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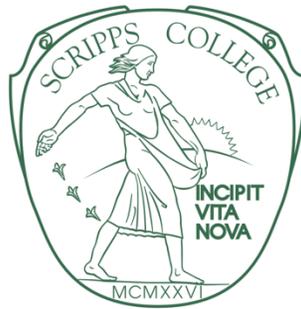
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**A STUDY ON BANGLADESH'S GRAMEEN BANK AND THE READY-MADE GARMENT
INDUSTRY: THE EFFECTS OF RISING INDUSTRIALIZATION ON THE RELIANCE OF
MICROFINANCE**

by

ELAINE YANG



**SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FULFILMENT OF THE DEGREE OF
BACHELOR OF ARTS**

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Abstract

Microfinance institutions offered a solution to borrowing to the ultra-poor through a group lending scheme where social capital drove repayment rates. In Bangladesh, the Grameen Bank was globally recognized as a successful microfinance institution, increasing financial literacy and mobility to the ultra-poor. Tangentially, the ready-made garment industry boomed in some districts with a Grameen Bank presence, while other districts were not impacted at all. Using a difference-in-difference regression model and focusing on the Grameen Bank districts before and after their exposure to the RMG industry on the number of branches, branch members, outstanding loan amount, and zone membership percentage of these districts, I find that the high exposure group to the RMG industrialized have larger outstanding loans and more members per branch, but a lower amount of district membership and average number of branches in the Grameen Bank when compared to the low exposure group. The main findings of this paper show that low exposure group still had a high membership rate and average number of branches which could be due to an increased number of low-income women migrating to low exposure group to obtain employment. The Grameen Bank is likely to still target and service low exposure group since more low-income women are migrating to these districts and may not have any financial assets after their initial move. However, the high exposure group to the RMG industry point to a decreased need on microfinance over time since membership rate and average number of branches were lower when compared to the low exposure group to the RMG industry.

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Table of Contents

I.	Introduction	5
II.	Institutional Background	7
	2.1 Historical Background on the Grameen Bank	7
	2.2 Background and Female Labor in the Ready-Made Garment Industry	8
	2.3 Current Insights on Bangladesh’s Ready-Made Garment Market Industry	10
III.	Literature Review	11
	3.1 Theoretical Studies on the Joint-Liability Model in Microfinance Institutions	11
	3.2 Positive Impacts of Microfinance Institutions	13
	3.3 Positive Impacts of Microfinance Institutions, but No Impact on Income.....	15
	3.4 Negative or No Impacts of Microfinance Institutions	16
IV.	Data and Results	17
	4.1 Data.....	17
	4.2 Methodology.....	18
	4.3 Summary Statistics	19
	4.4 Model.....	24
	4.5 Results	26
	4.5.1 Treatment vs. Control Group.....	26
	4.5.2 Dynamic Difference-in-Difference Analysis.....	29
	4.5.3 Continuous Difference-in-Difference Analysis.....	31
	4.5.4 High Exposure vs. Low Exposure	32
	4.6 Discussion.....	35
V.	Conclusion	35
	References	37

I. Introduction

This paper looks at whether industrialization affects the dependency and targeting of microfinance institutions as a group becomes more financially stable over time. I want to focus understanding what variables impact the Grameen Bank's lending target and these wealthier borrowers' reliance on microfinance institutions over time. Traditional financial institutions categorize those with no collateral as risky borrowers. However, microfinance offers a solution to spur microlending to the ultra-poor. Since the ultra-poor do not hold any financial assets, microfinance institutions, such as the Grameen Bank in Bangladesh, utilize a group lending scheme wherein groups of borrowers can participate in these institutions to obtain microloans without collateral. The joint-liability model corrects the market failures of moral hazard and adverse selection since the risk of default is placed onto the borrowers rather than the bank. Instead of the default risk falling onto the financial institution, default risk is transferred over to the borrowers since the loanee chooses their group members. Members must rely on the strength of their social capital in order to enforce others to repay the loans given by the microfinance institution. Usually, the group members will comprise of neighbors, co-workers, or family members, strengthening the social capital of a group. The strength of the social capital is what drives the repayment rates for a group as the group is responsible for providing the loan, rather than the bank. Members will pay a monthly fee into the pooled loan pot and one member of the group will get to use the pooled loan each month. If a member decides to default on the loan, other members will need to make up for that member's shortfall or risk getting kicked out of the microfinance institution.

Over time, the researchers of the Grameen Bank found that women had higher repayment rates than the men due to the lack of job opportunities for women in Bangladesh. Women relied heavily on the group lending scheme and their social capital to maintain the steady stream of the microloans offered under the guide of the Grameen Bank. Individual group members are incentivized to repay to maintain this line of credit and preserve social ties. This sentiment began changing for specific districts as the ready-made garment industry began recruiting low-income women (Azad 2016, Sharma 2020). As global demand grew for quick and low-cost clothing production options, Bangladesh's RMG industry expanded rapidly, providing an avenue for millions of low-income women in Bangladesh to gain financial independence through a steady income stream.

Concurrently, Desh Garments, the first Bangladesh company to only focus on RMG exports, was established in 1979 and largely employed low skilled, low-income female labor workers. Bangladesh's largest industry lies in the ready-made garment industry which employs a majority of low-income women, expanding job opportunities for low-income women. Bangladesh's RMG industry remains competitive today with other major exporters such as China, Vietnam, and India is due to their low production costs and wages to their workers. Despite these low wages, low-income female labor participation in the RMG industry is considerably high compared to other industries as it offers them a way of being financially independent (ILO and UN Women, 2018).

In my paper, I want to look at the impact of the Grameen Bank's target and reliance over time as the ready-made garment (RMG) industry continues to expand in parallel. As low-income women obtained job security and a stable income from the RMG industry, I want to test how that affects their dependency on microfinance institutions and how the Grameen Bank chooses where to open up more branches. Since women in districts with a RMG presence have a steady income stream, they do not need to rely on their social capital for financial capital like before. Since the Grameen Bank cannot touch a member's assets, the steady rise in income for low-income women due to the RMG industry may lead to higher default rates or more unpaid loans. This paper is unique as it investigates the reliance on microfinance institutions in alleviating poverty as a group becomes more financially stable over time. Since the RMG industry and Grameen Bank both service low-income women, I will use the exposure to the RMG industry as the "industrialization" indicator for that group. I want to compare specific districts that have had high exposure to the RMG industry versus other districts that have had low exposure to the RMG industry, and those that have not had any exposure to the RMG industry.

Using the exposure to the RMG industry as an indicator for "industrialization", I assess the impact on low-income women who become more financially stable by focusing on the effect of the outstanding loan amounts, members per branch, zone membership rates, and the total number of branches with a difference-in-difference regression model. The main findings in my paper will show that districts with high exposure to the RMG industry have larger outstanding loans and more members per branch, but a lower amount of district membership and average number of branches in the Grameen Bank when compared to low exposure districts. Low exposure districts to the RMG industry only have one factory, but have higher membership rates

and more branches in the Grameen Bank as more low-income women are migrating to these districts to find work. The Grameen Bank is likely to still target and service the low exposure districts to support the need for recent migrants into these districts, while the impact on the dependent variables for the high exposure districts point to a decreased need on microfinance over time. The average number of branches and district membership rate of the high exposure group are shown to be less than the low exposure districts. In order to add to the existing literature on this topic, this is the first paper to focus and connect the rising industrialization impacts on the reliance and targeting for microfinance institutions by investigating the relationship of the Grameen Bank and the ready-made garment industry of Bangladesh.

II. Institutional Background

This section will establish the historical significance of the Grameen Bank on low-income women in Bangladesh. I look at historical reports that describe the qualitative impact of the Grameen Bank. I will also focus on the historical and current insights in the ready-made garment industry and quantify how it has impacted low-income women. This will provide contextual evidence in how both these systems worked to uplift low-income women out of poverty and their relationship in Bangladesh's economic development.

2.1 Historical Background on the Grameen Bank

In 1976, the Grameen Bank was spearheaded by Professor Muhammad Yunus, Head of the Rural Economics Program at the University of Chittagong, as a research project to alleviate poverty by developing a banking system to provide credit resources to the poor. The Grameen Bank was unique in that no collateral is required to join the bank. Instead, the Bank relies on the group-lending scheme to drive repayment rates. The issue of collateral is the main hurdle in formal institutions lending to the ultra-poor. Since the borrowers of the Grameen Bank were the poorest of the poor, so they had no collateral to fall back on if they had to default, making them risky borrowers. However, the Grameen Bank's lending system embodied a group lending structure, meaning the Grameen Bank would not take collateral. The Grameen Bank would then provide the loan and the repayment obligations were instead provided by your group members, pushing the decision of risk onto the borrower. The social pressures of the group would entice borrowers to pay back the loans or risk getting kicked out as a group. This structured boded well

with the borrowers as they were able to start businesses or meet the daily needs for their families. Not only was this bank targeted to the ultra-poor, it also specified guidelines for certain demographics. This project primarily targeted impoverished women to participate in this study as women were better repayors than men. Since men had more job opportunities than women, their repayment rates were lower than women because they were not as reliant on their social capital to access financial capital (Grameen Bank 2022). He also wanted to expand financial literacy for those who were not familiar with any kind of banking systems.

For the first three years, the project began in neighboring villages around Chittagong and was later expanded to Tangail through the sponsorships of local commercial banks. By October 1983, the quick rise of this informal banking system became adopted by the national government with its previous successes in Tangail and Chittagong. By the beginning of 1984, the bank was lending to five major districts: Chittagong, Tangail, Rangpur, Dhaka, and Patuakhali. Today, the Grameen Bank services about 97% of women borrowers and has over 2,200 districts across Bangladesh (Grameen Bank 2022). Additionally, its efforts have alleviated over two-thirds of women who were previously categorized as impoverished.

2.2 Background and Female Labor in the Ready-Made Garment Industry

The ready-made garment industry (RMG) in Bangladesh has been expanding as it now makes up of over 83% of their exports. In 2017-2018, it has generated about \$30B (USD) in revenue. Interestingly, the RMG industry started at a similar time as the beginning of the Grameen Bank. In 1978, Reaz Garments, Jewel Garments, and Paris Garments were some of the largest players in the RMG industry, but Desh Garments Ltd (established in 1979) became the first company to solely focus on exports. Using the BGMEA (Bangladesh Garment Manufacturers and Exporters Association) data, in the last 30 years the RMG industry in Bangladesh has grown from only 40,000 to 4.2 million workers through the economic policies pushed by the Bangladeshi government in this sector. By the 1980s, this industry was dominated by the low-paid female labor workers, making up almost 90% of workers in the RMG industry. However, the female workforce has slowly declined with just 63.4% in 2017 (ILO and UN Women, 2018). From 2010-2018, there has been a 2.9% increase of male labor workers as the portion of female labor workers are continually declining (ILO and UN Women, 2018).

According to the International Labor Organization and UN Women's survey, 95% of the female workers gained their first formal job exposure through the RMG industry (ILO and UN Women, 2018). Unlike the Grameen Bank continually targeting women, the gender distribution in the RMG industry is slowly being overtaken by male labor workers. In areas of promotion and managerial roles, there are more men than women in grade 1 and grade 2 roles, but more female workers in lower grade roles compared to men. 83.8% of women labor workers make up the majority of the lower wage roles (ILO and UN Women, 2018). 95% of line supervisor roles are held by men due to the gender stereotypes that persist in Bangladesh today (ILO and UN Women, 2018). Even within the survey results, many of them believe that male labor workers produce greater output per worker and that male workers can work at night. Women also face a security issue when walking home late at night.

Another key reason as to why women are not pursuing these roles is due to lack of confidence in managerial positions and no overtime compensation. The lack of communication and leadership abilities and fear of social repercussions are other reasons as to why women are not likely to pursue these roles. Not only are there social pressures at work, but there are also social obstacles hindering them from joining the RMG sector. 1 in 3 women have faced some type of challenge such as parental disapproval from working outside the home, family members worried about working conditions, and religious faith concerns from working outside the home (ILO and UN Women). The benefits of being employed in the RMG sector have been proven to be highly satisfactory for both female and male labor workers with 86.9% female approval and 84.5% male approval (ILO and UN Women, 2018). Table 1 shows more specific benefits are outlined below with financial burdens and savings being the top benefits.

Table 1: Benefits of Being Employed in the RMG Sector

Benefits	Men	Women	Both
Family's financial crisis decreased	86.6	82.5	84.5
Can afford better clothes than before	49.3	48.4	48.8
Household food quality improved	31.7	39.3	35.6
Savings for the future	27.2	35.1	31.3
Household's quantity of food intake increased	25.0	33.0	29.1
Higher levels of trust in workers if they try to obtain a loan	35.5	20.4	27.7
Ability to repay loans	26.5	21.8	24.1
Can afford education for children	13.1	17.2	15.2
Can afford better health care	14.6	8.1	11.2
Can afford to buy a television and other household appliances	11.2	7.7	9.4
Can afford to buy furniture	7.1	8.4	7.8
Greater ability of women to take decisions at the household level	4.1	11.2	7.8
Can build and repair their homes	7.8	4.9	6.3
Can purchase land	7.8	3.2	5.4
Can purchase livestock	4.1	5.3	4.7
Receive more respect in society	2.6	5.3	4.0
Increased capacity to provide a dowry	0.4	0.7	0.5
Increased prospects of ensuring a better spouse for their children	0.4	0.4	0.4

Source: ILO and UN Women, "Workers' survey", *Study on the Ready-made Garment Sector in Bangladesh*, 2018.

Table 1 illustrates a survey conducted by the ILO and UN Women on the benefits for both men and women in the RMG industry.

The RMG industry has provided low-income females an opportunity to build up financial savings and credit despite it not centering on female labor in the more recent years. The female labor population has greatly impacted the rapid growth of the RMG industry. The RMG industry is continually industrializing some districts quicker than others, providing more financial independence for women in districts such as Chittagong, Dhaka, Tangail, and Rangpur.

2.3 Current Insights Into Bangladesh's Ready-Made Garment Market Industry

In a recent 2021 McKinsey & Company report, they outlined the current market trends for the ready-made garment industry (RMG) in Bangladesh compared to other key market players in RMG. According to the World Trade Organization, the ready-made garment industry makes up about 84% of Bangladesh's exports, which serves around 4 million garment workers

across the country. Historically, the RMG industry was laden with poor wages and unsafe working conditions, leading to various fires, killing over 1000 garment workers. The unsafe working conditions instilled a negative perception of Bangladesh's RMG practices, causing major buyers to pull out of Bangladesh and look elsewhere such as China, Italy, and Vietnam to fulfill the shortfall. As Bangladesh's market share began decreasing, safety initiatives became the forefront in recapturing the loss. Official safety groups such as the Alliance for Bangladesh Worker Safety and the RMG Sustainability Council increased transparency and provided specific metrics in building safety by closing down unsafe factories and remediating existing ones. Due to these remediation efforts, Bangladesh's RMG exports in 2011-2019 grew from \$14.6 billion to \$33.1 billion, increasing Bangladesh's share of RMG exports to 6.7% in 2019. The RMG industry is a consistent and dominant force within Bangladesh's economy and is relevant in understanding the relationship between growing economic mobility and the Grameen Bank for low-income women.

III. Literature Review

There has been large literature on theoretical approaches in understanding the dynamics of the joint liability model. I will focus on papers that deal with both the theoretical and empirical research behind the social determinants of repayment rates within group borrowing.

3.1 Theoretical Studies on the Joint-Liability Model in Microfinance

Institutions

Microfinance (both formal and informal) cases have been around for centuries, but recent economic literature have begun focusing on building a theoretical framework for microfinance institutions. In terms of early literature, there have been three papers that assert the notion of how joint-liability can aid in the formation of low risk groups: Stiglitz (1991), Sharma and Zeller (1997), and Ghatak (2000). These papers were some of the earliest instances of understanding the market failures (moral hazard and adverse selection) that lending to the poor may inhabit and how the joint-liability model corrects for this market failure.

Stiglitz asserts that peer monitoring can be a potential solution to the imperfect information in the loan market as the group of borrowers will be solely responsible for the

repayment of the loans. This allows the risk of default to be transferred over to the borrowers instead of the bank itself (Stiglitz 1991). This was also built upon a previous study that Stiglitz conducted alongside Weiss in 1981 to expand upon the issue of credit rationing due to asymmetric information. Stiglitz's main point about joint lending focuses on how peer monitoring can impact the borrower's choice about whom to add into their group since if one were to default, the other members will have to pay the shortfall (Stiglitz 1991). This idea is also explored in Sharma and Zeller (1997) where they maintain the idea that a self-selection process for group formation can increase repayment rates. Additionally, Ghatak (2000) also developed this theoretical framework through analyzing the problem of asymmetric information in loan markets. In this case, the borrowers know each other's risk type, but the bank does not (Ghatak 2000). He finds that lower interest rates and higher liability will inevitably help in the sorting process of group formation, meaning safer borrowers will choose to group with other safe borrowers (Ghatak 2000). The group formation works itself out in correcting this market failure that might occur in individual loan markets (Ghatak 2000).

Using a more theoretical approach, Chowdhury (2016) seeks to understand how higher social capital can also lead to free-riding behavior. Through repeated experimental games, he compares a treated microcredit group versus a control non-microcredit group (Chowdhury 2016). The results showed that treated group through repeated interactions and higher long-run gains were less likely to free ride than the control group (Chowdhury 2016). The repeated interactions over time strengthened the social ties, therefore increasing the repayment rate (Chowdhury 2016). Despite the vast literature on theoretical models of the group lending scheme, there has been a lack of empirical studies done on the economic performance of microfinance institutions due to the lack of data. Many people who participate in microfinance either do not have the ability or choose not to record these financial records. This could be due to the informality of microfinance transactions.

In terms of more empirical research on the impact of social capital in the joint-liability model, Wydick (1999) and Karlan (2004) performed studies in the correlation between existing social ties and increased repayment rates. Using data from FUNDAP (Foundation for the Integral Development of Socioeconomic Programs) in western Guatemala, Wydick (1999) carried out a survey using dummy variables to describe the social characteristics of the group members. With the Guatemala results, it showed that the strength of the social ties had little to no effect in

mitigating moral hazards issues or increase repayment rates (Wydick 1999). Instead, his conclusions suggest that the aggressiveness of the peer monitoring efforts of the group members are more likely to impact the performance of the repayment rates in the group (Wydick 1999).

Karlan (2004) focuses on empirical research where he looks at data from FINCA Peru to test the strength of the social capital and its relationship with repayment rates. In this study, he is able to successfully differentiate ex-ante (the selection process for the group) and ex-post (monitoring and enforcing repayment) considerations in his data generation/collection (Karlan 2004). The results found that individuals who live closer in proximity and who are cultural similar will have higher repayment rates because of peer monitoring (Karlan 2004). Additionally, Karlan (2004) finds evidence that these stronger social connections can also help with loan forgiveness as group members can easily distinguish if the late repayment was due to a personal issue or a moral hazard.

3.2 Positive Impacts of Microfinance Institutions

Javid and Abrar (2015) investigated the role of microfinance institutions (MFI) in alleviating the poor, specifically for women, through a cross regional analysis from 2006-2012. In this study, they found that the smaller the loan size, the higher the interest rate. Microfinance institutions focus on smaller loans as these loans finance a larger majority of the poor which increases outreach. This means that the number of active borrowers and percent of women borrowers has had a positive impact in alleviating poverty. Additionally, group lending is more advantageous as they charge lower interest rates and no collateral requirements. Group lending increases outreach of the MFIs as more people choose to borrow through an MFI with multiple people. Their study found that the breadth of outreach is positively correlated with the sustainability of the MFI in the long-run. In order to continue the operations of the MFIs, outreach is imperative in these MFI's longevity to cut the existing poverty levels.

Razzaque (2010) uses a longitudinal panel household database on Bangladesh to study the effectiveness of MFIs in poverty reduction. The results showed evidence of positive impacts of MFIs in positively influencing the household per capita income and assets. Additionally, he found an inverse relationship with the borrowers of MFIs and their probability in dipping below the poverty line. His results also assume that if all impoverished households were to join the

MFI, the poverty headcount ratio would decrease by 7 percentage points, indicating a positive impact on alleviating the poor.

Pantelić (2011) looks at the positive effects of microfinance and conditional cash transfers in the Latin American region in poverty reduction. Conditional cash transfers (CCT) differ from MFIs as they are spearheaded by the government and funded through the government. These CCTs provide a small monetary transfer to allow families to send their children to school and for medical care. They are aimed to improve the lives of the impoverished by increasing their access to education and healthcare services. The results found that microfinance institutions are more beneficial to those who live off of \$2 or more per day while it would be more beneficial to implement conditional cash transfers to those who are making less (Pantelić 2011). Microfinance institutions can provide more entrepreneurial activities and give the borrowers freedom in fighting poverty. Conditional cash transfers allow for immediate financial relief and generate higher human capital investments as it targets education and healthcare attainment. Pantelić asserts that a mix of these services would be best in targeting poverty reduction (2011).

Samer, et. al (2015) focused on Malaysia's microfinance role in alleviating poverty and tested it against household income. They looked at AIM (Amanah Ikhtiar Malaysia), a microfinance institution used to target impoverished women in rural and urban areas of Selangor and Melaka states. Using a multinomial logistic model, the findings showed that there was a positive impact on household income for women borrowers over the span of three years compared to new borrowers who represented the control group. In a similar case, Elhadidi (2018) also looked at the role of Egyptian microfinance institutions which targeted low-income women in Greater Cairo and rural parts of Egypt. Using the same model, his findings concluded that microfinance did have a positive impact on the overall household income for women borrowers who were apart of the microfinance institution for the last three years compared to newer borrowers. Both of these institutions worked in promoting entrepreneurial activities, providing accessible financial services, and improving upon financial opportunities for investment for low-income women.

Following the work of Nobel Prize Winner Muhammad Yunus (2007), there were many studies researching the significant impact of the Grameen bank in alleviating poverty. Salim (2013) researched the objective functions of the two largest microfinance institutions in

Bangladesh [Grameen Bank and the Bangladesh Rural Advancement Committee (BRAC)] to better understand their effectiveness in alleviating poverty. Their study focused on the location of the banks and the results showed a significant discrepancy if these institutions were to act like a profit-maximizing firm rather than a firm specifically targeting impoverished areas (Salim 2013). Their results found that the Grameen Bank and the BRAC were located where the most impoverished areas could get access to microcredit (Salim 2013).

Microfinance institutions in Bangladesh has also pushed economic growth in Bangladesh's economic development. In Amin and Uddin's (2018) research, they wanted to study the Grameen Bank's macroeconomic impacts between its microcredit loans and the economic growth of Bangladesh. They focus on the long run relationship between both these variables and found a positive effect on microfinancing in the long-run development of Bangladesh (Amin and Uddin 2018). These studies add to the growing literature on the macroeconomic effects of microfinance institutions in developing countries. This relates to my paper as I will be focusing on the RMG industry as my industrialization variable. I want to understand how economic growth can either negatively or positively impact the microfinance institution in the long run.

3.3 Positive Impacts of Microfinance Institution, but No Impact on Income

There have also been studies looking at the positive impacts of MFIs, but not necessarily linking them to a higher overall household income per capita. In one case, Attanasio et. al (2015) focused on a rural Mongolian microcredit program that targeted low-income women to study the impacts of joint liability lending and its effect on overall income growth. They also wanted to compare the effectiveness in poverty reduction with individual versus group lending models. They found a positive impact on group loans with female entrepreneurship and household food consumption. However, there was no significant impact on total income in the household. Additionally, they found no difference in the repayment rates for both individual and group lending structures as both have similar and high repayment rates (Attanasio, et. al 2015).

Agyapong, et. al (2015) study a case in Ghana on how microloans impact rural non-farm activities. Their results showed that microloans had a positive relationship with social welfare goods, but did not support innovation in self-supporting their non-farm activities (Agyapong, et. al 2015). In this case, there were more immediate, short term benefits in microcredit institutions,

but it did not help in the long run in accruing income over time. Similarly, Sayvaya and Kyophilavong (2015) looked at a more niche case of microfinance in Laos called the village development fund (VDF). They found that there were positive impacts of the VDF program on household income and expenditure, however, the VDF's impact was not found to be statistically significant. The promotion of the VDF may not be the most viable option in reducing poverty in the long-run.

There has also been a large focus in the advancement and empowerment of women in Bangladesh to be financially independent by targeting the distribution of microloans to this segment. In Hashemi, et. al (1996), they focus on both the Grameen Bank and BRAC which specifically target women borrowers in rural and impoverished areas. Using an ethnographic study, they looked at six villages where the lack of jobs in the labor market often hindered women's economic freedom (Hashemi 1996). However, Hashemi (1996) finds that the economic mobility of women is increasing through microfinance institutions where low-income women are able to obtain loans using a group lending scheme.

3.4 Negative or No Impacts of Microfinance Institutions

Chikwira, et. al (2022) investigate the role of microfinance institutions in alleviating poverty in developing economies through a Vector Error Correction Model using quarterly time-series data. They used variables such as poverty, microfinancing, small and medium enterprise (SME), and agricultural growth to determine their interrelationships in the long run and the short run. Their results showed that microfinance institutions actually increased poverty in the long run. Conversely, SMEs and agricultural growth decreased poverty in the long run. The regression results also showed the poverty increased the microfinance growth while SMEs had a negative relationship with poverty in the short run. Their findings suggest that microfinancing has been mismanaged and allocated improperly which may have exacerbated poverty levels.

There have also been studies done looking at financial crises in Asia and how MFIs responded to these economic downturns. During the Asian financial crisis, private credit and loans given by the World Bank reduced poverty, while microfinance institutions and remittances increased poverty levels in these areas (Imai 2013). Since microfinance loans are so small, they might not positively impact poverty at a high rate during an economic downturn as other private loans.

In my paper, I hope to focus on the effects of the rising industrialization trends on the default rates of microfinance institutions. Using a difference-in-difference model, I want to compare districts that have had exposure to the RMG industry to those that have not to understand how industrialization negatively or positively impacts the outstanding loan amounts, members per branch, zone membership percentage, and the number of branches per district. I am hoping to find that the rising industrialization indicator will negatively affect microfinance dependency and targets to districts who have a high exposure to the RMG industry.

IV. Data and Results

4.1 Data

In order to connect the Grameen Bank to the ready-made garment industry, I found two separate data sources to conduct my difference-in-differences analysis. First, I recorded the Grameen Bank's annual reports from the years 1984-2018. Using the Grameen Bank's annual reports, I created a panel data set of the bank's activity in 40 different districts from the years 1984 and 2018. The annual reports began in 1984 since the Bangladesh government took over the management of the Grameen Bank at that time. The annual reports had loan disbursements, total amount disbursed, district membership, number of members in the bank, etc. Each annual report provides the Grameen's Banks expansion to other districts, its current operation, innovations within some districts (e.g., digitizing bank data), and recent news regarding the previous year.

Next, I used factory data generated by the NYU Stern research team which included information about the existing RMG factories in Bangladesh. Their data was pulled from the Bangladesh Accord on Fire and Safety, BMGEA (Bangladesh Garment Manufacturers and Exporters Association) and DIFE (Department of Inspection for Factories and Establishments) to create a comprehensive list of the existing Bangladesh companies within the RMG industry. Each company has their address, their production specialty, and district location. In order to conduct my research, I found the years in which these factories were established to investigate the impact of the dependency on microfinance institutions post RMG industry on certain districts. Using the BMGEA website, I looked up 510 factories to obtain their establishment date and added it onto the factory data. The establishment date allows me to identify the number of factories that were established during the same years of the Grameen Bank's operations. With

this data, I can now compare the impact of the RMG industry on microfinance loans in specific districts to understand how the Grameen Bank is targeting certain districts that have or haven't industrialized. Industrialized indicates which districts have had at least one RMG factory established. Additionally, I want to compare the districts based on their exposure level to the RMG industry. By including the number of factories established in a year for each district, it allows me to see which districts are in the nascent state of industrializing and which have industrialized for a longer period of time.

4.2 Methodology

The method that I will be using to conduct my study will be a difference-in-difference analysis (DiD). A DiD model uses data from the Treatment and Control group before and after the introduction of the RMG industry (establishing a factory in a district) to measure the impact on the Treatment Group versus the Control Group as a result of industrialization. A DiD technique presumes that the Treatment Group and Control Group were trending similarly before the event and any deviation from this trend line is the impact of the RMG exposure.

In my original data, I had a total of 40 districts, but needed to drop 5 districts (Chittagong, Dhaka, Gazipur, Narayanganj, and Narsingdi) because they already had a presence of the ready-made garment industries/factories in these districts. If these 5 districts were included, it could heavily impact my results as these districts have a strong presence of the ready-made garment industry. In this study, there are 35 districts in total. There are a total of 663 observations in the whole dataset.

I generated a dummy variable called *TREATMENT* to determine which districts were impacted by the RMG industry. The Treatment group consists of all districts that received at least one RMG factory during the time period of 1984-2018. The districts included in the Treatment Group are Tangail, Dinajpur, Comilla, Mymensingh, Noakhali, Hobiganj, Pabna, Jessore, Feni, Kurigram, and Netrakona. The Treatment group consists of all districts that received at least one RMG factory during the time period of 1984-2018. The Treatment group's panel dataset has 222 observations.

The Control group never received any RMG factory presence during this time period of 1984-2018. The districts included in the Control Group are Rangpur, Patuakhali, Bogra, Sylhet, Rajshahi, Faridpur, Khulna, Jamalpur, Nilphamari, Barisal, Jhenaidah, Cox's Bazar, Gaibandha,

Naogaon, Chandpur, Kishoreganj, Bhola, Rangamati, Madaripur, Thakurgaon, Pirojpur, Sunamganj, Sirajganj, and Sherpur. Districts that have indicated a presence of RMG factories are called the “Treatment” group and were assigned the value 1, and districts that had no factories established are called the “Control” group. The Control group’s panel dataset has 441 observations.

I also included a year fixed effects variable to account for any time-specific shock that was affecting all districts similarly in a particular year. I also included a district fixed effects variable to account for any specific district effects that is time invariant and would affect my outcome variables. My main variable of interest is the *TREAT_YEAR* which captures the impact of the presence of the RMG industry effect on my selected dependent variables for the Treatment group. The years prior to the first establishment of a factory in a district were assigned a value of 0 while the years after were assigned a value of 1. This variable helps indicate which years in a specific district had exposure to the RMG industry and marks the post impact of the RMG industry on the Treatment group.

Additionally, I generated a continuous measure of treatment called *EXP_TREAT* to see the marginal impact of adding on another RMG factory in a district that has industrialized over time. This will help explain how an additional RMG factory affects my dependent variables and if they impact the dependency and targets of the Grameen Bank.

Finally, I generated an indicator variable called *HIGH_EXP* to differentiate which districts had high exposure, low exposure, or no exposure of the RMG industry. High exposure districts had more than one RMG factory in their district which includes Tangail, Comilla, Mymensingh, and Hobiganj. Low exposure districts only had one RMG factory in their district which includes Dinajpur, Noakhali, Pabna, Jessore, Feni, Kurigram, and Netrakona. The remaining districts were assigned a value of 0 and designated as the Control group.

4.3 Summary Statistics

In my paper, I am trying to analyze the impact of the RMG industry on several dependent variables to understand how industrialization affects the dependency and target of microfinance institutions over time. I want to focus on the following variables: *OS_AMOUNT*, *ZONE_MEM*, *BRANCH_NUM*, and *MEM_BRANCH*. *OS_AMOUNT* is the total loan amount outstanding for each district that the Grameen Bank services in millions of Bangladeshi Takas (BDT). The

outstanding loan amount is necessary to understand if post RMG industry exposure increased or decreased the loan amount because it can explain whether individuals are continuing to borrow from this group lending scheme. *ZONE_MEM* is the total percentage of members participating in the Grameen Bank in each district. Zone membership percentage is important to see if it impacted those joining the Grameen Bank in industrialized districts. *BRANCH_NUM* is the total number of branches in each district. *MEM_BRANCH* is the total average number of members in each branch for each district. Number of branches and member per branch per district are necessary in understanding how post RMG exposure affected these variables to see if it made borrowers less reliant on microloans from the group-lending scheme.

Table 2: Full Summary Statistics

Descriptive Statistics					
Variable	Obs	Mean	Std. dev.	Min	Max
<i>AMOUNT DISBURSED</i>	663	22572.0	20149.36	0.33	135728
<i>OUTSTANDING AMOUNT</i>	663	2388.5	2104.749	0.3	18273.8
<i>ZONE OUTSTANDING AMOUNT</i>	663	3.9	3.518498	0	31
<i>TOTAL NUMBER OF MEMBERS</i>	663	191708.9	69406.56	50	386285
<i>ZONE MEMBERSHIP</i>	663	4.2	3.594431	0	27
<i>FEMALE PERCENTAGE</i>	663	95.6	7.673662	17	101.32
<i>NUMBER OF BRANCHES</i>	663	68.8	16.36161	3	114
<i>BRANCH OUTSTANDING AMOUNT</i>	663	103.0	536.9399	0.1	5635
<i>MEMBERS OUTSTANDING AMOUNT</i>	663	7934.0	4603.907	738	27168
<i>MEMBERS PER BRANCH</i>	663	2803.7	978.6032	17	4862
<i>TOTAL NUMBER OF FACTORIES</i>	662	0.8	2.712958	0	20
<i>TREATMENT</i>	663	0.3	0.4722914	0	1

Table 2 illustrates the summary statistics for all districts, including both Control and Treatment group.

Table 3: Treatment Group Summary Statistics

Descriptive Statistics					
Variable	Obs	Mean	Std. dev.	Min	Max
<i>AMOUNT DISBURSED</i>	222	24156.12	22297.8	3.75	135728
<i>OUTSTANDING AMOUNT</i>	222	2629.984	2624.192	3.49	18273.8
<i>ZONE OUTSTANDING AMOUNT</i>	222	4.250541	3.955754	0	31
<i>TOTAL NUMBER OF MEMBERS</i>	222	188556.4	70049.67	360	338931
<i>ZONE MEMBERSHIP</i>	222	4.18982	3.350081	0	26
<i>FEMALE PERCENTAGE</i>	222	95.89856	8.621168	19	101.32
<i>NUMBER OF BRANCHES</i>	222	66.15766	14.47224	6	102
<i>BRANCH OUTSTANDING AMOUNT</i>	222	119.2694	604.33	0.58	5635
<i>MEMBERS OUTSTANDING AMOUNT</i>	222	8129.798	4835.889	738	27168
<i>MEMBERS PER BRANCH</i>	222	2846.779	983.1924	60	4519
<i>TOTAL NUMBER OF FACTORIES</i>	222	2.490991	4.227406	0	20
<i>TREATMENT</i>	222	1	0	1	1

Table 3 illustrates the summary statistics for only the Treatment Group. The Treatment group includes all districts with at least one RMG factory established in that district from 1984-2018.

Table 4: Control Group Summary Statistics

Descriptive Statistics					
Variable	Obs	Mean	Std. dev.	Min	Max
<i>AMOUNT DISBURSED</i>	441	21774.58	18952.87	0.33	116752
<i>OUTSTANDING AMOUNT</i>	441	2267.046	1778.212	0.3	9256.58
<i>ZONE OUTSTANDING AMOUNT</i>	441	3.782041	3.269984	0	23
<i>TOTAL NUMBER OF MEMBERS</i>	441	193295.9	69105.97	50	386285
<i>ZONE MEMBERSHIP</i>	441	4.220277	3.715009	0	27
<i>FEMALE PERCENTAGE</i>	441	95.5573	7.157165	17	100
<i>NUMBER OF BRANCHES</i>	441	70.16327	17.09348	3	114
<i>BRANCH OUTSTANDING AMOUNT</i>	441	94.85798	500.1297	0.1	4541
<i>MEMBERS OUTSTANDING AMOUNT</i>	441	7835.439	4484.992	1106	22852
<i>MEMBERS PER BRANCH</i>	441	2782.082	976.6852	17	4862
<i>TOTAL NUMBER OF FACTORIES</i>	440	0	0	0	0
<i>TREATMENT</i>	441	0	0	0	0

Table 4 illustrates the summary statistics for only the Control Group. The Control group includes all districts with no RMG factories at all from 1984-2018.

Table 2 illustrates the averages for all districts with a Grameen Bank presence, showing the summary statistics for both the Treatment and Control group for all of the dependent variables. Table 3 illustrates the averages for any district with a RMG factory in that district, also known as the Treatment group. Table 4 illustrates the averages for the districts with no RMG presence, also known as the Control group. When comparing Table 3 and Table 4, the average amount distributed in the Control group was 21774.58 in millions Taka while the Treatment group was 24156.12 millions. The Treatment group had a higher disbursement rate than the Control group since there may be more money in districts with an RMG presence as more low-income women may be migrating to these districts (Azad 2016, Sharma 2020). In addition, the

average outstanding amount was higher for the Treatment group than the Control group. The Treatment group had an average outstanding loan amount of 2629.98 in millions Taka and the Control group had 2267.04 in millions Taka which could be due to the higher amount of groups in the districts with any RMG presence. The zone membership percentage of the Treatment group was 4.18% and the Control group was 4.22% which demonstrates that all of the districts with or without RMG exposure had a similar amount of membership rates per districts. However, the total number of members and average number of branches for the Treatment group were lower than the Control group. The Control group had on average 4,739.50 more total members per district and 4.01 more number of branches than the Treatment group. This follows my research question as the districts with the RMG presence are turning away from microfinance institutions since they may not need to rely so heavily on the microloans obtained by the group-lending scheme. It may not be as beneficial to continue to pay back these loans when defaulting may be the better option since the Grameen Bank does not take any collateral and members in districts with any RMG exposure may now have financial assets to also rely on. To test whether this hypothesis holds, I use a DiD analysis to analyze where the ready-made garment industry has a causal impact on microfinance loans.

4.4 Model

I estimate the impact of the RMG industry on outstanding loan amount, members per branch, zone membership percentage, and the number of branches per district.

Equation 1:

$$Y_{idt} = \alpha + \beta 1(TREAT_YEAR_{dt}) + \lambda_t + \gamma_d + \epsilon_{idt}$$

Where d and t represent the district and year, respectively. In this study, the dependent variable, Y_{dt} , has four specifications as Y_{idt1} , Y_{idt2} , Y_{idt3} , Y_{idt4} . Y_{idt1} is *OS_AMOUNT* which is the total loan amount outstanding for each district that the Grameen Bank services in million BDT. Y_{idt2} is *MEM_BRANCH* which is the total average number of members in each branch for each district. Y_{idt3} is *ZONE_MEM* which is the total percentage of members in each district. Y_{idt4} is *BRANCH_NUM* which is the total number of branches in each district. $TREAT_YEAR_{dt}$ refers to the Treatment group post RMG exposure to measure the impact on the Treatment group with the

Control group as a result of industrialization. The year t represents the period from 1984 to 2018. λ_t refers to the year fixed effects which take into account time specific shocks that affect all the districts similar in that year. γ_d refers to the district fixed effects which accounts for any specific characteristics in a particular district that is time invariant and affects the dependent variables. The ε_{idt} is the error term.

Equation 2:

$$Y_{idt} = \alpha + \sum_{\tau < 0} \beta_{\tau} TREAT_ZERO_{dt+\tau} + \sum_{\tau=0}^5 \beta_{\tau} TREAT_ZERO_{dt+\tau} + \lambda_t + \gamma_d + \varepsilon_{idt}$$

This model creates dynamic difference-in-difference model where we can evaluate the impact of the RMG industry on the Treatment group with the Control group five years prior and post the establishment of the first RMG factory in a particular district. For the year of the first established RMG factory ($\tau = 0$), the variable $TREAT_ZERO_{dt}$ equals 1. For the years prior to the first RMG factory established in a district ($\tau < 0$), $TREAT_ZERO_{dt+\tau}$ equals 1 if it was a treatment district in the year $t + \tau$, and the value is 0 otherwise. Similarly, for the years post treatment ($\tau > 0$), $TREAT_ZERO_{dt+\tau}$ equals 1 if the district is a treatment district and the year $t + \tau$ and equal 0 otherwise. This will help determine if the Control group and the Treatment group were trending similarly before the first RMG factory was built in that particular district. The (τ), which is the lags and leads, focus on years before and after the first RMG factory was established in a particular district and are reflected in the β_{τ} in the difference-in-difference analysis.

Equation 3:

$$Y_{idt} = \alpha + \beta_1(EXP_TREAT_{dt}) + \beta_2(EXP^2_{dt}) + \lambda_t + \gamma_d + \varepsilon_{idt}$$

This model provides a continuous measure of treatment expressed in the EXP_TREAT_{dt} variable. EXP_TREAT_{dt} equals to the number of existing factories in a treatment district d in time period t . EXP^2_{dt} is EXP_TREAT_{dt} squared and included to take into account the nonlinear effects of the EXP_TREAT_{dt} variable. I am including this model to see the marginal impact of adding on another RMG factory in a district that has industrialized over time. Given that not all treatment districts received the same number of factories and the range varied from 1 to 20

ready-made garment factories, it is important to analyze the impact of industrialization on repayment by incorporating a continuous measure of treatment.

Equation 4:

$$Y_{idt} = \alpha + \beta_1(TREAT_YEAR_{dt}) + \lambda_t + \gamma_d + \varepsilon_{idt}$$

I conduct a separate difference-in-difference analysis and regression for Equation 4 separately on a low exposure group and the high exposure group and compare it to the Control group. I define the low exposure group as any district that only has one RMG factory and the high exposure group as any district that has more than one factory from 1984-2018. This analysis was done to assess the impact on the target and dependency of the microfinance loans based on the levels of RMG exposure for the Treatment group.

4.5 Results

4.5.1 Treatment vs. Control Group

Table 5: Treatment vs. Control Difference-in-Difference Model

Variable	All Treatment Districts
<i>OUTSTANDING AMOUNT</i>	593.637***
<i>MEMBERS PER BRANCH</i>	202.684***
<i>ZONE MEMBERSHIP</i>	0.783***
<i>NUMBER OF BRANCHES</i>	4.44***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 illustrates the results of the four coefficients on the treatment variable for each the regression. It includes all the districts with any exposure to the RMG industry including both High Exposure and Low Exposure group.

Treatment Group vs. Control Group

In this analysis, I am focusing on the results from [Equation 1](#). The variables that I'll be focusing on will be *OS_AMOUNT*, *MEM_BRANCH*, *ZONE_MEM*, and *BRANCH_NUM*. The

importance of these regressions, controlling for time and district effects, is because the implications with the positive coefficients differ from the descriptive statistics. First, I'll be comparing impact of the RMG industry on the Treatment group relative to the Control group. Focusing on Table 5, specifically the All column, the Treatment group's average outstanding amount increased by 593.64 in millions Taka post exposure to the RMG industry when compared to the Control group and was statistically significant at 1%. This result shows evidence that there is an increased outstanding loan amount in the districts that have exposure to the RMG industry. Individuals may be migrating to districts with more RMG factories to obtain more job opportunities (Azad 2016, Sharma 2020). The increased outstanding loan amount could be due to this increase in migration to these districts as more vulnerable, low-income women are trying to build up their financial assets through group-lending scheme with the existing Grameen Bank branches. With more groups of women joining the Bank, there will naturally be a larger outstanding loan amount in the industrialized districts.

With the second regression, the average number of members per branch of the Treatment group increased by 202 members compared to those in the Control Group and was statistically significant at 1% post RMG exposure. This increased in the number of members could be due to the higher population in these districts with RMG exposure as more low-income women are moving into these districts to find jobs. With a higher population rate, the average number of members per branch are increasing to accommodate for more women hoping to obtain a job in the RMG industry.

With the third regression, the average zone membership percentage increased by 0.78 percent in the Treatment group post RMG industry and was statistically significant. With the final regression, the average number of branches increased by 4.44 branches in the Treatment group post RMG industry and was statistically significant at 1%. The increase in the average number of branches and average zone membership percentage could be explained by this influx of vulnerable, low-income women coming into these RMG districts.

While focusing on Table 5, the results show that the Treatment groups had an increase in branch numbers, number of members per branch, average zone membership percentage, and the average outstanding loan amount. Low-income women in the Treatment group post RMG exposure are likely still somewhat reliant on the Grameen Bank as they are most likely migrating to these districts to obtain a job (Azad 2016, Sharma 2020). Azad (2016) asserts the impact on

the class and culture structure of Bangladesh that low-income women ascribe to has changed through migration to industrialized districts such as Dhaka. Azad demonstrates evidence of women migration into districts with a RMG presence for work (Azad 2016). The results show that the Grameen Bank is still targeting districts with an RMG presence as the demand for microloans are still present.

4.5.2 Dynamic Difference-in-Difference Analysis

Table 6: Dynamic Difference-in-Difference Model

Variable	<i>OS_AMOUNT</i>	<i>ZONE_MEM</i>	<i>BRANCH_NUM</i>
<i>TREAT_ZERO</i> _{$\tau=5$}	39.3776 (400.6505)	1.066113 (0.6993272)	5.742515 (4.26921)
<i>TREAT_ZERO</i> _{$\tau=4$}	103.5833 (385.9827)	0.5435095 (0.6737247)	5.693447 (4.112914)
<i>TREAT_ZERO</i> _{$\tau=3$}	148.3474 (386.4686)	0.708656 (0.674573)	8.59269** (4.118092)
<i>TREAT_ZERO</i> _{$\tau=2$}	621.345* (359.137)	1.167842* (0.6268661)	6.092707 (3.826854)
<i>TREAT_ZERO</i> _{$\tau=1$}	380.0861 (361.2361)	1.002729 (0.6305302)	5.567242 (3.849222)
<i>TREAT_ZERO</i> _{$\tau=0$}	412.4351 (361.4576)	1.329349** (0.6309168)	7.892208** (3.851582)
<i>TREAT_ZERO</i> _{$\tau+1$}	510.6098 (362.0422)	1.477194** (0.6319372)	9.883932** (3.857811)
<i>TREAT_ZERO</i> _{$\tau+2$}	716.486** (361.3109)	1.516099** (0.6306607)	11.10516*** (3.850019)
<i>TREAT_ZERO</i> _{$\tau+3$}	787.2622** (361.8)	1.417048** (0.6315144)	8.427689** (3.855231)
<i>TREAT_ZERO</i> _{$\tau+4$}	799.5307** (362.4595)	1.477758** (0.6326656)	9.272316** (3.862258)
<i>TREAT_ZERO</i> _{$\tau+5$}	1063.75*** (281.2712)	1.563267*** (0.4909531)	9.373395*** (2.997141)
<i>N</i>	663	663	663
<i>R-sq</i>	0.8437	0.8368	0.7064

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6 illustrates a dynamic DiD model where districts with any exposure to the RMG industry and the relationship five years prior to the first established RMG factory in that district and five years after with the dependent variables of *OS_AMOUNT*, *ZONE_MEM*,

and *BRANCH_NUM*. This regression controls for year fixed effects and district-level characteristics. The standard errors are reported in the parenthesis below the coefficient.

Table 6 refers to the results from Equation 2. In Table 6, *TREAT_M_t* refers to number of years prior to the first ready-made garment factory in that district. *TREAT_P_t* refers to the number of year after the first ready-made garment industry. *OS_AMOUNT*, *ZONE_MEM*, and *BRANCH_NUM* were the only dependent variables that had a similar trend relative to the Control Group prior to the RMG exposure and were statistically significant after the RMG exposure. *MEM_BRANCH* was not included because was statistically significant both before and after the RMG exposure. For *OS_AMOUNT*, it was positive and statistically significant two years after the first RMG factory was built in a district. For *ZONE_MEM*, the zone membership rates were positive and statistically significant following the first year with the first RMG factory in a district. The zone membership rates continued to be statistically significant and positive for the following five years. For *BRANCH_NUM*, the first year with the first RMG factory was also positive and statistically significant five years following the first establishment.

The results of Table 6 show that districts with any exposure to the RMG industry do have an increased outstanding amount of loans, but this could be because more vulnerable women are migrating to districts with an RMG factory to find work (Azad 2016, Sharma 2020). As more women are migrating to these districts to support their families, more women may form groups to obtain microloans from the Grameen Bank in order to support themselves in these districts. With the higher demand of microlending from low-income women migrating to these districts, the Grameen Bank opened more branches in these districts, increasing district membership for the districts with an RMG presence. The Grameen Bank is following and targeting districts where more vulnerable women are migrating to in order to service these women who are beginning to obtain jobs.

4.5.3 Continuous Difference-in-Difference Analysis

Table 7: Continuous Difference-in-Difference Model

Variable	<i>EXP_TREAT</i>
<i>OUTSTANDING AMOUNT</i>	-93.9968*
<i>MEMBERS PER BRANCH</i>	29.9072*
<i>ZONE MEMBERSHIP</i>	0.0824
<i>NUMBERS OF BRANCHES</i>	2.2211***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7 illustrates the continuous measure on the Treatment group. This table illustrates each of the regressions performed on the four independent variables to see its effect when adding an additional RMG factory.

Focusing on the results of [Equation 3](#), the variables that I'll be focusing on will be *OS_AMOUNT*, *MEM_BRANCH*, *ZONE_MEM*, and *BRANCH_NUM*. First, the Treatment group's outstanding amount decreased by 93.99 in millions Taka with each additional RMG factory built in a treated district relative to the Control group.. This amount was statistically significant at 10%. This shows that with each new factory, the outstanding loan amounts are decreasing since low-income women have a more stable stream of income, allowing them to repay their loans fully.

With the second regression, the Treatment group's members per branch increased by 29.90 members for each additional RMG factory established in a district. With the third regression, the Treatment group's zone membership increased by 0.08 but was not statistically significant. With the final regression, the Treatment group's number of branches increased by 2.22 for each additional RMG factory established in a district.

Again, the results from [Table 7](#) point to an increase in membership rates and branch openings in districts that have industrialized. This could be due to migration into these areas where low-income women can find jobs to support their families (Azad 2016, Sharma 2020). As the RMG industry begin recruiting low-income women, Sharma finds that it completely changes the traditional notions that have "prohibited them to leave the family compound alone, without being accompanied by a male member, on the grounds of safety and security" (Sharma 2020).

Sharma argues, “...all these notions were challenged once the women started working in the RMG factories, as they had no option but to move out of their houses to earn their living” (Sharma 2020). With the involvement of the RMG industry, women are now being empowered with a stable income to move to districts with a RMG presence. Grameen Bank is still servicing these districts as low-income women may need financial support to come into these districts to find work. These industrialized districts are still reliant on the Grameen Bank to provide financial resources, but this case may change given a long enough time horizon as more RMG factories continued to get built in the industrialized districts.

In my next model, I break the Treatment group into two groups: high exposure and low exposure. I want to magnify the effects of the RMG industry on these two groups so I can specify the impact on each of the dependent variables. This comparison will also help illustrate the reliance on microfinance institutions as a district has an increased amount of job opportunities versus a district that is only beginning to have some job opportunities to low-income women.

4.5.4 High Exposure vs. Low Exposure

Table 8: High Exposure vs. Low Exposure Difference-in-Difference Model

Variable	High Exposure	Low Exposure
<i>OUTSTANDING AMOUNT</i>	947.658***	283.182**
<i>MEMBERS PER BRANCH</i>	314.229***	186.681***
<i>ZONE MEMBERSHIP</i>	0.811*	0.9037***
<i>NUMBER OF BRANCHES</i>	2.69	5.903***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8 illustrates eight regressions for just the high exposure and just the low exposure group to the RMG industry and their impact on the four dependent variables.

For [Equation 4](#), I focus on comparing the high exposure and low exposure to the RMG industry group. Focusing on [Table 8](#), specifically the High Exposure and Low Exposure columns, the high exposure group’s average outstanding amount increased by 947.66 in millions

Taka post RMG impact compared to the Control group. However, the low exposure group's outstanding amount only increased by 283.18 in millions Taka post RMG impact. With this first regression, both the high exposure and low exposure groups were statistically significant. This shows that the high exposure group had a higher average outstanding loan amount when compared to the Control Group than the low exposure group. This higher outstanding loan amount could be due to the greater demand for loans in high exposure districts since more job opportunities are available, enticing more low-income women to obtain jobs in the RMG industry.

With the second regression, the average members per branch for the high exposure group increased by 314 members compared to the Control group and was statistically significant at 1%. With the low exposure group, the average members per branch increased by 186 members compared to the Control group and was statistically significant at 1%. This could also explain why the average outstanding loan amount may be higher could be due to the an influx of members in the high exposure districts. Additionally, the population for high exposure districts to the RMG industry is likely to be larger since it's more industrialized. Future analysis with district population data for each year can be used to assess this.

With the third regression, the average zone membership percentage for the high exposure group increased by 0.81 percent compared to the Control group and was statistically significant at 10%. The low exposure group increased their zone membership percentage by 0.90 percent and was statistically significant at 1%. The zone membership refers to the percentage of those in the district that participate in the Grameen Bank based on the total population of that district. In this regression, the lower exposure group had a higher zone membership rate because the RMG presence in the low exposure group are not as established as the high exposure group, causing an influx of low-income women who are coming to these districts to find jobs. Those who live in the low exposure districts may still rely on their social capital to obtain guaranteed financial assets as the RMG presence isn't as prominent compared to high exposure districts. However, the percentage of those living in the high exposure districts are not turning to the Grameen Bank to access microloans when compared to the percentage in low exposure districts. When looking at the first regression with the outstanding loans, high exposure districts are taking out larger loans but have a lower percentage of members in that district participating in microfinance.

With the final regression, the average number of branches for the high exposure group increased by 2.69 compared to the Control group. However, this amount was not statistically significant. The average number of branches for the low exposure group increased by 5.9 compared to the Control group and was statistically significant at 1%. The higher average number of branches for the low exposure group further explain the continued need for the Grameen Bank in these districts. There may be an increased in demand for the Grameen Bank's presence in the lower exposure districts since the RMG industry is still in a nascent state of industrialization, attracting more vulnerable, low-income women into these districts at a higher rate than districts with a high exposure to the RMG industry.

Based on the results of [Table 8](#), the high exposure group had more members per branch and a larger outstanding loan amount than the low exposure group, which could be explained by the larger population size since more industrialized districts will tend to have higher population sizes. The high exposure group may also have a greater ability to borrow either due to their employment in the RMG sector or there are a greater amount of groups borrowing. Since there are more groups borrowing, the average loan amount would be higher compared to the low exposure districts because they have more groups on average. Despite the higher members per branch in the high exposure group, there was a higher zone membership percentage increase and average number of branches for the low exposure groups. More vulnerable, low-income women are migrating into the low exposure districts in order to obtain jobs in the RMG sector.

Additionally, since the RMG industry isn't as robust as the high exposure districts, a higher percentage of those in the district are likely to be more reliant on the Grameen Bank to obtain any financial assets. With more groups of women coming into low exposure districts to find work (Azad 2016, Sharma 2020), the Grameen Bank has increased the number of branches in these districts to accommodate the influx of low-income women hoping to obtain jobs. However, in the high exposure districts, as more women are maintaining a steady stream of income, the number of branches have decreased since women may not be as reliant on microfinance to obtain financial assets. In high exposure districts, women are able to gain financial independence through employment in the RMG sector.

4.6 Discussion

One limitation of this research would be the lack of data surrounding population sizes in the districts tested. This variable would help standardize the number of members to compare it more fairly with the low exposure and high exposure groups. Without this data, it makes it difficult to directly compare the impact of the RMG industry for the high exposure and low exposure group since the population size might explain the higher outstanding loans and members per branch for the high exposure group.

If this research were to be carried out ten years out, would there be an incentive to default on these loans? An important distinction between microfinance and traditional financial institutions is that microfinance does not take collateral, meaning if one member were to default, there would be virtually no financial consequences because none of their assets would be seized. In my paper, the number of branches for high exposure groups are starting to decrease five years after the first RMG factory. Future papers can determine the tipping point for members to default on these microloans from a group-lending scheme. Since microfinance institutions do not rely on collateral, as a group gets richer through job security, the incentive to default may be greater than their incentive to continue repayment. Members in a high exposure district 10 years after the initial RMG establishment may see decreasing numbers of zone membership percentage, average number of branches, and members per branch over time since they will have obtained stable financial assets through jobs in the RMG sector.

V. Conclusion

In this paper, I obtained data from the Grameen Bank's annual reports and the ready-made garment industry to build a difference-in-difference model in order to understand the relationship between microfinance institutions and industrialization using the districts in Bangladesh who were affected by the RMG industry and those that were not affected. This study aims to determine the relationship between the rise of industrialization and the reliance and target of microfinance institutions. The purpose of my research is to assess the impact of industrialization from the RMG industry on microfinance institutions as a specific group becomes wealthier over time. I focus on low-income women since both the Grameen Bank and the ready-made garment industry target those groups directly. The Grameen Bank targets low-income women since women tend to be better borrowers because they rely heavily on their social

capital in order to maintain their status in the group lending scheme. In the ready-made garment industry, low-income women are also the main target of labor because their willingness to work is at a much lower cost than men which decreases overall production costs.

For my methodology, I obtained my data from the Grameen Bank's annual reports and a ready-made garment factory list compiled by a NYU Stern research project. Using a difference-in-difference model, I compared the districts that have had exposure to the RMG industry to those that have not to understand how industrialization negatively or positively impacts the outstanding loan amounts, members per branch, zone membership percentage, and the number of branches per district. The results showed that high exposure districts to the RMG industry had a decreased utilization of microfinance. However, the low exposure districts are still dependent on microfinance institutions since the Grameen Bank is opening more branches in these districts when compared to the high exposure districts. The results are most likely reflecting a larger influx of low-income women coming into the low exposure districts to obtain employment in the RMG industry. New groups are being formed which is increasing demand for more branches in the low exposure districts as women are still reliant on their social capital to obtain financial assets.

This paper is the first paper to look at the RMG industry's impact on the longevity of a microfinance institution such as the Grameen Bank. It's important in understanding borrowers' behaviors as they accumulate more wealth over time through industrialization initiatives such as the ready-made garment industry. This adds onto the existing literature regarding the long-run impacts of microfinance to better understand how public policy can help alleviate poverty. Microfinance has been a solution in many developing countries, but stable job opportunities can also help uplift those in impoverished situations to grow their own financial assets and independence. The results from this paper illustrate the decreased dependence on microfinance institutions as people accrue wealth through job stability. However, microfinance institutions are adjusting their strategy as we can see in their behavior in low exposure districts. Despite the nascent RMG presence, they're opening up more branches where demand is needed since low-income women are still reliant on their social capital for financial assets. Continued research may be helpful in finding the tipping point where the incentive to default is more efficient than continuing to repay in the group-lending scheme once a Treatment group has accrued enough wealth. 7

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