested to be underestimated
sum tprofits_b if tprofitscut ==1, det
drop if inrange(tprofits_b,r(p0), r(p50))
//Generate Average profits for each treatment
forvalue x=1/6{
sort treat2 wave
by treat2 wave: egen avg_profits_`x'_2_d = mean(tprofits) if wave >=1 & wave<=7 & tprofitscut == `x' & treat2 == 2
by treat2 wave: egen avg_profits_`x'_3_d = mean(tprofits) if wave >=1 & wave<=7 & tprofitscut == `x' & treat2 == 3
by treat2 wave: egen avg_profits_`x'_4_d = mean(tprofits) if wave >=1 & wave<=7 & tprofitscut == `x' & treat2 == 4
}
```

```
//Generate Growth Rates
sort id wave
gen tprofits_w0_d = tprofits if wave == 0
bysort id: replace tprofits_w0_d = tprofits_w0_d[_n-1] if tprofits_w0_d==.
forvalue x=1/6{
gen growth_rate_g`x'_d =.
forvalue ii=2/4{
 replace growth_rate_g`x'_d = (avg_profits_`x'_`ii'_d - tprofits_w0_d) / tprofits_w0_d if growth_rate_g`x'_d ==.
}}
//Generate groups to compare growth rates
gen growth_rate_d =.
forvalue x=1/6{
replace growth_rate_d = growth_rate_g`x'_d if growth_rate_d ==.
}
//Merge groups: 1=[1]; 2=[2+3]; 3=[4+5+6]
gen growth_rate_cat_d =.
replace growth_rate_cat_d = 1 if growth_rate_g1_d !=.
replace growth_rate_cat_d = 2 if growth_rate_g2_d !=. | growth_rate_g3_d !=.
replace growth_rate_cat_d = 3 if growth_rate_g4_d !=. | growth_rate_g5_d !=. | growth_rate_g6_d !=.
************************************************************************************
*--------- PLOT Growth Rates for Treatment by baseline Profit -----------*
************************************************************************************
//Generate Groups
gen growth_control_d = growth_rate_d if treat2 == 2
gen growth_class_d = growth_rate_d if treat2 == 3
gen growth_mentor_d = growth_rate_d if treat2 == 4
//Plot
graph box growth_control_d growth_class_d growth_mentor_d, over(growth_rate_cat_d) subtitle("(The 0-50 percentile of Baseline Profits <1000 ksh is DROPPED)" ) title("Growth Rates among Treatments by Baseline Profits") legend(rows(1)) legend(size(*0.8)) ylabel(-1(1)6) nooutsides yscale(range(-1 6)) name(DROP_Growth_rates_by_bProfits)
************************************
*--------- Control Group --------*
************************************
sum growth_rate_d if growth_rate_cat_d == 1 & treat2 ==2
local cm = r(mean)
reg growth_rate_d i.growth_rate_cat_d $controls if treat2 == 2
qui test _b[2.growth_rate_cat_d] = _b[3.growth_rate_cat_d]
display in red "H0: High Bprofits = Med Bprofits: `r(p)'"
local g2m = `cm' +_b[2.growth_rate_cat_d]
local g3m = `cm' +_b[3.growth_rate_cat_d]
************************************
*--------- Class Group ----------*
************************************
sum growth_rate_d if growth_rate_cat_d == 1 & treat2 ==3
local cm = r(mean)
reg growth_rate_d i.growth_rate_cat_d $controls if treat2 == 3
qui test _b[2.growth_rate_cat_d] = _b[3.growth_rate_cat_d]
display in red "H0: High Bprofits = Med Bprofits: `r(p)'"
local g2m = `cm' +_b[2.growth_rate_cat_d]
local g3m = `cm' +_b[3.growth_rate_cat_d]
************************************
*--------- Mentor Group ---------*
************************************
sum growth_rate_d if growth_rate_cat_d == 1 & treat2 ==4
local cm = r(mean)
reg growth_rate_d i.growth_rate_cat_d $controls if treat2 == 4
qui test _b[2.growth_rate_cat_d] = _b[3.growth_rate_cat_d]
display in red "H0: High Bprofits = Med Bprofits: `r(p)'"
local g2m = `cm' +_b[2.growth_rate_cat_d]
local g3m = `cm' +_b[3.growth_rate_cat_d]            //>>>>> THE END <<<<<
```

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