

Three Essays in Development Economics

by

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Dedication

For Johnny and Granny

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Abstract

This dissertation presents three studies on development economics. In the first essay, *Impacts of Healthcare Expansion on Labor Outcomes: Evidence from Thailand's Universal Coverage Scheme*, I examine the impact on labor outcomes of Thailand's UCS, a health reform in 2001-2002 that raised the national insured rate by about 30% to almost 100%. A healthcare expansion policy typically leads to a concern of distortionary effects on the labor market, such as lower incentives for labor supply or employment. At the same time, this type of policy is found to promote business creation and entrepreneurship. I run difference-in-difference analysis and use the access to civil servant medical benefit scheme (CSMBS), which features spousal coverage, to identify treatment and control groups. I do not find evidence that the reform decreases labor force participation or private employment, as concerned. However, there is evidence suggesting that the policy increases self-employment among females with high health demands and business ownership among males with high health demands.

In the second essay, *Migration Network and Selectivity in Education in Indonesia*, I study the variation in migration selection in terms of education across migration network sizes in the context of Indonesian internal migration from 1985-2005. Using origin-destination-specific established migrant fractions to identify network sizes, I provide empirical evidence that highlight the role of network size in lowering the degree of positive selection in migration with respect to education. The results suggest that as origin communities accumulate migration experience, the education level of migrants should decline.

In the third essay, *Do Migrants Demand In-kind Remittances?: Experimental Evidence among Kenyans in the U.S.*, I examine the paternalistic motive of migrants in the international remittance context using experimental data. I test whether there is a demand for in-kind (non-cash direct goods) transfers, specifically whether the ability to transfer remittance in form of in-kind, as opposed to cash, change migrants (givers) behaviors. I find that the availability of in-kind giving significantly decreases the values of cash transfers, indicating that there is a demand for in-kind remittances. While this channel changes the composition of remittances, it does not statistically change the total values shared or the fractions shared to relatives. Migrants with low trust measures and migrants who usually give instructions to relatives are found to use this channel more and share larger values.

The dissertation contributes to the empirical evidence regarding health policy impacts, migration patterns, and remittance behaviors. The three studies hope to shed some light on key development economics issues in health and migration policies.

1 Impacts of Healthcare Expansion on Labor Outcomes: Evidence from Thailand's Universal Coverage Scheme

Abstract

This paper examines the impacts on labor outcomes of Thailand's Universal Coverage Scheme (UCS), a health care reform launched in 2001-2002 and raising the national insured rate by almost 30%. A healthcare expansion policy typically leads to a concern of distortionary effects on the labor market, such as lower labor supply or employment. At the same time, this type of policy is found to promote business creation and entrepreneurship. The paper uses repeated cross-sectional survey datasets during 1991-2006 and a difference-in-difference analysis, focusing on the outcomes of sectoral choices and working. The access to civil servant medical benefit scheme (CSMBS), which features spousal coverage, is used to differentiate between treatment and control groups. The individuals whose spouses have CSMBS are identified as the control group since they have access to non-employment-linked health insurance, in which their labor outcome decisions should be unaffected by the UCS. The treatment group includes those with non-CSMBS spouses since UCS provides these individuals with alternative non-employment-linked health insurance and could change people's labor decisions. It is unable to conclude that the reform decreases labor force participation or private employment, as concerned. However, the policy impacts seem to vary across factors that drive health demands and valuation in health insurance such as underlying health conditions and age. There is evidence suggesting that the reform increases self-employment among unhealthy and older females and that it weakly increases business ownership among unhealthy males. While this analysis is subjected to endogeneities and assumption violations, it is an attempt to shed light on the health policy expansion impacts on labor outcomes in developing countries, which are key outcomes in tracking the economic productivities and healthcare costs.

1.1 Introduction

This paper explores the impacts of Thailand's Universal Coverage Scheme (UCS) on labor market outcomes. The study provides empirical evidence that contributes to the literature on job sorting and labor market efficiency, as well as the role of health improvement in the labor market. The results are also key components that should be monitored in healthcare financing and health resource allocation. Additionally, the evidence here is based on the health systems and labor market in a developing country, which could be different from the evidence from developed countries, contributing to the pool of empirical results. To my knowledge, Wagstaff and Manachotpong (2012b) is the only paper that studies labor impacts of the UCS. However, the authors use a different dataset and approach. The paper here also investigates the heterogeneity of policy impacts based on values placed on health insurance, which is not explored in the mentioned paper.

One of the motivations to study this question is the increasing importance of health insurance in labor market decisions. There has been a concern that the linkage between employment and health insurance could lead to the inefficiency of job sorting, the lack of job mobility or job lock (Madrian, 1994), and the lack of innovation. A strong tie between employment and access to healthcare could distort the labor market and cause the economy to forgo productivity from better job matches (Gilleskie & Lutz, 2002). While the job lock situation has not been the focus in developing countries, people without employment-linked health insurance still face high out-of-pocket health expenditure and private health insurance purchases, which could be part of the incentives that influence people to participate in the formal sector over the informal sector (Azuara & Marinescu 2011). It is important to acknowledge that in addition to health insurance, the formal employment typically offers other fringe benefits such as retirement plan and disability insurance that motivate formal sector participation. However, due to high healthcare costs, health insurance could be a significant determinant of sector choice decision.

Another motivation to study this question is the ambiguity of the theoretical predictions. In theory, a policy that weakens the linkage between employment and health insurance could lead to an improvement in the job market efficiency through more job mobility. It could also allow the population to partake in risk-taking behaviors such as business formation. At the same time, a health coverage expansion could also reduce labor supply, either by not participating in the labor force or reducing hours worked, since workers do not necessarily have to work full-time to gain access to health insurance. This reduction in hours worked could lead to a reduction in tax revenue and cause problems for the health system financing. In terms of health outcomes and its impacts on the population health, a health policy expansion could improve the overall health outcomes of the population and lead to more

labor supply and productivity. When people have better access to health services, they will be healthier and able to participate more in formal economic activities. The effects can be particularly substantial in developing countries where the initial health outcomes at the population level tend to be lagging behind. However, the labor effect of the health policy through this channel is likely to be effects in the long run. Therefore, the theories suggest that the labor force and formal sector participation could be ambiguous.

Lastly, the study contributes to healthcare financing and health resource allocation. People who work for formal sector typically utilize their employment-linked health insurance while people who work in the informal sector or do not participate in the labor force use the publicly-provided health insurance or spend out-of-pocket expenses. These schemes generally differ in pricing, financing, and resource management based on their designated hospitals and coverage. In addition, the formal and informal sector may face different effective tax rates. For example, it may be more likely for workers in the informal sector to avoid paying taxes or for business owners to reinvest profits in order to reduce tax payments. When people participate less in formal sector and more in the informal sector, the country could experience shortage of tax revenue for public health expenditure. Therefore, it is important to update the estimated distribution of workers across employment sectors in order to be able to accurately project tax revenues and allocation budget and health resources across schemes.

Thailand initially had four health insurance schemes which are social security (SS) for private employees, civil servant medical benefit scheme (CSMBS) for government employees, medical welfare scheme (MWS) for the poor, and voluntary health card scheme (HCS) targeting the poor and near-poor. Thailand's Universal Coverage Scheme (UCS) was introduced in 2001-2002 and changed the insurance landscape into three main schemes: social security, CSMBS, and UCS. UCS aims to provide the equity of access to health services and reduces impoverishment from health expenditures. It is one of the largest healthcare expansions among the low- and middle-income countries. This policy introduction made Thailand one of the earliest Asian countries that adopted a principle of universal coverage after countries such as Singapore, China, and Taiwan. The program initially charged users a low fee of about \$1 (30 baht) per visit but eliminated the fee in 2006. Like many countries, the employment-linked health insurance in Thailand is tied to payrolls, leaving people in the informal sector uncovered unless they have access to privately-purchased insurance or publicly-provided schemes through welfare. There was also a voluntary health scheme by the government, which was essentially a subsidized price for the voluntary purchase of the public health insurance for the uninsured. Despite accessibility to publicly-provided schemes for the uninsured in the pre-UCS era, the UCS instantly reduced the uninsured rate insured

rate by 30%, from 45% in 1996 to 93% in 2002 and 97% in 2006. It also significantly reduced impoverishment due to catastrophic out-of-pocket health expenses (Limwattananon et al., 2014). The fractions of out-of-pocket expenses were reduced from 45% and 34% in 1994 and 200 to 27% and 15% in 2002 and 2008. By 2012, the out-of-pocket expense became 12% of the total health expenditure (Tangcharoensathien, 2015). Based on the per-person public health spending, there is a reason to believe that the policy significantly changed the healthcare burden for the uninsured.

The study analyzes the labor impact of UCS using a difference-in-difference approach and repeated cross-sectional data from Health and Welfare Survey (HWS) from 1991-2006. The treatment and control groups are identified using spousal coverage. Individuals with access to spousal coverage are essentially unaffected by UCS since they have always had the alternative source of health insurance and do not need to rely on their employment-linked insurances when they exit their jobs or transitions to new jobs or new sectors. On the other hand, individuals without access to spousal coverage are treated since they had no alternative insurance in the pre-UCS era but now have an alternative scheme in the post-UCS era. One of the challenges is the lack of direct records whether individuals access the reported insurance schemes through themselves or their spouses. To overcome this challenge, individuals whose spouses have CSMBS are considered controls since CSMBS offer coverages to spouses and dependents. Since the SS scheme does not offer coverages to spouses, individuals whose spouses are under SS are considered treated. A small fraction of workers purchase private insurance or have access to private plans provided by employers. These individuals may be able to offer coverage to their spouses but the fraction of these individuals are negligible ¹.

Several concerns regarding this analysis design include the violation of outcomes' parallel trend assumptions, the increase of insured rate in the pre-UCS era, concurrent policies, and selection bias, i.e. the unobserved personal characteristics that might affect labor decision and correlate with the marriage decision process. Based on these concerns, which are discussed in more details in the result section, the study acknowledges the limitations, attempts to draw meaningful and sound insights from the findings, and proposes plans for further revisions.

The results are based on separate regressions for male and female samples. The study only includes married individuals in working and non-retirement age in the samples ². The regression results suggest that there is no statistically significant impact of UCs on working rate ³ in the male sample and a positive impact in the female sample. Due to the increasing

¹Further revisions could leave out these individuals and their spouses from the sample size to achieve better robustness

²Further revisions could include single individuals and analyze impacts by marital status

³This outcome includes individuals report mainly working in the past year in the private sector, govern-

working rate of the treated female in the pre-UCS era, i.e. non-parallel trends of treated and control groups, it is unable to conclude that the policy increases female working rate. The regression results show a positive impact on private sector employment, conditional on working, in the male sample. The policy impact is also negative on the self-employment outcome. However, these outcomes are subject to the violation of the parallel trends assumption. However, these pre-UCS parallel trends of these outcomes are not satisfied. When there are violations of the parallel trends assumption, the analyses could have provided more insights if the results show a reversal of the trends. For example, if the treatment group's outcome has an increasing trend of the outcome, compared to that of the control group, the negative regression coefficient strongly shows that the policy has a negative impact on the outcome. However, it is the case in for these findings. Therefore, these results suggest that it is not sufficient to conclude that the policy has adverse impacts on working rate and formal employment rate. This findings imply that the reform does not seem to result in a significant labor market distortion. It could also be possible that the results suggest that the policy has positive impacts on health and consequently positive impacts on working rate and formal employment. However, because of the violations of the parallel trends and the near timeframe of the datasets studied, it is unlikely that the positive impacts are due to better health of the population.

Since the UCS policy may not have a large effect on people who do not place high values on health insurance and should have a larger influence on the decisions of those with high health demands such as unhealthy and old-aged individuals, the study explores the heterogeneity of the policy impacts by underlying health conditions, age, education, and residential area. Focusing on the outcomes where the policy impacts are significantly different across subgroups, the study finds that the policy has positive impacts on the self-employment outcome among females with health conditions and old age. These impacts are significantly different from the effects on females without health conditions and in young age. Among old-aged females, the policy also has a negative impact on private employment. As for the male sample, the policy has a weak positive impact on business ownership outcome and a negative impact on government employment outcome among those with health conditions. As older and unhealthy individuals participate more in self-employment, the number of UCS users with high health care costs should go up and could contribute further to the rise in healthcare costs.

Section 2 discusses previous literature. Section 3 describes program background and

ment sector, and self-employment with and without employees. It is essentially the labor force participation rate minus unemployment. It is also the best available outcome in terms of measuring labor force participation since unemployment variables are not available in the datasets.

details of UCS. Section 4 and 5 discuss a theoretical framework and empirical strategy. Section 6 discusses data and summary statistics. Results and discussion are presented in Section 7. Lastly, the paper concludes findings and discuss policy implications in Section 8.

1.2 Literature Review

Due to constant changes in the U.S. health policy landscape, the array of literature focuses on the U.S. context and finds mixed responses of labor supply from health policy expansion. For example, the CBO’s budgetary outlook forecasted that the combined effect of ACA, i.e. both the individual mandate and Medicaid expansion, would decrease the aggregate employment rate by about 0.5% (CBO, 2010). The eligibility expansion and contraction of public programs like Medicaid, the Affordable Care Act (ACA), and Massachusetts Health Care Reform are among programs investigated by researchers regarding the labor supply responses to public insurance expansion. For example, using an enrollment cap of Wisconsin Medicaid program, Dague et al. (2014) conducts a regression discontinuity analysis and propensity score matching difference-in-difference approach, comparing the labor supply of individuals enrolled to the program and waitlisting individuals. Focusing on the non-elderly, non-disabled, and childless adults, those who were enrolled experienced a significant 2-10%⁴ decrease in employment rates, compared to waitlisting individuals. The authors also find negative effects on earnings, assuming that wage rates remained constant, where the wait-listing individuals earn \$200-\$400 per quarter more than the Medicaid enrollees.

Similarly, Garthwaite et al. (2014) finds an increase in employment when people lose enrollment from Tennessee Medicaid program, suggesting that the Medicaid enrollment decreases labor supply. The study investigates the Medicaid dis-enrollment among 170,000 Tennessee residents in 2005, using both across and within-state variation in the exposure to the dis-enrollment. The methodology used to identify causal effect is difference-in-different regressions with other Southern states as control group. The study finds an increase in both employment rates and job search behaviors. However, the authors note that the magnitudes of policy responses are sensitive to local labor market conditions and the valuation the residents place on health insurance. They state that the study covers a time period where Tennessee was experiencing economic expansion with the low unemployment rate at about 5.6% (Dague et al., 2014), which could allow Tennessee residents to move into the labor force and find employment more smoothly, compared to studies in other states or years.

In contrast, a study on the Oregon Health Insurance Experiment in 2008 finds insufficient evidence that infers an adverse response of labor supply. The study analyzes employment or

⁴The standard errors are ranged from 0.0023 to 0.029.

having non-zero earning among low-income adults who were randomly selected for Medicaid enrollment opportunity (Baicker et al., 2013). The coefficient is -0.0156, insignificant, with standard errors of 0.014. The authors reject that Medicaid can cause more than 4.4% decrease or 1.2% increase in employment. The authors note that the lack of negative employment response could arguably be due to the low-income eligibility criteria (100% of FPL) and the eligibility criteria that requires enrollees to have been without health insurance for six months. These individuals are likely to seek more earnings and employment and may not decrease labor supply when being enrolled in the experiment.

In addition to job lock, the topic of "entrepreneurship lock" is one of the concerns that employment-linked health insurance in the U.S. may hinder business creation. Outcomes such as self-employment and business creation are studied to address this research question. The U.S. literature finds both positive responses and a lack of responses when population faces healthcare expansion. Fairlie et al. (2010) exploits the age, 65, cutoff of Medicare eligibility in a regression discontinuity analysis and uses the age in months from the CPS data. The authors find an increase in business ownership rate among male retirees who just turn 65, relative to the males in near-retirement age of just before 65. The paper does not find the same results from other ages between 55 to 75 and suggests that the employment-linked health insurance may cause an inefficient level of business creation.

Another study by Olds (2016) also uses an income threshold in a regression discontinuity approach to study the effect of State Children's Health Insurance Program (SCHIP) on household's business creation. SCHIP was implemented swiftly with about 15% of household reporting having children covered by SCHIP. The net family income threshold is used to determine eligibilities but may vary by state ⁵. The study finds that SCHIP increases the parents' self-employment by 15%, incorporated ownership by 36%, and business share of household income by 12%. The author further tests and identifies that the mechanism of these increase in business activities are due to the reduction in risk, as opposed to the credit constraint channel. The policy allows families to be able to endure a high level of risks entering self-employment. These findings suggest that social safety nets have spillover benefits on the supply of firms and business creation.

In addition to previous studies of healthcare eligibility and expansion, a study by Heim and Lurie (2010) investigates the effects of an increase in the deductibility of health insurance premiums for the self-employed in Massachusetts. In the U.S., in addition to the premium differences, there is a tax differential between health insurance purchases through employers and self-employed. For example, before the Tax Reform Act of 1986 (TRA86), self-employed

⁵For example, the cut-offs for Arkansas, Tennessee, and Texas is 100% FPL while the cut-off for New Jersey is 350%

individuals may deduct merely 25% of the health insurance premium expense of the taxable income while the employers' insurance purchases for employees are generally excluded from both payroll and income taxes. Over time, the deductibility fraction increases to 60% in 1999, 70% in 2002, and 100% in 2003. Using a panel data of Massachusetts tax returns, the authors find that these tax incentives raise the probability of being self-employed by 1.5%. They also find that the probability of entering self-employment increases by 0.8% and the probability of exiting self-employment decreases by 2.8%.

On the contrary, a few studies do not find similar evidence. Evidence from Gumus and Regan (2009) studies the same series of tax amendments to TRA86 as in Heim and Lurie (2010) but uses CPS data from 1996-2007. They find insignificant effects of the policy on the probability of being self-employed. They argue that despite the full deductibility of the health insurance premium for the self-employed, it may not be sufficient to compensate for high search costs, restriction of pre-existing conditions, and high premium costs of the private non-group market. Holtz-Eakin (1994) uses the variation of state laws in allowing portable health insurance, i.e. allowing workers to continue purchasing health insurance after leaving the job. The study finds no effect of employment-linked insurance on the propensity to be entrepreneurs. The author also concludes that it is unlikely that the introduction of universal health insurance would significantly enhance entrepreneurial activities. Chavda (2015) studies the 2006 reform of the Massachusetts health care market and its effects on entrepreneurship. The author provides evidence that the increase in self-employment disappeared with better control techniques such as county border matching and synthetic control strategies. The study also provides results confirming the negative relationship between tax rates and entrepreneurship. Thus, the policy's future rise in taxation could counter-balance the policy's short-term increase in business. The author also provides evidence of heterogeneity of business creation, showing more positive impacts on the capital-intensive industries, relative to less capital-intensive industries. The study concludes that entrepreneurs are probably limited by factors, other than health insurance.

In the international context, the literature also finds mixed responses of both the labor supply and sector choice outcomes from the health policy expansion. Recent evidence on the impact of health programs on labor market outcomes, such as job mobility and wages in developing countries, are the following. Azuara and Marinuscu (2011) study the impact of Seguro Popular in Mexico on the informal sector. Seguro Popular is a health insurance program targeting the uncovered workers in the informal sector, introduced in 2002. The program provides health insurance to 50 million Mexicans without social security. The authors use the gradual roll-outs of the program and find no evidence of an increase in informal sector participation, suggesting that the expansion of social protection programs has negligible

distortionary impacts on labor supply. The impacts are significant among workers with less than nine years of schooling but remain small in magnitude at less than 2%. They also find no increase in wage gain among job movers or individuals transitioning between formal and informal sector. They conclude that marginal workers in developing countries may not choose formal or informal sectors based on the availability of health benefits.

On the opposite, Camacho et al. (2013) examines a Columbia's social program expansion called the Subsidized Region (SR) in the early 1990s and concludes that the policy leads to an increase of informal participation by 4%. The authors observe that there was an upward trend of informality rates in Latin American countries coincides with the expansion of social program provisions (Grosch, 1994). They further discuss that the valuation of SR in Columbia must be pretty high among the SR enrollees. Aterido et al. (2011) studies Segular Popular program and finds a positive response of the informal sector. The study finds that the program lowered formality by 0.4-0.7%, driven by the reduction of flows from the informal sector into the formal sector. The study finds that the program reduced the worker inflow into formality by 3.1%.

Taiwan is among the first Asian countries that attempted to implement universal health-care. The government introduced National Health Insurance (NHI) in 1995. The program is financed by premiums from employees, contributions from employers, and subsidies from the government. Before the NHI was introduced, non-working individuals did not have access to any public health insurance scheme. After NHI, these individuals pay premiums ⁶ and can access health insurance with employers, working family members, or governments as sponsors. A study by Kan and Lin (2009) uses the fact that the premiums faced by private employees went up significantly, compared to the premiums faced by public employees. They examine the impacts of NHI on private employees' labor supply and wage, using difference-in-difference and correcting for the endogeneity of sectoral choices. The authors find a decrease in hours worked among the private-sector employees, relative to public employees. They find that overall there is a lack of change in relative private and public wage rates but that the NHI's impact on relative private and public wage is negative and rises with wage rates. This study concludes that NHI has distortionary effects on the labor market employers and it is unclear whether employers or employees bear more of the burden. Chou and Staiger (2001) also provide evidence that a welfare expansion decreases labor supply. The authors examine the introduction of a subsidized program in the pre-NHI era, which provide insurance to family members of employees. This program was found to discourage married women from working. On the contrary, Mete-Schultz (2002) studies the NHI's effects on elderly's labor force participation since NHI tend to be particularly valuable to subgroups such as

⁶Low-income individuals can be exempt from paying premiums

the elderly or the poor. The study finds that the effects on labor force participation are insignificant, i.e. 1.6% increase for females and 4% decrease for males.

The impact of Thailand's universal coverage scheme on labor market was investigated by Manachotpong and Wagstaff (2012b). The study uses the Labor Force Survey quarterly from 1997-2000 and monthly from 2001-2005 and exploits the staggered implementation across provinces and time in months. The policy was implemented over a period of nine months in four waves. The study is able to identify the set of provinces in each implementation waves, which were about two to four months apart. They find an increase in employment, especially among married women, a decrease in formal-sector employment among married men, and an increase in informal-sector employment among married women. UC increased informal sector employment by 2% initially and 10% after three years. However, the effects on formal sector are relatively small. The evidence is consistent with the hypothesis that UCS reduces medical expenditure risk associated with informal sector and allows the male partners to switch out of formal employment and the female partners to switch into the informal employment. While the study provides convincing and solid evidence, the study does not discuss if the rollout process was random. For example, the municipalities where Segular Popular was first implemented were associated with high informality rate, high fraction of males, and high doctors per capita. However, after controlling for several determinants at municipality level, the informality rate becomes an insignificant indicator of the implementation timing. Thus, it is important to confirm if informality determined the timing of the UC's rollout waves. There are a few contributions in addition to the study by Manachotpong and Wagstaff (2012b). First, this paper attempts to provide additional empirical evidence of the UC impacts on labor market, using different methodology and could yield different results. Second, this paper uses different survey datasets, specifically the Health and Welfare Survey (HWS), include information on chronic health conditions. These variables allow the study to analyze the heterogeneity of the policy impacts across different health demands since there is a reason to believe that subpopulations such as unhealthy individuals value health insurance significantly more than the rest of the population.

The impacts of health policy expansions and coverage on health outcomes have been well documents in both developed and developing countries. There is strong empirical evidence suggesting a significant health improvement after the introduction of universal coverage or healthcare expansion. This improvement in health could potentially lead to an increase in labor force participation and formal employment since the population is able to contribute more efficiently due to better health and the ability to work long hours. The effect, however, may not be an immediate response and only contribute to the national health capital in the long run. For example, lower mortality rates and probabilities of getting sick are found

to correlate with health coverage and public spending. According to a cross country study (OECD, 2016), life expectancies are found to have positive correlations with health coverage and health resources, such as coverages by public providers and densities of general practitioners. High public health spending leads to lower child, maternal, and adult mortalities (Bokhari et al., 2007; Moreno-Serra & Smith, 2012). The expansions of the U.S.'s Medicare and Medicaid are associated with better adult and infant health outcomes (Moreno-Serra & Smith, 2015). As for the health outcomes of Thailand's UCS, Limwattananon et al. (2014) compares the changes of healthcare utilization among groups to whom coverage was extended, with those of public sector employees and dependents. They find that the UCS reform reduces the probability that a sick person goes without receiving formal treatment by 3.2%. The percentage of receiving ambulatory care and admission to public hospitals also increases by 2.7% and 1%, respectively. Wagstaff and Manachotpong (2012a) also find a small decrease in the probability of reporting too sick to work due to the reform. The UCS also resulted in an estimated decrease of 6.5 infant deaths per 1000 births among the poor from 2001 to 2005 (Farahani et al., 2010; Gruber et al., 2013). Thus, there is ample evidence demonstrating the relationship between better health and the universal coverage or coverage expansion.

Lastly, various studies find positive relationships between labor outcomes, such as wages and probabilities of being employed, and health measures, such as height and weight. Currie and Madrian (1999) author a detailed review of health effects on wage, hours worked, and labor force participation. For example, Strauss and Thomas (1998) reports that among white males aged 27-35 from the U.S.'s National Longitudinal Survey of Youth, the elasticity of wages with respect to height is positive at around 1. In developing countries, such as Brazil, the elasticity is even larger at 3 or 4. Fogel (1994) finds that living standards over time increase with a decline in mortality and rise in body size. Bound (1991) reports that among the OECD population, those with more education and higher incomes are less likely to have any health limitations. Studies also find a positive relationship between health and hours worked (Chirikos & Nestel, 1985; Mitchell & Burkhauser, 1990). However, since these relationships are not necessarily one-way, i.e. an increase in income and labor outcomes could lead to better health, researchers use instrumental variables such as calorie intake, travel time to health services, water quality, and sanitation services to further study the causal impacts of health on labor outcomes. However, the validity of these variables is arguable since individuals may choose residential locations based on these amenities (Ronsenzweig and Wolpin, 1988). In sum, it is possible that a public healthcare expansion encourages labor force participation and formal sector employment due to an improvement in health of the overall population.

1.3 Program Overview

Thailand's Universal Coverage Scheme (UCS) is a primary-care-focus program providing a comprehensive package of health services including disease prevention and health promotion universally to the population who do not have access to health coverage via their employment. The program was launched during 2001 and 2002 and was initially called the 30-baht policy due to the price per visit at 30 baht (\approx \$1). The fee was eliminated by the subsequent government in 2006. The program was first piloted in six provinces in 2001 and was rapidly rolled out to all 76 provinces by early 2002. According to Manachotpon and Wagstaff (2012b), the program was gradually rolled out in four waves within the period of nine months total. The UCSs objectives include creating the equitable access among the entire Thai population and reducing the financial risk from health expenses of major diseases and injuries, such as the impoverishment from medical bills. The take-up process was simple. Individuals were required to register at designated hospitals, chosen from the list of approved care providers in the district health system network. The approved list of hospitals consists mainly of public providers and a small number of private providers. UCS users are required to get primary care from their designated hospitals, with the possibilities to be referred to other hospitals if needed. The program increases the population coverage from 68% in 2001 to 95% by 2004 as shown in Figure 1, covering around 65% of the population. Prior to this implementation, the government provide public health insurance via Medical Welfare Scheme (MWS), targeting children, elderly, and low-income earners, and Voluntary Health Card Scheme, premium-based insurance with government subsidies. After the UCS, these public schemes were eliminated and the enrollees were moved into the UCS.

UCS provides packages that are comprehensive with a small set of restricted diseases and results in a significant increase in patient demand and healthcare utilization. The access to health services, the utilization rates of outpatient and inpatient care services, and the overall health have improved. Based on an assessment report for Health Insurance System Research Office (Evans, 2012), the probability of forgoing formal treatments during illnesses has decreased. UCS also results in a one-third reduction of household medical expenditures and a half reduction among the top wealth quintile ⁷, resulting in a lower financial risk due to medical bills. There is also a crowd-in effect where households spend more on health goods such as medicines and medical supplies amount, which is about 20% above the pre-UCS level. There is also a decline in catastrophic expenditure incidence, from 6.8% in 1996 among the population to 2.8% in 2008 among UCS members in the bottom wealth quintile and from

⁷Thailand has both private and public hospitals, as well as a lot of clinics. Clinics and private hospitals charge a higher price for services. Since the top wealth quintile uses these services more, the medical bill among top wealth quintile can be much higher in the pre-policy era.

6.1% to 3.7% among the top wealth quintile. The study also finds a decline of household impoverishment, where a household falls below the national poverty line as a result of health expenditure shocks. The rate falls from 1.97% and 2.71% in 1996 and 2000 to 1.2% in 2004. However, even though UCS removes risks related to uncertainties in health spending, the authors do not find a decline in precautionary savings. Further studies should also look at the effect of UCS on investment and entrepreneurial activities.

Studies show no crowd-out of private formal care, in which patients do not reduce utilization of private hospital in order to use UCS via public hospitals (Lindelov et al. 2012). In contrast, the private care sector has a comparable growth with the public-sector⁸ due to higher medical workforce, capacity, competitiveness, growing demand for better care services, and promotion of medical tourism in Thailand. Recent studies look at topics related to the harmonization of Thai health coverage schemes to achieve equity across schemes, as well as the UCS impact on private hospitals and their strategic responses.

Prior to and after the implementation of the UCS schemes, individuals with formal employment are covered under Social Security (SS) benefits for private employees and Civil Servant Medical Benefit Scheme (CSMBS) for government employees. The UCS package is claimed to be equivalent to the other two health coverage schemes with the exception of a small list of restricted diseases. SS covers approximately 15% of the population in 2013. The program is financed through contributions paid by employees, employers, and the government. The contributions are linked other benefits offered by the system such as a comprehensive benefits of unemployment assistance, retirement plans, and death and disability compensation. SS offers benefits to workers but typically excludes their dependents. SS's health insurance package is similar to that of UCS. However, SS users can select designated hospitals from a larger list of participating care providers, where 60% are private providers and 40% are public providers. Based on these differences, the bundling with other social safety nets and the larger access of providers, some workers may place higher values on SS than UCS.

CSMBS covers government employees and government pensioners, around 9% of the population. The program is financed via general taxes and provides coverage for dependents including spouse, children, and parents. Thus, spouses of government employees with CSMBS are also covered by CSMBS. The data used here shows that over 90% of the gov-

⁸Thai health system has extensive coverage of the district health system (DHS) throughout the country. A typical districts catchment population of around 50,000 is served by a district hospital with 30-120 beds and 100-300 staff including general doctors, nurses, dentists, pharmacists and all other personnel, and by 10-15 subdistrict health centers, each with 3-5 paramedical staff. New medical graduates have mandatory service in rural areas, started in 1972 (Evans, 2012). The strong health infrastructure reflected in many health outcomes indicators such as 98% coverage of antenatal care, 73% prevalence of modern contraceptive use, and 98% immunization coverage of DTP3 (Tangchareonsatien et al., 2009)

ernment employees reported having access this scheme ⁹. The benefit package is considered the most superior among the three schemes with a smaller selected disease exclusion list. The users can access health in most public hospitals, as opposed to designated providers in UCS and SS schemes. The expenditure per capita of this scheme is also found to be the highest since users have access to larger lists of treatments and drugs. Because of more comprehensive coverage and the flexibility in choices of care providers, the value placed on CSMBS is likely higher than SS and UCS.

The disparities of the benefit packages across the three schemes, particularly the quality of care and the lists of selected disease exclusion, are documented in the following studies. The annual public spending per capita is estimated to be \$97, \$71, and \$366 for patients in UCS, Social Security, and CSMBS, respectively (Tangcheroensathien et al., 2014; Lindelow et al., 2012). CSMBS's high cost per patient stems from its inpatient fee-for-service provider payment method, as opposed to UCS's and SS's combination of capitation and DRG (diagnosis-related group) payment. The fee-for-service payment allows hospitals to prescribe higher-quality drugs to CSMBS users, where providers can reimburse the medical expenses from the government. On the contrary, the capitation and DRG system restricts hospitals to pre-distributed budgets, making the cost per patient more controllable. The relatively poor outcomes of care among UCS users may also be due to a lack of preventative care, an inadequate continuity of care over a long period of illness, and inadequate measures to prevent complications (Evans, 2012). This claim suggests that the low cost per patient in the UCS scheme could be influenced by patients' behaviors since they are less likely to utilize the healthcare and spend less.

In terms of program financing, the largest source of total health expenditure is from government spending, accounting for 85% of total health expenditure or 5.3% of GDP during 2001-2005, higher than the United States 4.4%, Singapore's 1.6%, and South Korea's 3.8%. A report cites estimates from Thai National Health Account Working Group that the public spending accounts for 45% in 1994, 56% in 2000 and 2001, and 63 to 76% in 2002-2012 (Tangchareonsathien, 2015). The total health expenditure accounts for 3.5% of the GDP, 3.3-3.4% in 2000-2001, and 3.5-4.5% of GDP in 2002-2012. The public health spending in other developing countries like Mexico, China, and Indonesia is 3.2%, 2.9%, and 1.2% of the GDP, respectively (Lindelow et al, 2012). Despite a rise in public expenditure, the program was praised because of the increase in population coverage and the improvement in health equity.

⁹The Health and Welfare Survey in 2001 records whether an individual accesses reported insurance via own employment, spouse, or other family members

1.4 Theoretical Framework

UCS is a healthcare expansion policy that targets uninsured population, including non-working individuals and workers with informal sector such as self-employment. The reform could change decisions related to labor outcomes such as labor force participation, sectoral choices, and hours worked. Based on a standard static labor theory, given all else constant such as labor demand. the policy lowers the incentive for workers to remain in the labor force or working in the formal sector. Contrarily, the policy raises the health capital of the labor force, which could lead to higher participation rates in the labor force and formal sector.

Workers make decisions based on the combination of wages and benefits from each sector choice. Following Gruber and Krueger (1991), the utility from working (U) is a linear combination of wage (w) and health coverage (c), as shown in Equation (1). αc represents the extent to which an individual place a value on the health coverage benefits, i.e. the monetary value or cost of health benefits. α should range between 0 and 1. Working in an informal sector, workers may earn different wage rates and forgo the health benefits offered in the formal sector. Choosing to not participate in the labor force, an individual gains non-monetary benefits from leisure and contributes to household production and forgo the health benefits offered in the formal sector

$$U = f(w + \alpha c) \tag{1}$$

UC's provision of fundamental and preventatives health services to all uninsured population exogenously raises the overall utilities of informal sectoral choice and non-labor force participation choice. The policy could influence some marginal workers to switch from formal sector to informal sector or non-working. The switching is likely to be concentrated among workers who place high valuation on health coverage such as those facing high healthcare expenditures. Although the value offered UC may not be as high as the values offered in SS or CSMBS schemes ¹⁰, the policy changes the relative benefits of being and not being in formal sector and potentially can lead to changes in sectoral choices.

While UCS may disincentivize participation in formal sector and the labor force, the reform could raise national health capital, which allows for higher labor force participation and formal employment. The fundamental importance of health on labor market outcomes is well-known (Grossman 1972; Weiss 1972), in which health is one of the key factors in determining the labor force participation (Romer, 1990; Barro, 1991). Good health increases

¹⁰Through premium contributions, SS offers non-health safety net programs such as death and disability compensation and retirement accounts. CSMBS offers a superior package in terms of treatment and drug choices and a wider range of health providers

the number of healthy days to produce and consume goods and services. It is common to model labor force participation (Y) as a function of health capital (H) and other factors such as education (E), stocks of physical capital (K), and a vector of other variables (Z). The relationship of health and labor supply, particularly labor force participation, has been studied extensively. Even with the challenges from the endogeneity of health measures and employment status, many studies develop convincing evidence that identifies a positive relationship between health and labor force participation (Berkowitz & Johnson, 1974; Mete & Schultz, 2002; Cai & Kalb, 2006; Cai, 2010; Garcia-Gomez et al., 2010).

$$Y = f(H, E, K, Z) \tag{2}$$

In sum, UCS reform could result in an ambiguous change in labor force participation and sector choices, particularly in the long-run. On one hand, the labor force participation and formal employment could fall due to an increase in the compensating differentials of the informal sector and non-working. On the other hand, the reform raises health capital stock that could lead to more labor force participation and formal employment. However, this latter effect may not be evident in the short-run. It is also speculated with UCS should result in high taxation levied from business revenues, which could hinder business creation and offset the increase in self-employment from the policy.

1.5 Methodology

This study focuses on the partial equilibrium effect on the policy on labor outcomes, assuming that the labor demand and wage offers in the formal sector remain constant ¹¹. To estimate the marginal effect of the policy, the study adopts a difference-in-difference approach and uses a linear probability regression model in equation (4), as opposed to other limited dependent variables model (Angrist & Pischke, 2009; Manachotpon & Wagstaff, 2012b). A valid result from difference-in-difference approach requires that the outcomes of treatment and control groups have parallel trends in the pre-policy periods ¹². The study further examines the heterogeneity of the policy effects across different health conditions and age, which are related to health demands and valuation of health insurance, through a triple-difference

¹¹This is likely since the policy does not change healthcare cost faced by the formal sector

¹²To formally test the parallel trends, studies run the following equation where the interacted terms between treatment indicator and year dummies are used, instead of the treatment indicator and the post-policy indicator. The identifying assumption requires that $\alpha_{2,t}$ for t of pre-treatment periods to be zero

$$E_{i,t} = \alpha_0 + \alpha_1 T_{it} + \sum_{\tau \neq 2001} \alpha_{2,\tau} (T_{i\tau} Y_{\tau}) + X'_{it} \gamma + \sigma_{pt} + \epsilon_{it} \tag{3}$$

method presented in equation (5).

Main Policy Impact

$$E_{i,t} = \beta_0 + \beta_1 T_{it} + \beta_2 T_{it} P_t + X'_{it} \gamma + \sigma_{pt} + \epsilon_{it} \quad (4)$$

where E_{it} and T_{it} are labor outcome variable and treatment indicator of individual i in survey year t . P_t is an indicator for post-policy periods. X_{it} represents a set of observable characteristics, which include regions, age-groups, educational attainment, and residential (urban) areas¹³. σ_{pt} represents province-time fixed-effects to control for variations in labor outcomes due to time and location. ϵ_{it} represents the error terms. Note that P_t is omitted since the regression already controls for time fixed-effects. β_2 is the coefficient of interest, which represents the treatment effect of the policy on labor outcomes. The regressions are run separately for male and female respondents due to a significant difference in labor force participation and sectoral choices observed in the Thai datasets. The fifth term on the left hand side takes into account the time-trend effect of the observable characteristics on labor outcomes.

Heterogeneity of Policy Impact

$$E_{i,t} = \beta_0 + \beta_1 T_{it} + \beta_2 T_{it} P_t + \beta_3 T_{it} P_t H_{i,t} + \beta_4 H_{i,t} + \beta_5 T_{it} H_{i,t} + \beta_6 P_t H_{i,t} + X'_{it} \gamma + \sigma_{pt} + \epsilon_{i,t} \quad (5)$$

where $H_{i,t}$ is an indicator of health conditions or demographics of interest. β_3 represents the difference of policy impacts between subgroups with $H_{i,t} = 1$ and 0. The policy impact for a subgroup with $H_{i,t} = 1$ is the sum of β_2 and β_3 while that for $H_{i,t} = 0$ is β_2 . This approach restricts the coefficients of covariates and time-trend effects to be the same across subgroups. To allow for the coefficients of covariates and time-trends to vary subgroups, the study could also run equation (4) separately for each subgroup. However, due to small fractions of individuals with health conditions, the study follows the analysis in equation (5)

1.6 Data

The datasets used in the analysis are repeated cross-sectional data from Thailand's Health and Welfare Survey (HWS) in 1991, 1996, 2001, 2004, 2005, and 2006. The surveys cover about 19,914 to 23,701 surveyed households per year, with the exception of a large survey sample of 62,167 households in 2001. The surveys cover about 68,000 to 98,000 individuals

¹³Sectoral choices and insurance scheme coverage tend to vary across geographical regions and residential areas due to different level of economic development.

per year. The survey was first conducted in 1974 by National Statistical Office (NSO) and was conducted every five years in the early stage. After 2001, the survey was conducted on an annual or biennial basis. The survey aims to obtain the information of health status, illness, disability, treatments, habits such as smoking and alcohol use, health insurance, health expenditure, health service utilization, satisfaction with health facilities, and other related health information. The survey sampling is a multi-stage sampling method by administrative units and residential areas ¹⁴. NSO provides weights at individual and household level.

Treatment Variable

Following several studies, the spousal coverage is used to identify treatment variable (Gumus & Regan, 2009; Holtz-Eakin, 1994; Fairlie et al., 2010) since having access to health policy expansion such as UCS should not affect an individual already covered by his/her spouse. This individual does not have to rely on employment for health insurance and is not expected to change behavior due to the implementation of UCS. Due to a lack of spousal coverage variable ¹⁵, the control group is defined as those married to individuals with access to CSMBS ¹⁶, offered to eligible government employees. For simplicity, if both spouses are government employees and report having access to CSMBS, it is assumed that they have access to CSMBS via own employment. Among the three scheme offered in Thailand, public provision, private employment, and government employment, CSMBS is the only scheme that offer health insurance to spouse ¹⁷. Individuals married to non-CSMBS beneficiaries are considered treated. Other alternatives of control groups such as individuals married to private employees should be considered for further analysis since their observable characteristics such as education may be more similar.

Two main reasons for which spousal coverage could be endogenous to the labor outcome of husbands/wives. First, unobserved characteristics of both spouses that affect labor supply could be correlated (Lundber, 1988; Cebi, 2011). For example, wives with strong preferences for leisure, child-bearing, or home production might tend to pair with husbands who can provide spousal coverage. This would overstate the effect of treatment variable (no spousal

¹⁴In the first stage, each of the 77 provinces was divided up into sampling units consisting of urban areas (blocks) and rural areas (villages). A random sample of blocks and villages was then chosen within each province with a sample size proportional to the total population of the province. In the second stage, 10-15 random households within each sampled block and village were chosen (Yiengprugsawan et al., 2009). The survey samples are representative of the Thai population. The response rates are around 75% for all years surveyed.

¹⁵Only available in 2001

¹⁶For simplicity, CSMBS includes both CSMBS and state-enterprise insurance. Both offer spousal coverage

¹⁷A negligible fraction of private-employment-linked health insurance offer spousal coverage, based on the 2001 dataset. Only 0.5% of the population has access to private-employer insurance and only 8.4% of these individuals report having this access via spouse. While, SS does not provide spousal coverage, 0.3% of those with SS report having this access via spouse, which is likely the measurement error.

coverage) on labor supply (working). However, since the treatment group's working rate is much lower than the control group in the dataset, it is unlikely that the control group (with spousal coverage) has strong preferences for leisure. Another source of endogeneity stems from the joint decision of both spouses. For example, husbands may sort into employment with spousal coverage, which allows wives to participate in risky activities such as informal sector. However, in this sample, the control group (with spousal coverage) has lower participation rates in self-employment. It is more likely that the control group (with spousal coverage) prefer working and formal sector, which means that they may be more risk averse compared to the treatment group. This notion suggests that the estimates from this analysis are the upper bounds in terms of magnitudes.

Sample Size

The sample is restricted to married individuals in non-schooling and non-retirement ages¹⁸. Single individuals are excluded from the analysis since tend to be younger and have less access to formal social safety nets, causing them to be less likely adjust their labor decisions due to the UCS policy change. However, it is arguable that single individuals are initially more susceptible to risks and may react to the UCS policy more than couples. Thus, the estimates from this analysis could be more or less modest than if the treatment group include single individuals.

Next, retirees are excluded from the sample for two reasons. First, some retirees may have access to retirement health coverage, which serves as an alternative to employment-linked insurance. These retirees should be unaffected by the policy but it is unable to detect this information in the dataset. Second, many elderly receive Medical Welfare Scheme¹⁹ prior to UCS and, thus, are not heavily affected by the UCS policy. Schooling-aged individuals are excluded from the sample since their decision to not participate in the labor market might include a decision to go to school.

Lastly, to eliminate the chance to misidentify a control group as treated, further restrictions are applied. Since individuals might have access to CSMBS via children or parents, which is unable to identify in the dataset, couples with old females²⁰ are excluded from the samples. However, this step results in a significant reduction of sample size, which may not be necessary since the fraction of CSMBS access via children is unlikely to be substantial.

¹⁸The cutoff is between 20 and 60 years old since the retirement age in Thailand is 60 and a large fraction of Thai teenagers attend school until 19-20 years old.

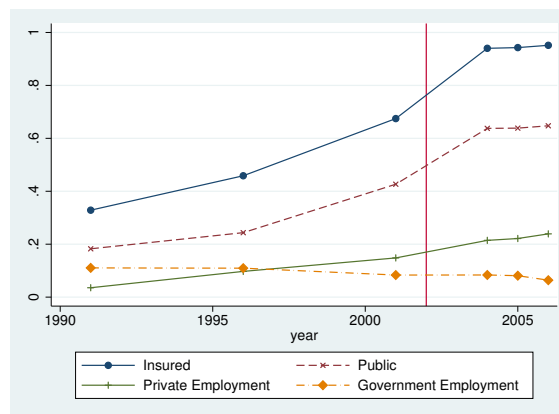
¹⁹MWS covered elderly but in practice, the elderly still faced large burden from out-of-pocket medical expenditure.

²⁰Specifically, couples whose wives are over 45 years old. According to CIA factbook in 2009, Thai females on average have their first child at 23.3 years of age. Together with the fact that a post-secondary education last until 21-22 years of age, these couples may have adult children who can provide them with CSMBS coverage.

The sample size for this analysis include 42,560 females and 42,560 males Initially, the surveys have 457,025 respondents aged over 15 years old, from about 150,000 households. The sample drops 175,760 non-head and non-spouse individuals. 46,345 single individuals were further dropped from the sample. Lastly, the age restriction excludes an addition of 143,701 observations from the sample. 92.3% of the females and 96.2% of the males are treated. Since the size of the control group is relatively small compared to the treatment group, further revisions could modify control groups to include merely spouses of private employees.

Figure 1 shows the insured rate over the period of study, 1991-2006, where the insured rate rises from about 67% in 2001 to near 100% after the UCS introduction. The plot shows a steady increase of SS coverage through private employment and a decrease in CSMBS coverage through government employment. These trends reflects an expansion of formal employment in private sector and a contraction of government sector. The public scheme, which includes Medical Welfare Scheme and Voluntary Health Card Scheme in the pre-UCS periods, has shown an increase in coverage in the 1990s.

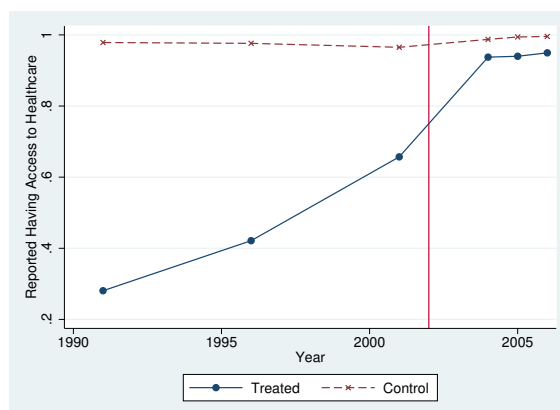
Figure 1: Insurance Access by Types



Note: The graph ignores the plot of small percentages, 1-2%, of the population who report purchasing private health insurance plans.

In Figure 2, the insured rate of the control group (with spousal coverage) should be 1 throughout the crouse of the study but show the rate slightly below 1 possibly due to measurement errors. The insured rate of the treatment group after UCS increases about 30% from 2001. The increase in insured rate from 1991 to 2001 is particularly due to the public provision expansion. The Voluntary Health Card (VHC), one of the two main public schemes, covered about 1.4% in 1991 and rose dramatically to 15.3% and 20.8% in 1996

Figure 2: Insured Rate by Treatment Status



Note: Due to measurement errors, the insured rates of the control group presented are not 1, but they are expected to be 1.

and 2001 due to the introduction of government premium subsidy ²¹ (Tangchareonsathien et al., 2009). The Medical Welfare Scheme (MWS) covers about 13% of the population (Tangchareonsathien et al., 2009).

Although Figure 2 shows a rising trend of insured rate, a threat to the identification strategy, the monetary benefits of VHC are likely to be significantly less than the benefits UC offer after 2001. Prior to 1993, the benefits of VHC were limited to 6-8 illness episodes per card and capped at 2,000 baht per episode (Pannarunothai et al., 2000). After 1993, although the government expanded the benefits of VHC and claimed that the program was comprehensive, the expenditure per capita was estimated to be 534 baht (\approx \$18) in 1999 (Tangchareonsathien et al., 2000). The public spending per capita of VHC was estimated to be 250 baht (\$8) (Tangchareonsathien et al., 2000) while the UCS expense per capita reached \$97 by the 2010s (Tangcheroensathien et al., 2014; Lindelow et al., 2012). It is reasonable to assume that the UCS expense per capita is much larger than VHC in the 2000s, as well. Thus, the introduction of UCS significantly raised health benefits through an expansion of public health insurance from the 1990s.

Table 1 and 2 shows descriptive statistics for the female and male samples, respectively, while Table 3 reports the descriptive statistics by treatment status. The average ages of the female and male samples are 33.2 and 36.6. About 34% of the sample lives in urban areas. 17% and 20% of the females and males, respectively, have high school education. These rates are reasonable since the compulsory education of the lower secondary education (middle

²¹Starting 1993, the parliament approved that VHC cost 500 baht (\approx \$17) per household and would be subsidized by the government for 500 baht. The policy was in effect starting 1995. (Pannarunothai et al., 2000)

school) was not enforced until 2003. The fraction of the sample with college education is 6.8 and 7.8% for females and males.

Table 1: Descriptive Statistics of Female Sample

	1991	1996	2001	2004	2005	2006	All	Control	Treated
Treated	0.905 (0.293)	0.908 (0.289)	0.923 (0.266)	0.929 (0.257)	0.928 (0.258)	0.943 (0.233)	0.923 (0.266)		
Demographics									
Age	31.52 (6.270)	32.63 (6.558)	33.39 (6.601)	33.68 (6.573)	33.52 (6.733)	33.96 (6.809)	33.17 (6.651)	35.16 (5.939)	33.00 (6.680)
Urban	0.256 (0.436)	0.324 (0.468)	0.352 (0.477)	0.382 (0.486)	0.358 (0.480)	0.347 (0.476)	0.339 (0.473)	0.545 (0.498)	0.321 (0.467)
Bangkok	0.107 (0.309)	0.138 (0.345)	0.162 (0.368)	0.177 (0.382)	0.147 (0.355)	0.127 (0.333)	0.144 (0.351)	0.157 (0.364)	0.142 (0.350)
At least high School	0.0937 (0.291)	0.118 (0.322)	0.141 (0.348)	0.189 (0.391)	0.198 (0.399)	0.256 (0.436)	0.168 (0.374)	0.567 (0.496)	0.137 (0.343)
At least college	0.0559 (0.230)	0.0766 (0.266)	0.0565 (0.231)	0.0664 (0.249)	0.0719 (0.258)	0.0760 (0.265)	0.0675 (0.251)	0.378 (0.485)	0.0427 (0.202)
Insurance access									
Insured	0.318 (0.466)	0.440 (0.496)	0.667 (0.471)	0.936 (0.245)	0.943 (0.231)	0.948 (0.222)	0.723 (0.448)	0.980 (0.139)	0.701 (0.458)
Public Insurance	0.183 (0.387)	0.240 (0.427)	0.439 (0.496)	0.654 (0.476)	0.664 (0.472)	0.667 (0.471)	0.485 (0.500)	0.0409 (0.198)	0.522 (0.500)
Government Employment	0.108 (0.311)	0.107 (0.310)	0.0779 (0.268)	0.0787 (0.269)	0.0751 (0.264)	0.0591 (0.236)	0.0834 (0.276)	0.868 (0.339)	0.0184 (0.134)
Private Employment	0.0266 (0.161)	0.0866 (0.281)	0.135 (0.341)	0.199 (0.399)	0.205 (0.404)	0.221 (0.415)	0.149 (0.357)	0.0782 (0.269)	0.155 (0.362)
Employment									
Working	0.309 (0.462)	0.374 (0.484)	0.468 (0.499)	0.541 (0.498)	0.562 (0.496)	0.574 (0.495)	0.477 (0.499)	0.708 (0.455)	0.458 (0.498)
Government	0.159 (0.366)	0.137 (0.343)	0.104 (0.305)	0.101 (0.301)	0.0851 (0.279)	0.0709 (0.257)	0.102 (0.302)	0.502 (0.500)	0.0504 (0.219)
Private	0.505 (0.500)	0.578 (0.494)	0.594 (0.491)	0.615 (0.487)	0.629 (0.483)	0.610 (0.488)	0.598 (0.490)	0.188 (0.391)	0.650 (0.477)
Self-employed	0.325 (0.469)	0.280 (0.449)	0.287 (0.452)	0.267 (0.443)	0.264 (0.441)	0.285 (0.452)	0.281 (0.450)	0.283 (0.451)	0.281 (0.449)
Employer	0.0108 (0.104)	0.00580 (0.0760)	0.0157 (0.124)	0.0167 (0.128)	0.0221 (0.147)	0.0339 (0.181)	0.0195 (0.138)	0.0269 (0.162)	0.0185 (0.135)
Underlying Health									
Chronic conditions	0.360 (0.480)			0.182 (0.386)	0.151 (0.358)	0.150 (0.358)	0.205 (0.403)	0.190 (0.393)	0.206 (0.404)
Major chronic conditions	0.0718 (0.258)			0.0536 (0.225)	0.0540 (0.226)	0.0459 (0.209)	0.0471 (0.212)	0.0393 (0.194)	0.0477 (0.213)
Observations	6928	5740	15568	4615	4590	5119	42560	5508	37052

Source: Thailand's Health and Welfare Surveys (1991, 1996, 2001, 2004, 2005, 2006)

Notes: Observations are unweighted sample size; Means and standard deviations are calculated using population weights given by Thai National Statistical Office; The insurance access consists of public insurance (Medical Welfare Scheme and Voluntary Health Card Scheme in the pre-UCS years and Universal Coverage Scheme after the policy change), government-employment-linked insurance (Civil Servant Medical Benefit Scheme (CSMBS) and State-Enterprise Scheme - both offer spousal coverage²²), and private-employment-linked insurance (Social Security and Employer-provided plan (≈ 0.003)); About 1-2% of the sample report privately purchasing health insurance plans; Employment outcomes include working²³, formal sector conditional on working, and informal sector conditional on working.

Overall, 72-73% of the sample reports that they have access to health insurances over the period of the study. During the pre-UCS periods, the reported insured rates are 32-34%, 44-48%, and 67-68% in 1991, 1996, and 2001, respectively. After the UCS reform, the reported insured rates are approximately 94-96% between 2004 and 2006. The fraction of population

²²Unable to differentiate the two schemes in the datasets

²³Unable to distinguish between unemployment and non-labor force participation

Table 2: Descriptive Statistics of Male Sample

	1991	1996	2001	2004	2005	2006	All	Control	Treated
Treated	0.956 (0.206)	0.955 (0.206)	0.961 (0.194)	0.965 (0.185)	0.964 (0.185)	0.974 (0.159)	0.963 (0.189)		
Demographics									
Age	34.68 (6.946)	35.80 (7.281)	36.89 (7.477)	37.14 (7.516)	37.26 (7.576)	37.42 (7.704)	36.58 (7.494)	38.95 (6.191)	36.49 (7.525)
Urban	0.267 (0.442)	0.309 (0.462)	0.359 (0.480)	0.384 (0.486)	0.364 (0.481)	0.341 (0.474)	0.339 (0.473)	0.590 (0.492)	0.329 (0.470)
Bangkok	0.110 (0.312)	0.123 (0.328)	0.159 (0.365)	0.163 (0.370)	0.138 (0.345)	0.118 (0.322)	0.135 (0.342)	0.127 (0.333)	0.136 (0.343)
At least high School	0.125 (0.330)	0.168 (0.374)	0.179 (0.383)	0.209 (0.407)	0.231 (0.422)	0.284 (0.451)	0.201 (0.401)	0.817 (0.387)	0.180 (0.384)
At least college	0.0684 (0.252)	0.0983 (0.298)	0.0747 (0.263)	0.0711 (0.257)	0.0765 (0.266)	0.0782 (0.269)	0.0781 (0.268)	0.647 (0.478)	0.0586 (0.235)
Insurance access									
Insured	0.338 (0.473)	0.475 (0.499)	0.682 (0.466)	0.944 (0.230)	0.942 (0.233)	0.955 (0.207)	0.734 (0.442)	0.986 (0.120)	0.725 (0.447)
Public Insurance	0.182 (0.386)	0.247 (0.431)	0.415 (0.493)	0.623 (0.485)	0.615 (0.487)	0.628 (0.483)	0.460 (0.498)	0.0110 (0.105)	0.478 (0.500)
Government Employment	0.112 (0.316)	0.111 (0.314)	0.0884 (0.284)	0.0883 (0.284)	0.0864 (0.281)	0.0686 (0.253)	0.0919 (0.289)	0.906 (0.292)	0.0604 (0.238)
Private Employment	0.0437 (0.204)	0.107 (0.309)	0.160 (0.367)	0.229 (0.420)	0.237 (0.425)	0.257 (0.437)	0.176 (0.381)	0.0659 (0.248)	0.180 (0.384)
Employment									
Working	0.983 (0.129)	0.981 (0.138)	0.958 (0.201)	0.959 (0.198)	0.954 (0.209)	0.959 (0.198)	0.965 (0.183)	0.985 (0.123)	0.964 (0.185)
Government	0.107 (0.309)	0.107 (0.309)	0.105 (0.307)	0.0976 (0.297)	0.100 (0.300)	0.0902 (0.286)	0.101 (0.301)	0.745 (0.436)	0.0755 (0.264)
Private	0.260 (0.439)	0.323 (0.468)	0.358 (0.480)	0.430 (0.495)	0.419 (0.493)	0.445 (0.497)	0.375 (0.484)	0.119 (0.324)	0.385 (0.487)
Self-employed	0.602 (0.490)	0.524 (0.499)	0.477 (0.499)	0.407 (0.491)	0.417 (0.493)	0.361 (0.480)	0.461 (0.498)	0.0935 (0.291)	0.476 (0.499)
Employer	0.0316 (0.175)	0.0461 (0.210)	0.0598 (0.237)	0.0656 (0.248)	0.0644 (0.246)	0.104 (0.306)	0.0629 (0.243)	0.0423 (0.201)	0.0637 (0.244)
Underlying Health									
Chronic conditions	0.391 (0.488)			0.135 (0.342)	0.126 (0.331)	0.122 (0.327)	0.186 (0.389)	0.186 (0.389)	0.186 (0.389)
Major chronic conditions	0.0432 (0.203)			0.0292 (0.168)	0.0378 (0.191)	0.0404 (0.197)	0.0317 (0.175)	0.0443 (0.206)	0.0312 (0.174)
Observations	6928	5740	15568	4615	4590	5119	42560	2917	39643

Note: See Table 1

with insurance from the private sector constantly rose during the study period, possibly due to both the private employment expansion. The fraction of population with CSMBS declines from 11% to about 7% due to the contraction of the government sector. About 1-5% of the sample has coverage from own-purchased plans.

Labor Outcome Variables

The dependent variables or outcomes of interest include an indicator of whether an individual works (working), works for a private employer, works for a government employer, is self-employed, or is an employer. The study assumes individuals report being family workers as non-labor force participation, thus non-working. Since the data does not allow for a differentiation between being unemployed and being out of the labor force, the working variable, here, does not equal to labor force participation, by definition, but it is the best estimate.

Table 3: Descriptive Statistics by Treatment Status

	Female				Male			
	Pre		Post		Pre		Post	
	Control	Treated	Control	Treated	Control	Treated	Control	Treated
Demographics								
Age	34.30 (5.793)	32.38 (6.572)	36.20 (5.948)	33.55 (6.727)	38.09 (6.179)	35.74 (7.334)	40.01 (6.043)	37.18 (7.630)
Urban	0.534 (0.499)	0.291 (0.454)	0.559 (0.497)	0.348 (0.476)	0.581 (0.494)	0.302 (0.459)	0.601 (0.490)	0.355 (0.479)
Bangkok	0.172 (0.377)	0.133 (0.340)	0.140 (0.347)	0.151 (0.358)	0.161 (0.367)	0.130 (0.336)	0.0853 (0.279)	0.141 (0.348)
At least high School	0.516 (0.500)	0.0810 (0.273)	0.631 (0.483)	0.187 (0.390)	0.794 (0.405)	0.132 (0.339)	0.849 (0.358)	0.225 (0.418)
At least college	0.396 (0.489)	0.0322 (0.177)	0.356 (0.479)	0.0523 (0.223)	0.653 (0.476)	0.0574 (0.233)	0.640 (0.480)	0.0596 (0.237)
Insurance Access								
Insured	0.968 (0.175)	0.435 (0.496)	0.994 (0.0749)	0.939 (0.240)	0.983 (0.128)	0.484 (0.500)	0.988 (0.108)	0.946 (0.226)
Public Insurance	0.0121 (0.109)	0.318 (0.466)	0.0752 (0.264)	0.704 (0.457)	0.000611 (0.0247)	0.299 (0.458)	0.0239 (0.153)	0.642 (0.479)
Government Employment	0.897 (0.304)	0.0208 (0.143)	0.832 (0.374)	0.0162 (0.126)	0.917 (0.275)	0.0674 (0.251)	0.892 (0.311)	0.0540 (0.226)
Private Employment	0.0566 (0.231)	0.0874 (0.282)	0.104 (0.305)	0.216 (0.411)	0.0622 (0.242)	0.108 (0.311)	0.0704 (0.256)	0.247 (0.431)
Employment								
Working	0.689 (0.463)	0.358 (0.479)	0.730 (0.444)	0.547 (0.498)	0.986 (0.117)	0.973 (0.162)	0.983 (0.131)	0.957 (0.204)
If Working								
Government	0.517 (0.500)	0.0565 (0.231)	0.485 (0.500)	0.0469 (0.211)	0.746 (0.436)	0.0775 (0.267)	0.745 (0.436)	0.0736 (0.261)
Private	0.200 (0.400)	0.634 (0.482)	0.175 (0.380)	0.660 (0.474)	0.128 (0.334)	0.324 (0.468)	0.108 (0.310)	0.442 (0.497)
Self-employed	0.267 (0.442)	0.299 (0.458)	0.301 (0.459)	0.270 (0.444)	0.0903 (0.287)	0.552 (0.497)	0.0974 (0.297)	0.404 (0.491)
Employer	0.0162 (0.126)	0.0103 (0.101)	0.0389 (0.193)	0.0233 (0.151)	0.0361 (0.187)	0.0468 (0.211)	0.0500 (0.218)	0.0795 (0.270)
Underlying Health								
Chronic conditions	0.323 (0.468)	0.363 (0.481)	0.137 (0.344)	0.162 (0.369)	0.310 (0.463)	0.394 (0.489)	0.138 (0.345)	0.127 (0.333)
Major chronic conditions	0.0391 (0.194)	0.0407 (0.198)	0.0394 (0.195)	0.0519 (0.222)	0.0317 (0.175)	0.0245 (0.155)	0.0542 (0.227)	0.0352 (0.184)
Observations	3847	24389	1661	12663	1999	26237	918	13406

Individuals report being self-employed under "own account" are considered self-employed while those report being self-employed with at least one employee on a regular basis are considered employers or business owners. The sector choices outcomes used in the analysis are conditional on working.

As for employment outcomes, 96.5% of the males report working while the female rate is much lower at 47.7%. Conditional on working, about 10% of both males and females work for the government. 59.8% and 28.1% of females are private employees and self-employed, respectively. The rates are 37.5% and 46.1% for males. About 2.0% of the females are employers while 6.3% are employers among the males.

From Table 3, female control group is more likely to work for the government and own

business, which could be due to the marriage matching in terms of education and the availability of wealth. The female self-employment rate between the two groups are similar in the pre-UCS periods. Similarly the male control group is more likely to work for the government but less likely to own business. The male treatment group is significantly more likely to be self-employed and private employees.

Health Demand Variables

The health demand variables used in the triple-difference analysis include chronic health conditions, major chronic conditions or diseases, and high age indicators. Individuals have chronic illnesses if they report having pre-existing chronic conditions e.g. diabetes, kidney problems, cancer, liver problem, epilepsy, etc. They have major diseases if they report having heart problems, high blood pressure, diabetes, or asthma. Individuals are considered old-aged in this sample if they are at least 40 years old. 20.5% of the females and 18.6% of the males report having pre-existing chronic illnesses. About one-fourth to one-sixth of these illnesses are considered major chronic illnesses.

Comparison of Observables across Treatment Status

Table 3 shows mean comparisons of observable characteristics such as age, residential areas, and educational attainment. The observables between the two groups are quite different. The control group is associated with those of older age, more education, and living in urban areas. In the analysis, it is important to control for variables that directly influence the dependent variables, especially those influencing both the treatment variable and the labor outcomes.

Examining the Parallel Trends of Outcomes

The difference-in-difference approach requires that the dependent variables ²⁴ the treatment and control groups have parallel trends before the policy change. Figure 3 presents visual evidence to determine with this assumption is met. The outcomes that likely pass this assumption are government employment for females and males. Table 4 presents regression results from main regressions but with individual year-treatment interaction terms, instead of the post-treatment interaction term. The table serves a similar purpose as the visual plots but was controlled for observable characteristics and time fixed-effects. The coefficients present the estimated policy impact by year. To satisfy the assumption, the treatment effect in the pre-policy periods should individually be zero, which is the case for government employment outcome for females. It is also the case for working, private employment, and employer outcomes in males. Interpreting the results needs cautions, particularly

²⁴Or the residuals of the dependent variables after controlling for the covariates that are strong predictors of treatment indicator and outcomes.

for the working and private outcomes in females and the government and self-employment outcomes in males since they show clear evidence of non-parallel trends.

Figure 3: Labor Outcomes by Treatment Status



Notes: Dashed line is control group and solid line is treatment group; Sector outcomes are conditional on working.

1.7 Results and Discussion

Main Results

Table 5 presents the main regression results where the labor force participation outcome are presented in column 1 and employment sectors conditional on working are presented in column 2-5. Column 2-3 are outcomes in the formal sector while column 4-5 are outcomes in

Table 4: Regression Results with Individual Year-Treatment Interaction Terms

VARIABLES	(1) Working	(2) Government	(3) Private	(4) Self-employed	(5) Employer
Panel A: Female Sample					
Treated	-0.0835** (0.0423)	-0.217*** (0.0347)	0.384*** (0.0379)	-0.121*** (0.0444)	-0.0454* (0.0233)
1991*Treated	-0.203*** (0.0477)	-0.0245 (0.0402)	-0.0638 (0.0447)	0.0468 (0.0511)	0.0415* (0.0238)
1996*Treated	-0.0983 (0.0622)	-0.00549 (0.0490)	-0.124** (0.0522)	0.0855* (0.0513)	0.0442* (0.0233)
2001*Treated	-0.0974** (0.0462)	-0.0514 (0.0387)	-0.0455 (0.0423)	0.0732 (0.0489)	0.0237 (0.0246)
2005*Treated	-0.0156 (0.0558)	-0.0490 (0.0482)	-0.0263 (0.0535)	0.0388 (0.0627)	0.0365 (0.0278)
2006*Treated	-0.0520 (0.0526)	-0.00240 (0.0475)	-0.185*** (0.0596)	0.142** (0.0574)	0.0453* (0.0261)
Constant	0.742*** (0.0292)	0.191*** (0.0205)	0.675*** (0.0386)	0.120*** (0.0373)	0.0136 (0.00957)
Observations	40,936	19,697	19,697	19,697	19,697
R-squared	0.160	0.404	0.272	0.194	0.074
Test for joint significance (P-Value)	2.96e-05	0.460	0.110	0.321	0.0920
Panel B: Male Sample					
Treated	-0.0177 (0.0108)	-0.308*** (0.0520)	0.216*** (0.0505)	0.0567 (0.0564)	0.0346 (0.0225)
1991*Treated	0.0171 (0.0122)	-0.130** (0.0566)	-0.0850 (0.0540)	0.221*** (0.0594)	-0.00546 (0.0255)
1996*Treated	0.0214 (0.0153)	-0.0848 (0.0614)	-0.0759 (0.0564)	0.154** (0.0610)	0.00722 (0.0293)
2001*Treated	-0.00856 (0.0118)	-0.140** (0.0568)	-0.0727 (0.0541)	0.203*** (0.0579)	0.00991 (0.0237)
2005*Treated	-0.0132 (0.0174)	-0.215*** (0.0612)	0.0577 (0.0581)	0.149** (0.0621)	0.00887 (0.0325)
2006*Treated	0.00517 (0.0178)	-0.146** (0.0629)	0.0150 (0.0701)	0.0998 (0.0616)	0.0314 (0.0340)
Constant	0.956*** (0.0194)	0.383*** (0.0210)	0.556*** (0.0339)	0.120*** (0.0330)	-0.0601*** (0.0165)
Observations	40,669	39,086	39,086	39,086	39,086
R-squared	0.034	0.305	0.225	0.250	0.074
Test for joint significance (P-Value)	0.00749	0.0638	0.475	0.000897	0.851

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; The regressions include province-year fixed effects and use population weights provided by National Statistical Office; The regressions control for age groups, educational attainment, residential areas, and region indicators.; Test for joint significance are the joint p-values whether 1991*treated, 1996*treated, and 2001*treated are significantly different from zero. 2004*treated is omitted in the regressions.

the informal sector. The regressions use individual weights provided by the National Statistical Office. The standard errors are robust. The regressions control for educational attainment, age groups, regions, and urban residence status, as well as control for province-year fixed effects to account for the time-specific effects on labor outcomes.

The policy impact on working outcome in females is positive and statistically significant. However, it is likely influenced by the increasing pre-trend of the working outcome in the treatment group. Thus, this result should be not meaningful evidence that the policy has a positive impact on working rates in females. As for other outcomes, the coefficients are not

Table 5: Main Regression Results

VARIABLES	(1) Working	(2) Government	(3) Private	(4) Self-employed	(5) Employer
Panel A: Female Sample					
Treated	-0.218*** (0.0209)	-0.244*** (0.0167)	0.306*** (0.0182)	-0.0525*** (0.0168)	-0.00889* (0.00512)
Post*Treated	0.111*** (0.0298)	0.0104 (0.0249)	0.00359 (0.0303)	-0.00561 (0.0293)	-0.00842 (0.0110)
Observations	40,936	19,697	19,697	19,697	19,697
R-squared	0.161	0.408	0.272	0.196	0.073
Pre-Treated	0.358	0.0565	0.634	0.299	0.0103
Pre-Control	0.689	0.517	0.200	0.267	0.0162
Post-Treated	0.547	0.0469	0.660	0.270	0.0233
Post-Control	0.730	0.485	0.175	0.301	0.0389
Panel B: Male Sample					
Treated	-0.00632 (0.00607)	-0.423*** (0.0199)	0.138*** (0.0170)	0.247*** (0.0149)	0.0382*** (0.0108)
Post*Treated	-0.0137 (0.00907)	-0.00246 (0.0306)	0.102*** (0.0298)	-0.109*** (0.0270)	0.00988 (0.0171)
Observations	40,669	39,086	39,086	39,086	39,086
R-squared	0.034	0.307	0.225	0.251	0.075
Pre-Treated	0.973	0.0775	0.324	0.552	0.0468
Pre-Control	0.986	0.746	0.128	0.0903	0.0361
Post-Treated	0.957	0.0736	0.442	0.404	0.0795
Post-Control	0.983	0.745	0.108	0.0974	0.0500

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; The regressions include province-year fixed effects and use population weights given by National Statistical Office; The regressions control for age groups, educational attainment, residential areas, and region indicators; The outcomes in column 2-5 are conditional on working.

significant. For the government, self-employment, and employer outcomes, which arguably pass the parallel trend assumption, it seems acceptable to suggest that the policy has no distortionary impacts to these labor outcomes.

As for males, the policy impacts on working and government outcomes are negative but insignificant. The policy impact on private employment is significant and positive at 10.2% while the impact on self-employment is negative at 10.9%, suggesting that the private sector replaces the self-employment sector after 2001. Since the parallel trends are arguably satisfied only for working, private, and employer outcomes, it is reasonable to conclude the policy has no significant distortionary effects on working and employer outcomes. While theory suggests that the positive effect on private outcome is possible due to better health of the population, the positive effect on private outcome is quite large and should be interpreted with caution. Visually, this outcome does not satisfy the parallel trend assumption. In

sum, for both female and male samples, there is no evidence that the policy would deter the overall population from working or crowd out private sector employment, which is a concern in developed countries.

Concerns and Caveats

The identification strategy is subjected a few issues. First, there could be unobserved characteristics that influence both the labor outcomes and the selection into treatment and control groups, i.e. selection bias. For example, wives with preference for leisure or home production could have self-select themselves into the control group (with spousal coverage). However, as the paper argues in the earlier section, this is unlikely to be the case since the female working rate of the control group is significantly higher than the treatment group. It could also be arguable that risk-averse spouses might be self-selected into the control group, which is unlikely true for females but could be true for males (employer outcome). This issue could be corrected using panel data to control for unobserved characteristics of each individual.

Second, the paper is unable to satisfy the parallel trend assumption for most of the outcomes, undermining the validity of the regression results. As discussed in the previous section, this analysis could potentially yield meaningful insights if the policy impacts on working or private employment is negative and significant. Since these two outcomes have increasing pre-trend among the treated group, relative to the control group, negative policy impact coefficients are strong evidence that the policy has sufficiently large impacts to reverse the trends. To mitigate this issue, further revisions could modify the control group, such as focusing on spouses of private employees, or reweight the control groups.

Third, the increasing insured rate in the pre-UCS periods, as presented in Figure 2, could pose another threat to the identification strategy. Based on the figure, one may argue that the policy is not a shock. Thus, people may change labor market decisions before the actual policy implementation date, causing insignificant results. Plus, the results could also suffer from the influence of the previous rise in the insured rate on the labor outcomes, dampening the UCS effects, based on this set-up. However, as argued in the previous section, UCS is a swiftly rolled-out policy after the rise of the new government led by Prime Minister Taksin Shinawatra. There was a lack of public discussion or program pilot regarding universal healthcare before 2001. The public most likely did not expect the jump public health insurance in 2001-2002. Furthermore, in terms of monetary value, UCS expenditure per capita is much higher than the public scheme expenditure per capita before 2001. Thus, UCS should have an unexpected and disruptive effect on the healthcare system and people's decision. This issue should not be a major concern in this analysis.

Fourth, another concern involves concurrent policies. It is important that when the policy

was implemented, there were no other policies that differentially affected the labor outcomes of treatment and control groups. Concurrent policies to be considered are Village Fund (VF) and One Tambon One Product (OTOP). VF was a microfinance policy that allowed the local villages to manage government funding of 1 million baht (\$30,000) per village and grant loans to the locals with low collaterals through group lendings. One Tambon One Product (OTOP) was a nation-wide support program to develop, manufacture, and distribute local products, typically food and agricultural products. Each tambon ²⁵ would pick one product to showcase and develop. For example, both policies could potentially increase self-employment and business creation among the treated group (no spousal coverage) more than the control group since the treatment group might have worse access to financial products. However, compared to the UCS policy, these policies had significantly smaller scales and were rolled out at slower rates than the UCS reform.

Another concurrent policy to be considered is the expansion of social security (SS) policy in 2002-2003. The policy change allowed all employers to enroll their workers in the SS scheme, as opposed to the previous regulations that only allowed employers with at least 10 employees to enroll in SS. This policy change could make the private sector more attractive and increase private sector employment. The policy could also weaken the effect of UCS on self-employment and labor force participation. For example, without the SS policy change, the positive effect on self-employment and the negative effect on working could have been more evident. However, since the social security office periodically passed laws to update the coverage to private employees, this policy announcement could be considered expected. The effect of this social security expansion should already be reflected in the pre-trends of the outcomes.

Heterogeneity of the Policy Impacts

The policy impacts are likely to vary by individuals health demands, which can be proxied using their underlying health such as whether they are in old age or have chronic illnesses or major diseases. The policy expansion should affect to people with health conditions more since health insurance is valuable to this group. The policy could allow these individuals to switch from full-time to part-time or non-working to accommodate their health conditions. They are able to rely less on health insurance from the formal sector. The study uses variables of chronic health and specific types of pre-existing health conditions reported in HWS data. The variables are cross-walked and consistent across survey years 1991, 2004, 2005 and 2006 ²⁶. The measures also capture responses with multiple conditions. As described in Table

²⁵An administrative unit after district. The rank of the administrative units are province, district, tambon, and village

²⁶Other survey years might ask similar questions but are unable to capture the same meanings as the

Table 6: Regression Results: Heterogeneity of Policy Impacts by Health Demand

VARIABLES	(1) Working	(2) Government	(3) Private	(4) Self-employed	(5) Employer
Panel A: Female Sample					
Main effects	0.186*** (0.0325)	-0.00711 (0.0300)	-0.00864 (0.0366)	0.0307 (0.0380)	-0.0150 (0.0126)
Effect on subgroup without chronic illness	0.180*** (0.0360)	0.0204 (0.0337)	0.0127 (0.0388)	-0.0205 (0.0423)	-0.0126 (0.0141)
Effect on subgroup with chronic illness	0.240*** (0.00102)	-0.0644 (0.384)	-0.115 (0.282)	0.197** (0.0155)	-0.0172 (0.548)
Difference	0.0600 (0.0796)	-0.0848 (0.0789)	-0.128 (0.111)	0.217** (0.0886)	-0.00460 (0.0317)
Effect on subgroup without major diseases	0.182*** (0.0333)	0.000854 (0.0308)	-0.00416 (0.0378)	0.0182 (0.0389)	-0.0149 (0.0132)
Effect on subgroup with major diseases	0.271** (0.0382)	-0.167 (0.119)	-0.0761 (0.380)	0.244* (0.0637)	-0.000983 (0.974)
Difference	0.0894 (0.134)	-0.168 (0.110)	-0.0719 (0.0918)	0.226* (0.135)	0.0140 (0.0326)
Effect on subgroup with young age	0.149*** (0.0350)	0.0320 (0.0301)	0.0427 (0.0374)	-0.0545 (0.0352)	-0.0202 (0.0143)
Effect on subgroup with high age	0.0291 (0.528)	-0.0212 (0.608)	-0.116** (0.0147)	0.120** (0.0228)	0.0174 (0.279)
Difference	-0.120** (0.0563)	-0.0533 (0.0512)	-0.158*** (0.0597)	0.174*** (0.0623)	0.0376* (0.0218)
Panel B: Male Sample					
Main Effect	-0.0193* (0.00997)	-0.00990 (0.0361)	0.105*** (0.0350)	-0.120*** (0.0328)	0.0250 (0.0206)
Effect on subgroup without chronic illness	-0.0229* (0.0120)	0.00224 (0.0413)	0.0758* (0.0407)	-0.0803** (0.0387)	0.00222 (0.0178)
Effect on subgroup with chronic illness	-0.0203 (0.328)	-0.0884 (0.160)	0.184*** (0.000908)	-0.184*** (0.00137)	0.0885 (0.0913)
Difference	0.00254 (0.0236)	-0.0907 (0.0740)	0.108 (0.0669)	-0.104 (0.0681)	0.0863 (0.0543)
Effect on subgroup without major diseases	-0.0191* (0.0104)	0.00426 (0.0376)	0.106*** (0.0366)	-0.129*** (0.0341)	0.0192 (0.0214)
Effect on subgroup with major diseases	-0.0294 (0.253)	-0.248** (0.0308)	0.0738 (0.476)	0.0581 (0.570)	0.116* (0.0713)
Difference	-0.0103 (0.0274)	-0.252** (0.121)	-0.0322 (0.109)	0.188* (0.107)	0.0966 (0.0675)
Effect on subgroup with young age	-0.00426 (0.0101)	0.0180 (0.0435)	0.147*** (0.0389)	-0.163*** (0.0388)	-0.00233 (0.0223)
Effect on subgroup with high age	-0.0267 (0.151)	-0.0272 (0.550)	0.0415 (0.376)	-0.0251 (0.492)	0.0108 (0.683)
Difference	-0.0225 (0.0211)	-0.0452 (0.0630)	-0.105* (0.0608)	0.137*** (0.0533)	0.0131 (0.0337)

Note: See Table 5; Since the chronic illness and major disease variables are only available in 1991, 2004, 2005, 2006, the main regression results as in Table 5 but with restricted survey year samples are also presented in the row, Main Effects; Note that the effects with triple differences with high age indicators are regressions of the full sample years; The regressions include the same set of explanatory variables as in Table 5 and, additionally, the following terms: three-way interacted terms between treated, post, and health demand, interacted terms of treated and health demand, and interacted terms of post and health demand; The effects of subgroups represent β_2 and $\beta_2 + \beta_3$ as represented in equation 5. Difference represents β_3 i.e. the triple difference of the coefficient of the three-way interacted terms; The chronic illness is 1 if individuals report having pre-existing chronic conditions e.g. diabetes, kidney problems, cancer, liver problem, epilepsy, etc. The major diseases is 1 if individuals report having the following conditions: heart problems, high blood pressure, diabetes, or asthma. The high age variable is 1 if individuals are 40 years old and above.

survey years being used.

3, about 18-20% of the population reported having chronic illnesses. About 3.1-4.8% of the sample has major illnesses, defined, here, as having heart diseases, high blood pressure, asthma, and diabetes. As for high-age indicator, the cutoff is set at 40 years old since it is the age in which people start to develop health issues.

The results are presented in Table 6 where the main effects, recalculated for survey years, 1991 and 2004-2006, are also presented. These main effects from a restricted set of survey years are similar in directions and magnitudes, compared to the main effects in Table 5. Focusing on the outcomes that arguably pass the parallel trend assumption, the discussion will ignore the working and private outcomes among females, as well as the government, private, and self-employment among males.

Table 6 shows that the policy increases self-employment among female with all three measures for high health demand. The effects among high-health-demand subgroup are also significantly different from the those among low-health-demand subgroup (insignificant effects). However, the magnitudes of the policy impacts among high-health-demand subgroup are quite large but similar across the three measures, at about 17% to 23% increase. The impacts on employer outcomes are negative (insignificant) for the two direct high condition measures across all subgroups, except the subgroup with high age where the impact is positive (insignificant). The difference of the impact on this outcome for group with high and low age is positive at significance level of 90%, suggesting that the policy impact on the high-age group is 3.7% larger than the policy impact on the low-age group. Lastly, the impacts on government outcomes are positive (insignificant) for low-health-demand groups and negative (insignificant) for high-health-demand groups. These findings is consistent with the theory that people who value UCS become less dependent on formal employment. While the private outcomes does not pass the parallel trend assumption, the results exhibit similar patterns as the government outcomes where the impacts on the high-health-demand group are more negative than their counterparts. Thus, the results among females fit the narrative that UCS may crowd out formal sector employment and encourage informal sector participation.

Among males, focusing on working and employer outcomes, similar narratives are detected. Table 6 shows that the working responses of high-health-demand subgroups are more negative (insignificant) than low-health-demand subgroups, except for when using chronic illness as health demand measure. The employer rate responses are more positive (insignificant) in high-health-demand subgroups for all three measures. The employer responses among subgroup with major diseases is positive at 90% significance level.

1.8 Conclusion

Like many developing countries, Thailand has been facing the challenge of a widening gap of inequality, including the inequity in access to health services prior to the UCS implementation. The regional variations in health outcomes and the unequal distribution of health resources across geographical areas were major concerns in evaluating the country's health profile. To address this concern of health outcome inequality and access inequity, the government swiftly introduced UCS in 2001-2002 to provide health services for the uninsured and achieve health equity across the entire population. Since then, monitoring the impacts of this scheme in terms of health status, utilization of health services, out-of-pocket healthcare expenditure, and strategic purchasing, has been a main focus of the policy evaluation and monitoring. Since the policy could also have distortionary impacts on the labor market, the paper examines the unintended policy impacts on the labor outcomes such as working and sectoral choices. The study contributes to the empirical pool of health policy impacts on the labor market, which is still limited in the developing countries setting. To my knowledge, Wagstaff and Manachotpong (2012b) is the only paper that studies labor impact of the UCS reform. However, the author uses a different survey and does not investigate the variation of policy effects by health demand or values placed on health insurance.

The study is unable to conclude that the UCS reform decreases labor force participation and formal employment, as concerned in many countries. However, the study finds evidence consistent with this prediction among subpopulation with high health demand such as those with chronic illnesses, major diseases, and high age. The results also seem to suggest that the policy increase self-employment and business ownership, where the impact on self-employment is more evident than the business ownership outcome. For the self-employment outcome, the results among females are more salient than results among males, suggesting that females may have more flexibility with labor market decision.

Based on these results, the UCS introduction is likely welfare-improving since there is no adverse impact on the labor market and there is positive impacts on health outcomes. The lack of labor response from the overall population could possibly result from the fact that the value of UCS is still inferior to schemes from formal employment in the early 2000s, the period of the study. Recently, the UCS expense per capita exceeds the SS expense per capita. Additionally, it is important to note that this type of study is sensitive to time and local labor market conditions (Dague et al., 2014).

The findings regarding the increase in self-employment and the decrease in working and formal sector participation among individuals with high health demand provide implication regarding healthcare financing and operations. Switching from formal to informal sector or non-labor force participation is usually associated with lower tax revenues to the government,

which is supposed to be used to finance the UCS. Also, since self-employed and non-workers are covered by UCS, the government should also expect more high-cost users in UCS and plan program financing and operation accordingly.

The paper addresses concerns and caveats when interpreting the results from this study, including the selection bias, the violation of parallel trend assumption, the threat regarding the rising pre-trend of public insurance, and the concurrent policies, as well as proposes steps for further revisions. Future studies could make use of panel data to control for individual-specific preference or modify control groups with weights or propensity score matching to satisfy the parallel trend assumption. Furthermore, there should be analyses on other outcomes such as hours worked, part-time status, and wages to provide further evidence. This work aims to demonstrate how existing national data sources can be used to describe and potentially track the change in labor outcomes due to this health policy in order to inform policymakers in Thailand and other middle-income countries with similar resources of these impacts.

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2 Migration Network and Selectivity in Education in Indonesia

Abstract

How does the structure of recent migrant inflows change when communities experience more migration? I study the variation in migration selection in terms of education across migration network sizes in the context of Indonesian internal migration from 1985-2005. Using data of years of migration and origins at municipality-level, I am able to identify origin-destination-specific migration networks using the ratio of established migrants stock at a destination and population at origin. I provide empirical evidence that highlight the role of network size in lowering the degree of positive selection in migration with respect to education. The results suggest that as origin communities accumulate migration experience, the education level of migrants should decline. The findings shed light on domestic policies related to rural and urban development, as well as international policies related visa criteria such as visa provision via family ties.

2.1 Introduction

As labor mobility increases, host countries experience a rising volume of immigrants and become more concerned about migrant quality, an important labor issue to monitor for both receiving and sending areas. Various studies document and seek explanations for a drift of migration selectivity from positive to negative over time (Hatton & Williamson, 2014). As a result, there might be public hostility in the host countries towards new immigrants who tend to have lower skills or education and pose some adverse impacts on the labor market, urban issues, and government spending. In an international migration context, some host countries have responded by imposing more restrictive immigration policies such as bans and quotas. The selectivity of migrants also becomes an important issue in home countries. Sending (home) countries may have concerns regarding a brain drain problem which could deteriorate the labor market and economic development. Migration can also cause a surplus of labor supply in the destinations, worsening the issues of unemployment, poverty, inequality, and crime in both origins and destinations.

Migration network plays a key role in increasing net benefits of migration and is found to increase migration flows (Biene et al. 2009). However, studies on roles of networks on the quality of migrants remain limited, both in the international and internal migration context. The paper, thus, attempts to study how migration networks affect the selection in migration with respect to education in order to better understand the characteristics of new migrant flows and provide insights on possible labor and development issues that may arise in urban and rural communities.

This paper examines how the migration network sizes could affect the migration selection with respect to education. While the paper analyzes the data from the internal migration context, it is assumed that the migration decision models should be similar in the international migration context. However, it is important to acknowledge several differences between the two settings. For example, the migration costs in the international context are likely larger. Also, the possibility of return migration or the communication frequency could differ. It is reasonable to assume that internal migration is associated with larger return migrants and communication opportunities, allowing networks to have a larger strength in the internal context²⁷. Thus, while the results presented here could be applicable to the international context due to the assumption of similarity in the migration decision models, it is ambiguous whether the estimates from this study are the lower or upper bounds for the international context.

Some advantages in studying internal migration context include the variation in network sizes under similar immigration rules. In the international context, cross-country studies face a challenge where network sizes are not exogenous and determined by international policies. Controlling for historical economic developing indicators, the network sizes are arguably exogenous in the internal context.

I construct an origin-destination-level network measure using the ratio of stocks of established migrants in a given origin and destination and the population at that origin. This information can be retrieved using current and past municipalities reported in the Intercensal Survey (SUPAS) in 1985, 1995, and 2005. I find that internal migrants in Indonesia are positively selected with respect to education where migrants on average have two more years of schooling than non-migrants. The main findings suggest that municipalities with large migration networks are associated with lower degree of positive selection, which is in line with the narrative that networks decrease the educational level of new migrant streams. The results show that a 1% increase in network size raises 0.11 years of schooling, which is about 5% of the degree of positive selection (≈ 2 years). While the estimates are relatively low in

²⁷i.e. knowing one person in the internal network could increase the chance of migration more than knowing one person in the international network

terms of magnitude, I find that the estimates vary with municipalities, suggesting that the role of networks in selection can differ. Subsample regressions show that the role of network effects in lowering selection degree is stronger for long-distance and across-region migration, which typically faces higher migration costs. Similar evidence is found for communities with high levels of connectivity, proxied by sizes, urban rates, and a diversity measure. To my knowledge, this paper is first to study the relationship of migration networks and selection with respect to education in the context of the Indonesian internal migration.

In terms of contributions, this paper provides implications on advantages and disadvantages between a family reunification policy and a skill-based admission policy, as well as identifies migration impacts on rural development and urban employment. For an international context, different visa criteria could lead to different characteristics of migrants, an aspect host countries are typically concerned. While the study focuses on the analysis of internal migration, international migrants usually face higher migration costs and rely more on family connections or networks. This claim suggests that the impacts in an international setting could be stronger than the results presented in this paper. Thus, the role of networks in an international context could be more salient than its role in a domestic context.

This research also has implications on labor issues that may arise in the destinations, especially to the unskilled fraction of the population. Depending on the quality of migration influx, certain skill groups could be hugely affected by migration. For example, an influx of low-skilled workers is likely to worsen job prospects of low-skilled residents in the destinations. Its impacts on high-skilled residents are ambiguous depending on whether these skill sets are complements or substitutes. There could also be long-term impacts to the origins such as skill depletion and lack of regional development. For example, a persistence of positive migration self-selection, without return migration, could lower human capital at origins and lead to lack of skill competitiveness in the origins. The origins could face difficulties in raising income level among their population since the remaining human capital, which is part of the production, is not sufficiently skilled. The origins could also have difficulties in accumulating human capital of the following generations due to lack of knowledge. In terms of business development, the outflow of skilled people decreases the demand for high-quality goods, reducing the capacity of firms in these origins to be able to finance productions of high-quality goods and services. With lacks of skill competitiveness and demand for high-quality goods, the origins can experience a vicious circle, in terms of economic development.

The remainder of the paper is organized as followed. Section 2 summarizes literature review related to migration models, predictions and evidence on migration selection with respect to education, and roles of networks in migration selection. Section 3 presents the theoretical framework adopted in this paper. Section 4 describes the identification strategy.

Section 5 explains data sources and discusses summary statistics. Results and discussion are presented in section 6. Finally, Section 7 concludes the paper.

2.2 Literature Review

Self-selection pattern is a large and active topic in migration. Studies have found mixed patterns of self-selection with respect to educational attainment. These mixed results are consistent with theories of sorting. To put it simply, theories suggest that self-selection patterns vary by origin's and destination's wage distributions and average (or minimum) wages, migration costs, and variables related to migration gains such as job search variables in destinations, risk of unemployment at destinations, etc. Roy Model (Roy, 1951; Borjas, 1987) shows that migrants are positively selected with respect to education if the returns to education in destinations are higher than ones in origins, i.e. the wage distribution is more disperse at destinations than origins. On the contrary, when destinations have lower returns to education but high average or minimum wage, migrants tend to be negatively selected.

Studies increasingly incorporate moving costs in the migration selection model. Borjas (1988) shows the selection patterns can be different when incorporating moving costs in the model if moving costs are related to labor market confounders. Moving costs could vary across individuals and tend to correlate with income-generating factors, including education. Chiquiar and Hanson (2005) assume that migration costs are decreasing in education and demonstrate that an intermediate selection, where the highly-skilled and unskilled workers do not migrate, can emerge from this modification. The unskilled workers may face relatively high migration cost, for example in terms of the number of hours worked to sponsor the moving costs, than the skilled workers. Thus, even though the destinations may offer higher average wages and have lower returns to education, moving costs significantly decrease net benefits from migration for these unskilled workers. The authors find a lack of negative selection among Mexican-US immigrants and evidence of intermediate selection. They find that individuals who belong in the middle of Mexico's local skill distribution are most likely to migrate This finding is contradictory with a public perception that Mexican immigrants are negatively selected. Other factors such as financial constraints can also play a role in lessening the degrees of negative selection (Angelucci, 2011).

Migration network is an evident factor in the volume of migration and seems to play an important role in migration self-selection. Migration often starts with a narrow range of each community's socioeconomic and demographic structure, following geographical, cultural, and political channels and allowing populations with low migration costs to first migrate. The presence of already-migrated groups lowers migration costs and risks for the newcomers and

prospective migrants (Massey et al. 1994; De Haas 2010), who rely on past and current migrants for information and financial supports on transportation and housing. Migration networks can also lower psychological and assimilation costs by providing familiar cultures, foods, and languages. As migration becomes more prevalent, it is typical to observe that the characteristics of migrants become more diverse and cover a wider range of population. The migrant streams usually become less selective and more representative of each community. The migration network is thus a self-reinforcing process that continues as long as the networks are within certain thresholds and do not break down.

Migration networks help lowering migration costs physically and mentally (Massey, Goldring & Durand, 1994; Carrington, Detragiache, & Vishwanath, 1996; Bauer et al., 2005; Kanbur & Rapoport, 2005). Intuitively, networks help lower transportation and relocation cost, provide housing at destinations, lower time spent in job search, raise job prospects such as better job types and pays, reduce risk of being unemployed, and provide emotional support. Relatives and friends could help newly-arrived migrants find housing and provide car rides to destinations. They could raise their chance of being employed by referring migrants to jobs and sharing industry knowledge. They can also help with the migrants' income smoothing during job searching periods by providing food and part-time jobs. Lastly, they serve as familiar environments with local foods and languages, which help migrants transition to different cultures and lifestyles. Networks can also be a source of finance for moving and act as a normative pressure that makes people migrate. Since networks reduce costs and risks in migration, it is expected that a larger volume and broader set of people will migrate (Masset, Goldring & Durand 1994).

Various studies provide empirical evidence of a relationship between migration network and migration costs. Carrington et al. (1996) model labor migration with decreasing moving costs as migration networks grow and show that the model is consistent with the historical pattern of the Great Black Migration during 1915-1960. The North-South migration patterns did not start right after the Civil War when the income gap was large but was accelerated many years later even when the income differentials narrowed down. They conclude that migration networks must have played a role in lower moving costs and still attracted migrants to Northern destinations despite the narrower wage gains. Biene et al. (2009) studies international migration in 1990 and 2000 and concludes that international networks, also referred to as diasporas, increase migration flows by lowering the migration costs. Mahajan and Yang (2017) studies the role of migration networks on migration flows using hurricane incidences across the globe to identify shocks, i.e. hurricane-induced migration, to U.S. immigration from the hurricane-affected countries. The authors identify migration networks as prior migrant stocks in the U.S. and find that the size of hurricane-induced migration

increases in the size of prior migrant stocks.

Migration networks could increase job prospects such as the probability of getting hired, job arrival rate, and the level of wage (Munshi 2003; Zhou 2015). They usually help lower job search costs, increase the likelihood of getting hired, and improve wage outcomes. Munshi (2003) identifies exogenous migration networks among Mexican migrants in the U.S. labor market using rainfall shocks. He finds that individuals from large networks are more likely to be employed and receive higher pay. Zhou (2015) estimates a dynamic model for internal migration in China and distinguishes two channels in which networks may affect migration decisions. The results suggest that networks have direct effects through both migration costs and through job arrival rates. However, some studies may find the adverse effects of networks on job prospects due to lack of job-search and assimilation efforts in segregated enclaves (Boeri et al., 2011).

Focusing on the role of network in lowering moving costs, several studies claim that moving costs are decreasing with education, suggesting that networks could potentially affect selection patterns with respect to education. The evidence or assumption that networks' impacts on moving costs vary educational levels are key in this reasoning throughout this paper. When considering wage as a time-equivalent unit, skilled individuals should face smaller migration costs since they need fewer working hours to meet the fixed out-of-pocket moving costs (Chiswick 1999; Chiquiar & Hanson 2005; Cuecuecha, 2005). In addition, in the context of Mexico-U.S. migration, Chiquiar and Hanson (2005) argue that educated individuals may have fewer difficulties meeting bureaucratic requirements, paperwork, and legal costs than less-educated individuals. In terms of access to credits, less-educated individuals may face higher interest rates or borrowing costs due to their higher probabilities of defaults (Angelucci, 2011). Chiswick (1999) suggests that individuals with higher human capital such as higher schooling and language proficiency are able to access and interpret information more efficiently, which lowers their psychological costs and makes the migration process easier. Similarly, individuals with higher education or skills are found to be better equipped with the ability to bargain with potential employers (Cuecuecha, 2005) and have higher ability to assimilate information and transferable skills (Bauernschuster et al., 2012)

The skilled workers are also likely to have better access to job opportunities through their networks, causing them lower financial and psychological costs related to job search and security in the destinations. Thus, given that moving costs vary with educational attainment, network can have different impacts across education groups and affect decision to migrate for each education group. It is likely that a migration network can impact selection with respect to education through its relationship to moving costs. ²⁸.

²⁸Details are presented in theory section

Studies find that networks reduce migration selection with respect to several characteristics, including educational attainment. Massey et al. (1994) finds that within the origin communities, the range of migrant characteristics broadens over time. The authors conclude that the migration prevalence, defined as people with migration experience in the communities, dampens the role of demographic and economic factors in migration decision. Biene et al. (2009) studies migration networks or diasporas, which is defined as stocks of emigrants, from 195 countries to 30 developed host countries in 1990 and 2000. The study finds that these networks increase the size over time and lowers the average educational attainment of current migration flows. The study also finds that migration network leads to high concentration of low-skilled immigrant problem. The paper concludes that without the change in family reunification policy, the skill-based selection rules may not alleviate with the concern of the falling quality of migrants.

This paper's research question is closely aligned with McKenzie and Rapoport (2010) that finds that networks lower the degree of positive selection or lead to negative selection with respect to education in the Mexico-U.S. migration context. The authors exploit the arrivals of rail system in Mexico and historical out-migration rates to instrument for migration networks and exogenously identify the causal impact of migration network on selection. Another related study is Bertoli (2010), which studies self-selection of Ecuadorian migrants in an international migration setting, using the geographical variation in economic crisis impacts to exogenously identify migration networks. The results from this study are consistent with the prediction that migration networks increase the degree of negative selection with respect to education. On the contrary, the findings in Orrenius and Zavodny (2001) do not seem to imply any relationship between network and selection patterns. The study identifies migration networks as having a father or sibling with previous migration experience in the Mexico-U.S. migration context and use this network measure to proxy for migration cost. The results suggest that networks improve hazard rate of migration but have no differential effect by skill level.

Evidence from developing countries and from internal migration context includes Garip and Curran (2012). The authors use panel data from Thai villages during 1984-2000 to construct a network measure using the number and distribution of migration trips. The study provides empirical evidence that migrant streams become less selective in terms of gender, marital status, and land ownership, but a lack of evidence in terms of education.

As for the Indonesian context, internal migration is a long-standing phenomenon whereas international migration is relatively limited. Only 1.5% of the population lived abroad in 2001 whereas 10% lived in a province different from their birth province (Farre & Fasani 2013). The intra-provincial migration is estimated to be two to three times larger (Duncanes

& Abella 2009) According to the 1930 census, 11.5% of the total population lived outside their districts of birth. About 5.6% moved beyond provincial borders, which accounted for about 3.3 million interprovincial migrants (Lottum & Marks 2011). Throughout this century, inter-provincial migration rates, i.e. fraction of individuals living outside birth provinces, rose significantly from about 5% in 1971, similar to the rate during the colonial era, to 8.2% in 1990 and 10.1% in 2000 (Lottum & Marks 2011).

The literature on internal migration in Indonesia stress the significance of employment opportunities in shaping the mobility patterns (Hugo & Graeme, 2000; Lottum & Marks 2011; Spaan 1999; Hugo 1978; Mantra 1981) The concentration of economic activity in Java has resulted in more rural-urban migration and many growing urban centers such as Jakarta, Surabaya, and Semarang (Lottum & Marks 2011).

Indonesia’s transmigration policy can post a threat to this analysis since it intended to redistribute the national labor mobility and could impact individuals’ migration decision. This policy aimed to encourage labor movement from the populated Java islands to the less-populated outer islands. First launched in the 1950s, the policy was able to relocate 90 thousand households during the 1950s and 1960s. By 1997, the policy managed to move 1.4 million families or 6.5 million people to move out of Java (Tirtosudarmo, 2009). However, after the financial crisis in 1997 and the political transition, the program was scaled down and did not provide enough incentive to achieve the same level of migration. There were also huge waves of reverse migration from the outer islands backs to the inner islands. The caveats regarding the transmigration policy will be discussed in the results section.

2.3 Theoretical Framework

Migration decision is based on net discounted values of income streams in origins and destinations (Sjasstad, 1962). Let the wages faced by residents at an origin and a destination be w_d and w_o . Assume, the wage equation follows a log-linear functional form and is a linear combination of location-specific minimums (μ) and increases in schooling (s). The minimums and the returns to education (δ) are assumed to be non-negative.

$$\ln w_o = \mu_o + \delta_o s \tag{6}$$

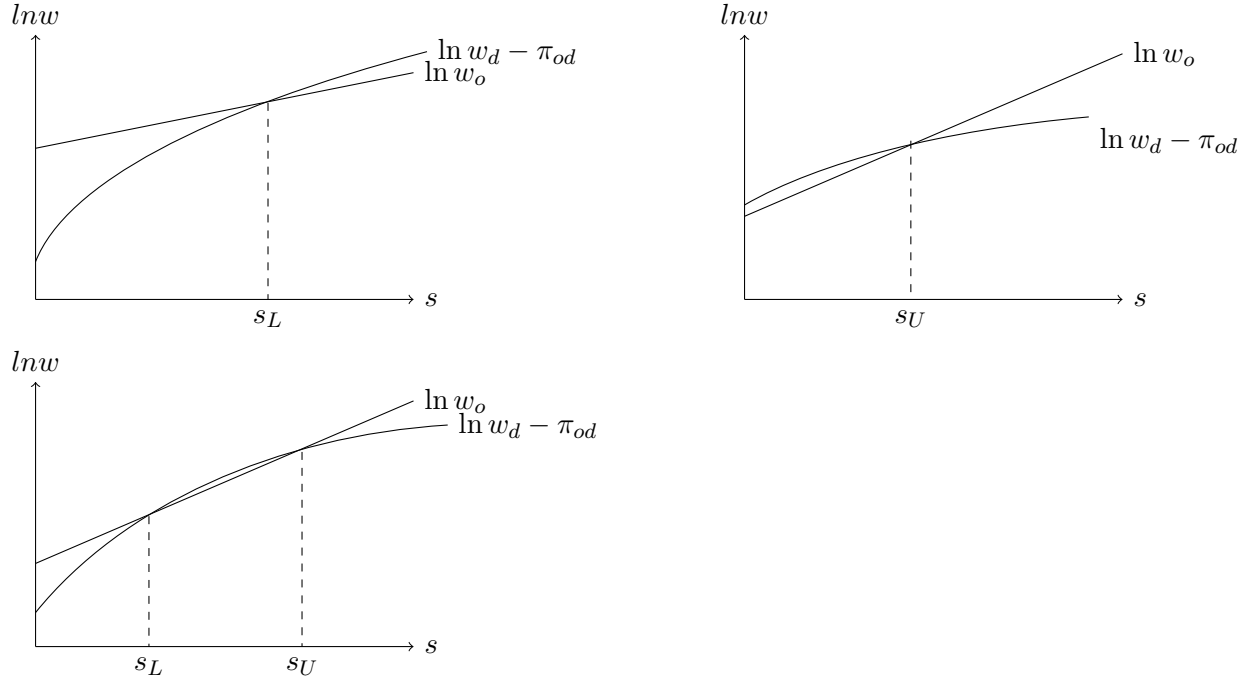
$$\ln w_d = \mu_d + \delta_d s \tag{7}$$

Now, let a migration cost between an origin and a destination (C_{od}) be non-negative. The decision to migrate should depend on the migration cost and the relative wage between origin and destination and. Following Chiquiar and Hanson (2005), let π_{od} be a migration cost in time-equivalent units, i.e. $\pi_{od} = C_{od}/w_o$. Also, let migration decrease in education and

assume this function following form, $\ln(\pi_{od}) = \mu_\pi - \delta_\pi s$. Thus, the gain from migration is the following. Figure 4 shows possible migration selection patterns based on different conditions of minimum wages, returns to education, migration costs, and the assumed functional form.

$$\begin{aligned} \ln w_d - \ln(w_o + C_{od}) &\approx \ln w_d - \ln w_o - \pi_{od} \\ &\approx (\mu_d - \mu_o) + (\delta_d - \delta_o)s - e^{\mu_\pi - \delta_\pi s} \end{aligned} \quad (8)$$

Figure 4: Migration Selection Patterns with Respect to Education



Note: Assume the functional form as in equation (8); The solid curved line represents the wage profile at destination, net of migration cost; The dashed curved line represents the wage profile at destination, net of migration cost, and accounts for the network effect; The solid straight line represents the wage profile at origin; Top-left is the positive selection case where $\delta_d > \delta_o$; Top-right is the negative selection case where $\delta_d < \delta_o$ and $\mu_d > \mu_o$; Bottom-left is the intermediate selection case where $\delta_d < \delta_o$ and $\mu_d > \mu_o$ and δ_π is large; A trivial case where $\delta_d < \delta_o$ and $\mu_d < \mu_o$ should not lead to any migration

Following McKenzie and Rapoport (2010), assume migration networks reduce migration cost as in the following functional form, where network sizes have a negative linear relationship with logged time-equivalent migration costs ($\ln(\pi_{od})$), as presented in equation (9). Schooling in equation (9) is now considered a function of network as well.

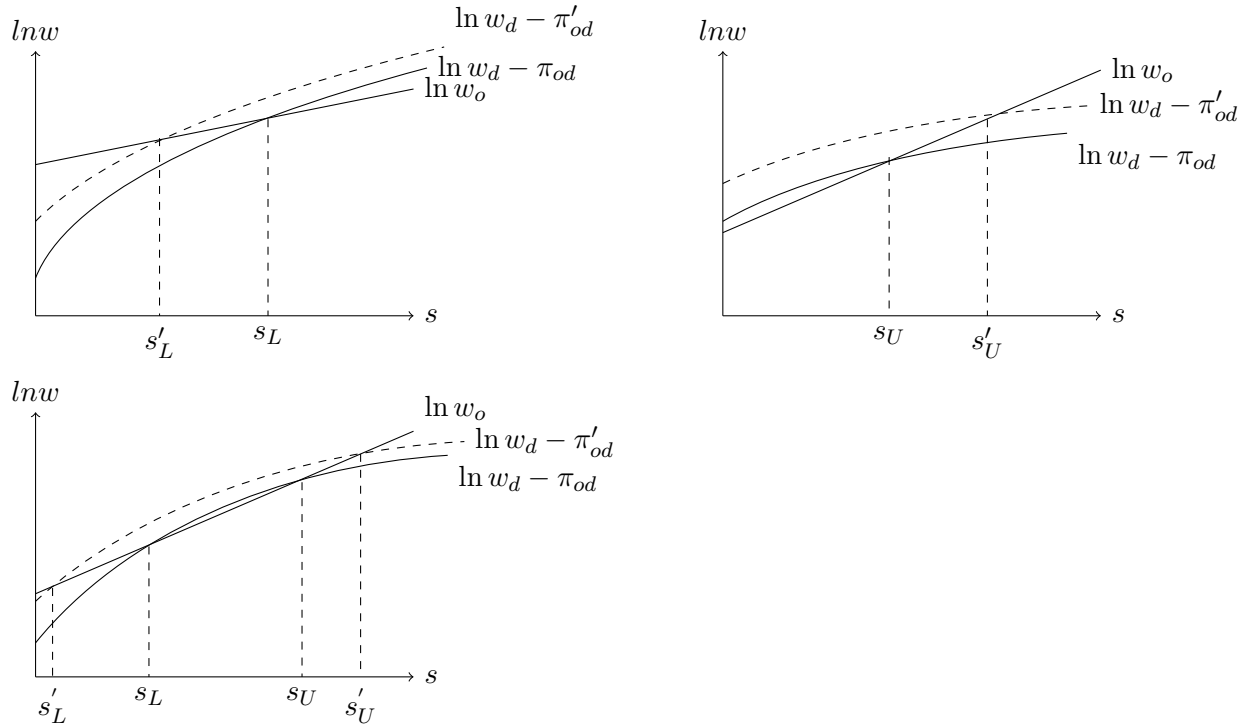
$$\ln(\pi_{od}) = \mu_\pi - \delta_\pi s(n) - \gamma n_{od} \quad (9)$$

This functional form implies that the rate in which network sizes reduces migration costs is decreasing with respect to education, i.e. the double differential of migration cost

with respect to education and network is positive ($\frac{\partial^2 \pi_{od}}{\partial s \partial n_{od}} < 0$)²⁹. In other words, it is implied, here, that networks help lower time-equivalent migration costs more for unskilled individuals. Since unskilled individuals are likely to benefit more from their networks than skilled individuals, it is reasonable to assume this mathematical form.

Based on this functional form and assuming non-decreasing distribution across education level, network should decrease a degree of positive selection. However, one can assume a different functional form, e.g. zero double-derivative, which will lead to an ambiguous prediction depending on further assumptions regarding population distribution across education level. Figure 5 shows the migration selection patterns when network is introduced to the model.

Figure 5: Migration Selection Patterns with Role of Migration Network



Note: π'_{od} is time-equivalent migration cost individuals face when they have access to migration network; The solid curved line represents the wage profile at destination, net of migration cost; The dashed curved line represents the wage profile at destination, net of migration cost, and accounts for the network effect; The solid straight line represents the wage profile at origin; Top-left is the positive selection case where $\delta_d > \delta_o$; Top-right is the negative selection case where $\delta_d < \delta_o$ and $\mu_d > \mu_o$; Bottom-left is the intermediate selection case where $\delta_d < \delta_o$ and $\mu_d > \mu_o$ and δ_π is large; A trivial case where $\delta_d < \delta_o$ and $\mu_d < \mu_o$ should not lead to any migration.

²⁹Mckenzie and Rapoport (2010) states this claim differently but leads to the same implication. The authors show a mathematical proof in the appendix that as networks increase, the drop in the education lower bound is larger than the rise in the education upper bound.

2.4 Identification Strategy

To test the extent to which migration networks change selection with respect to education, I estimate the following equation using a sample of new migrants.

$$E_{iodt} = \alpha + \beta N_{odt} + \phi' X_{iodt} + \gamma' U_{od} + \psi' Z_d + \sigma' Z_o + \rho' Y_t + \epsilon_{iodt} \quad (10)$$

where E_{iodt} is years of schoolings. N_{odt} is a origin-destination-specific network size variable. X_{iodt} is a vector of individual-level characteristics key to a migration decision including gender, marital status, and age. U_{od} is a vector of origin-destination-level characteristics key to migration decision including origin-destination distance and origin-destination wage ratio. Z_d is a vector of historical economic development indicators at destination including historical urban rate, agricultural rate, land ownership rate, and labor force participation in 1980. Z_o is a vector of historical economic development indicators at origin, which further includes historical schooling variables such as historical average schooling years of working-age male, school attendance rate of schooling-age male, and Gini of working-age male's schooling years since these variables are key predictors of years of schooling. Lastly, Y_t is survey year indicators since the analysis pools data from three different survey years. Based on the theory section, the main coefficient, β , is expected to be negative.

The main concern in this analysis is the endogeneity of network size since there might exist omitted variables that influence both network sizes and years of schooling. For example, investments in schooling infrastructure may not be reflected in the historical development and education variables. It directly affects years of schooling and could potentially influence migrant networks. The origins with well-equipped schooling infrastructure provide residents with more education and allow them to migrate out for better opportunities, which grant their offsprings with larger network sizes. This scenario should lead to an upward bias since the omitted variable is positively correlated with network size and education, causing β to be less negative. On the contrary, an ill-equipped schooling infrastructure should lead to low schooling on average, which could drive people to emigrate and seek better education elsewhere. This scenario, instead, leads to a downward bias since the omitted variable is positively correlated with network but negatively correlated with education, causing β to be more negative. Since the first case is more likely to fit the Indonesia internal migration context, negative estimated β should imply negative causal effect as well.

While OLS regressions with observational data do not necessarily imply causal relationship, controlling for origin-level and destination-level historical development indicators, as well as origin-destination-level distance and wage ratio, as shown in the equation should mitigate the endogeneity issue. To further address this concern, I also control for origin

and destination fixed-effects, which theoretically does not completely eliminate the omitted variable issue but should reduce the degree of bias.

2.5 Data

The study uses the migration information at municipality level, available in Indonesia's Intercensal Survey (SUPAS) starting in 1985. Most national datasets offer information on migration flows up to province-level, thus, the migration information at municipality level in SUPAS is advantageous for this study ³⁰. The intercensal surveys, thus, allow for variation of network size across the country, about 281 municipalities in 1980 ³¹, as opposed to about 33 provinces.

In this study, I use the most recent and available datasets in 1985, 1995 and 2005. Central Bureau of Statistics Indonesia (BPS) conducts SUPAS every ten years between census surveys, also conducted every ten years. The datasets are repeated cross-sectional and nationally representative. However, the surveys are conducted among permanent residents, defined as individuals with permanent addresses or residence, excluding non-permanent residents such as homeless, refugees, crews of Indonesian ships, those living in inaccessible areas, and those living on boats or houseboats, which may cause the observed migration rates to be underestimated. For example, the data may not be able to detect seasonal migration. The data is available upon request via IPUMS-International, which inventories and harmonizes micro-census data from international sources.

Migration Network Size Measure

Starting from 1985, the surveys record migrants' origins and birthplaces at municipality level, as well as the duration of stay at current municipalities ³². The information on the duration of stay in current residence allows researchers to be able to differentiate between recent and established migrants. Here, the established migrants are defined as those migrated at least 5 years ago, i.e. have been living in current municipalities for 0 to 4 years.

Since a stock of established migrants at a destination from a origin should constitute a migration network for residents in that origin, the migration network variable is computed using the ratio of established migrants stock and population in the origin. I exclude estab-

³⁰To my knowledge, no other available surveys provide information on duration of stay and origin at municipality level. For example, Indonesia's census surveys (SUSENAS) started recording origins at municipality level in 2000 but do not record duration of stay. However, they have larger sample sizes and cover non-permanent residents.

³¹The number of municipalities grows to about 444 municipalities by 2010.

³²Specific questions are the followings. "Did you ever lived in other regencies/municipalities?" "Where was your last residence before you live in current residence?" "How long have you been living in this current regency/municipality?"

lished migrants who moved back to birth municipalities, which is about 11.7% of all the established migrants since they are less likely to provide assistance for people in their previous locations (their previous destinations) in migrating to their hometowns. About 75.2% of all the established migrants report birth municipalities as their previous locations while 13.1% report non-birthplace as their previous locations. I assume that the first group constitutes networks for their birthplaces while the second group constitutes networks for both their birthplaces and their previous locations.

The choices of population in the denominator of the network measure include current population, historical population in 1980, population at origin municipalities, and population reported born at each municipality. These population measures give similar results. Therefore, I use population at origin municipalities. When computing population at origin municipalities, defined as population across the country who share the same previous residential municipalities, I restrict the data to municipalities that are surveyed across all three survey years ³³. Since the surveys exclude some provinces in 1995 and 2005 ³⁴, I restrict the analysis to migration between 192, out of total 281, municipalities ³⁵. The final sample includes municipalities in Java, Sumatra, and Nusa Tenggara regions and exclude about 89 municipalities outside these regions. The municipalities are also cross-walked to be consistent with the municipality list in 1980.

Figure 3 shows the distribution of network size for all new migrants and for observed origin-destination pairs in all survey years. The average origin-destination network size among new migrants is 0.0155, i.e. about 1.5 people out of 100 people in their communities is established migrants in a specific destination. The fraction of established migrants in this sample is about 18%, i.e. about 1 in 5 persons in each community is established migrants in various unspecified destinations.

Educational Attainment Outcome

The variable for years of schooling is ranged from 0 to 17. Since this variable is observed at destination after the move, as opposed to when migrants leave origins, I restrict the analysis to individuals who are in post-schooling ages at the time of the move, specifically 25 years old in survey years or at least 20 years old in the time of the move ³⁶. This step aims to avoid the case where migrants move to pursue further education at destinations.

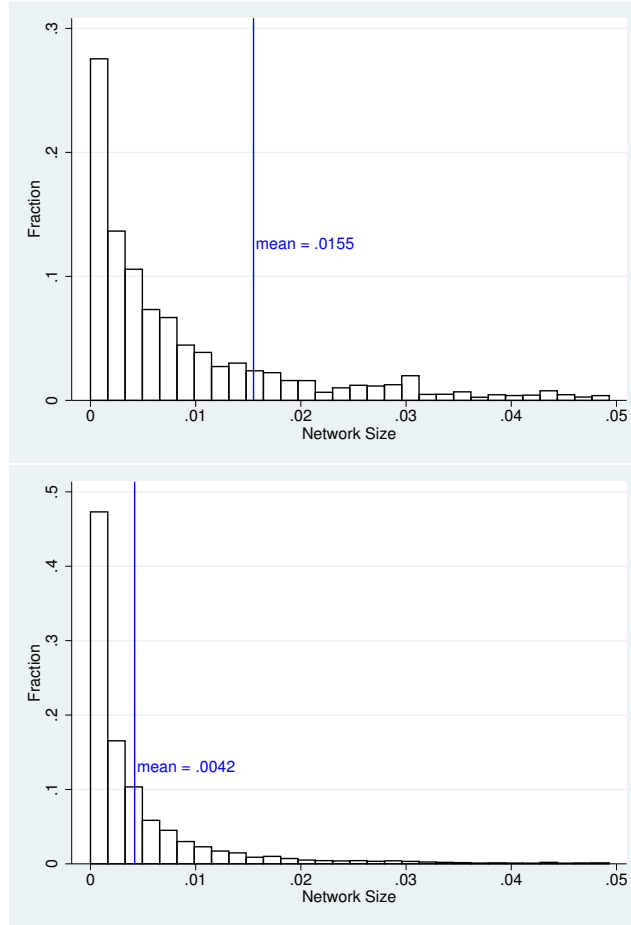
³³This step is not necessary when analyzing a single survey year

³⁴BPS excludes provinces in Kalimantan, Sulawesi, Maluku, and Papua regions in the 1995 survey and provinces in Aceh region in the 2005 survey

³⁵The observations excluded in the analysis account for 26% of total observations in the 1985 survey, 5% of total observations in the 1995 survey, and 33% of the total observations in the 2005 survey

³⁶By the age of 21-25, only 6.8% of population report to be attending schools, compared to 20% among individuals aged 18-20% years old.

Figure 6: Distribution of Network Size



Note: Top plot shows distribution among migrants; Bottom plot shows distribution among observed unique origin-destination pairs.

Educational Attainment Outcome

In addition to the exclusion of schooling-age respondents, I also exclude the elderly population, specifically individuals older than 60 years old in the years of surveys, since they are less likely to migrate ³⁷.

The main analysis focuses on the new migrants, defined as those who moved to current municipalities within 5 years ago, i.e. have been living in current municipalities for 0-4 years. The fraction of new migrants for all survey years is about 4.3%. The sample excludes returning migrants, defined as those who moved back to their birth municipalities, which is about 20% of the new migrant pools or about 1.1% of the initial sample.

Compared to the initial sample size, the age restriction excludes about 59% of the data.

³⁷The rate in which individuals aged 61-65 moved within the past 5 years is only 1.2%, compared to 5% in their 30s, 2.5% in their 40s, and 1.7% in their 50s.

The region restriction further excludes about 23% of this pool. The sample size then becomes a total of 604,153 observations, which comprises of 28,844 new non-return migrants and 575,309 non-migrants. The main analysis focuses on the sample of new non-return migrants.

Table 7: Descriptive Statistics

	Mean	SD
Individual Characteristics		
New migrant	0.0433	0.204
Age	39.04	10.04
Male	0.488	0.500
Married	0.848	0.359
Years	5.898	4.081
Primary-school	0.590	0.492
High-school	0.163	0.369
Observations	604153	
Individual Characteristics (New Migrants)		
Age	33.53	8.148
Male	0.559	0.496
Married	0.815	0.388
Years of schooling	9.550	4.174
Primary-school	0.853	0.354
High-school	0.486	0.500
Network size	0.0155	0.0243
Network = 0	0.0966	0.295
Distance	252.5	341.0
Distance (logged)	4.740	1.307
Wage ratio (dest/origin)	1.172	0.427
Observations	28844	
Origin-Destination Characteristics		
Network size	0.00419	0.00931
Network = 0	0.199	0.399
Distance	413.9	428.5
Logged distance	5.435	1.190
Wage ratio	1.174	0.442
Observations	9693	
Municipalities Characteristics (Historical)		
Population	648518	486164
Pop<300,000	0.292	0.456
Pop 300,001-999,999	0.505	0.501
Pop>1,000,000	0.203	0.403
Urban rate	0.263	0.339
Agriculture rate	0.507	0.269
Land-ownership rate	0.731	0.168
Labor force participation	0.914	0.0405
Average schooling	4.980	1.687
Attendance rate	0.564	0.0968
Gini of schooling	0.275	0.0259
Observations	192	

Note: Individual weights are applied

Table 7 shows descriptive statistics. The internal migrant rate, excluding returning mi-

gration, is 4.3%. The average age of the sample is 39.04 years old while new migrants are on average younger with an average age of 33.5. A larger fraction of migrants are male and married where 55.9% and 81.5% of the new migrants are male and married, compared to 48.8% and 84.8% in the overall sample. Migrants are also more educated than non-migrants. Overall, the average years of schooling is 5.90 while the average years of schooling among new migrants is 9.55. Among new migrants, 85.3% and 48.6% completed primary and high school, compared to 59.0% and 16.3% among the overall sample. The average origin-destination-specific network size faced by these new migrants is 0.0155 or 1.5%. The average distance among these new migrants is 252.5 miles. The wage ratio is constructed using data from Labor Force Survey (SAKERNAS), as the ratio of wage at destination and origin. The average wage ratio is 1.172. Table 1 also presents the historical development and schooling measures of municipalities using Census (SUSENAS) data in 1980.

2.6 Results and Discussion

Main Results

Table 8 presents the main results where column 1 and 2 show the selection pattern in the Indonesian internal migration context where internal migrants in Indonesia are overall positively selected with respect to education. Column 3 and 4 show the main regression results of the network role in selection pattern where migration networks decrease the positive selection. The regressions control for observed individual-level and municipality-level characteristics that should influence educational attainment and migration decision. I find that new migrants have about 2.10 more years of schooling than non-migrant. Controlling for origin fixed-effects gives a similar coefficient.

Column 3 and 4 show linear regression results of years of schooling on origin-destination-specific network size among new non-return migrants. The coefficient of network size represents the relationship of network size and educational attainment of migrants i.e. role of network on degree of the selection pattern. Controlling for individual-level and municipality-level observed characteristics, I find that the coefficient of network size is -11.11. This result suggests that a 0.01 or 1% increase in origin-destination-specific network size decreases years of schooling by 0.11, which is about 5% of the positive selection (2.1 years). The magnitude of the coefficient becomes smaller at -8.38 when controlling for origin and destination fixed-effects, suggesting that in column 3, there might be unobserved characteristics at municipality-level that bias the coefficient downward causing the coefficient in column 3 to be more negative than in column 4.

This analysis is unable to control for individual-level unobserved characteristics such as

Table 8: Main Regression Results

	(1)	(2)	(3)	(4)
	Years	Years	Years	Years
<i>Individual characteristics</i>				
New migrant	2.102*** (0.100)	2.100*** (0.097)		
Male	1.346*** (0.029)	1.346*** (0.029)	1.402*** (0.059)	1.413*** (0.059)
Married	-0.071* (0.037)	-0.072* (0.038)	-0.019 (0.074)	0.032 (0.072)
Age	-0.127*** (0.002)	-0.127*** (0.002)	-0.100*** (0.004)	-0.100*** (0.004)
<i>Origin-destination characteristics</i>				
Network size			-11.107*** (4.201)	-8.377*** (2.532)
Distance (logged)			0.044 (0.043)	0.126** (0.049)
Wage ratio (dest/origin)			-0.308** (0.145)	-0.074 (0.231)
<i>Historical origin-level characteristics</i>				
Urban rate	-1.272*** (0.263)		-2.507*** (0.467)	
Agricultural rate	-0.690*** (0.246)		-1.093** (0.525)	
Land ownership rate	-0.706* (0.381)		-0.798 (0.592)	
Labor force participation	1.137 (1.255)		-1.487 (1.968)	
Average schooling	0.817*** (0.049)		0.709*** (0.095)	
Gini of schooling	-3.943*** (1.428)		10.305*** (3.190)	
Attendance rate	2.398*** (0.582)		5.290*** (0.881)	
<i>Historical destination-level characteristics</i>				
Urban rate			-0.016 (0.238)	
Agricultural rate			-2.316*** (0.402)	
Land ownership rate			3.045*** (0.494)	
Labor force participation			-7.901*** (1.242)	
<i>Survey year fixed-effect</i>				
Year 1995	1.609*** (0.037)		1.724*** (0.103)	
Year 2005	2.964*** (0.062)		2.454*** (0.106)	
Observations	604111	604111	28840	28840
Adjusted R^2	0.358	0.366	0.214	0.252
Origin and Destination Fixed Effect	No	Yes	No	Yes
Sample	All	All	Migrants Only	Migrants Only

Note: Regressions in column 1 and 3 use the entire sample (migrants and non-migrants) and include gender, age, marital status, origin-level historical development and schooling characteristics, and survey year fixed-effects. Since non-migrants do not have destinations, the regressions exclude variables for destination and origin-destination characteristics such as network size, wage ratio, distance; The municipalities historical characteristics include 1980's urban rate, fraction of agricultural household, land ownership rate, average year of schooling among males, Gini of male schooling, attendance rate among males, and labor force participation rate among males; Regressions include origin and destination fixed effects in column 2 and 4; Standard errors are clustered at origin level; Individual weights are applied

personal drive and motivation, which could post a threat to the interpretation. For example, an individual may self-select himself in an origin with large network size. At the same time, this individual is likely to achieve high education due to personal drive and motivation. This scenario would lead to an upward bias, which underestimates the magnitude of the coefficients but post no threat to the sign of the coefficients. Therefore, the results still suggest that network sizes might decrease the degree of positive selection with respect to education.

As for other factors, the coefficients of distance and wage ratio are positive and negative, respectively, suggesting that the degree of positive selection is larger for long distance migration and smaller for relatively attractive destination wages. Long-distance migration is typically associated with high transportation cost and psychological cost, which can hinder individuals from moving. Wage ratios represent the attractiveness of average wage at destinations, compared to at origins. They are an important factor that attracts more workforce to the destination. It can induce negative selection, especially when the returns to education are low. The results suggest that higher destination wages decrease the degree of positive selection. However, the significance of these two factors are relatively weak, compared to those of network sizes.

Table 9: Robustness Check

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Years	Primary school	High school	Years	Years	Years	Years	Years	Years
<i>Individual characteristics</i>									
Male	1.413*** (0.059)	0.099*** (0.006)	0.124*** (0.007)	1.473*** (0.066)	1.662*** (0.184)	1.191*** (0.122)	2.130*** (0.112)	1.430*** (0.092)	0.863*** (0.077)
Married	0.032 (0.072)	0.043*** (0.007)	-0.040*** (0.009)	0.069 (0.090)	0.433 (0.374)	-0.160 (0.112)	0.069 (0.184)	-0.148 (0.123)	0.149 (0.125)
Age	-0.100*** (0.004)	-0.008*** (0.000)	-0.009*** (0.000)	-0.095*** (0.005)	-0.146*** (0.024)	-0.107*** (0.006)	-0.106*** (0.008)	-0.098*** (0.006)	-0.098*** (0.007)
<i>Origin-destination characteristics</i>									
Large network	-0.271** (0.121)								
Network size		-0.635*** (0.202)	-0.662** (0.264)	-7.240** (2.942)	-21.485 (17.751)	-11.499** (4.508)	-22.947*** (8.782)	12.142*** (3.210)	9.590*** (3.301)
Distance (logged)	0.149*** (0.046)	0.006** (0.003)	0.014** (0.006)	0.153* (0.083)	0.331 (0.330)	0.065 (0.091)	0.160* (0.085)	0.198*** (0.059)	0.026 (0.061)
Wage ratio (dest/origin)	-0.071 (0.231)	0.000 (0.019)	-0.011 (0.028)	-0.073 (0.289)	1.050 (0.734)	-0.277 (0.328)	-0.076 (0.854)	-2.300*** (0.707)	-1.521** (0.758)
Observations	28840	28844	28844	17864	1481	9443	5342	14365	9124
Adjusted R^2	0.252	0.185	0.172	0.260	0.310	0.250	0.308	0.234	0.207
Sample	All	All	All	Java	Nusa T	Sumatra	1985	1995	2005

Note: All regressions control for origin, destination, and year fixed-effects and apply individual weights; Standard errors are clustered at origin level; Column 1 uses an indicator for large network which is 1 if network size \geq the mean or 0.015; Column 2 and 3 use alternative schooling outcomes: primary school and high school indicators ; Column 4-6 and 7-9 present regression results by regions of origins and survey years, respectively; In the row Sample, "All" mean all new migrants.

For robustness check, Table 9 shows that the results are consistent with the previous table and are not driven at extreme values of network size, schooling outcomes, certain regions of origins, or particular survey years. Column 1 presents a regression result using an indicator for large network size, as opposed to a continuous variable, to test if the results are driven by network size outliers. The coefficient remains negative, suggesting that the results in Table 8 are unlikely to be influenced by this concern. Similarly, outliers in the outcome could post a concern. To test if this is the case, I use indicators whether migrants completed primary and high school education and still find significant negative coefficients for network size. These results are consistent across most regions of origins, except for Nusa Tenggara, and across all survey years. However, the coefficients vary in magnitudes. The coefficients are larger for Nusa Tenggara (insignificant) and Sumatra regions. The magnitudes of coefficients are also decreasing across survey years, which may suggest that the role of network in positive selection decreases over time.

Table 10: The Role of Network across Migration Costs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Years	Years	Years	Years	Years	Years	Years	Years
<i>Individual characteristics</i>								
Male	1.414*** (0.082)	1.428*** (0.075)	1.481*** (0.145)	1.404*** (0.064)	1.408*** (0.080)	1.417*** (0.077)	1.367*** (0.114)	1.504*** (0.118)
Married	0.031 (0.091)	0.090 (0.116)	0.109 (0.161)	0.024 (0.085)	0.022 (0.089)	0.080 (0.115)	-0.356** (0.154)	0.041 (0.165)
Age	-0.101*** (0.005)	-0.100*** (0.006)	-0.096*** (0.009)	-0.099*** (0.004)	-0.098*** (0.005)	-0.100*** (0.006)	-0.086*** (0.008)	-0.105*** (0.008)
<i>Origin-destination characteristics</i>								
Network size	-23.767*** (6.467)	6.072** (2.777)	-41.048** (16.412)	-6.753*** (2.355)	-6.306** (2.769)	-7.452** (3.542)	-18.185*** (3.818)	-0.210 (3.559)
Distance (logged)	-0.012 (0.072)	0.273** (0.119)	0.207 (0.279)	0.127* (0.071)	0.188*** (0.064)	0.555*** (0.103)	0.169*** (0.059)	0.267*** (0.076)
Wage ratio (dest/origin)	-0.208 (0.281)	0.682* (0.388)	0.172 (0.427)	-0.160 (0.262)	-0.071 (0.246)	0.565 (0.389)	-1.693* (0.873)	-3.378*** (0.902)
Observations	16112	12724	4399	24405	14422	14414	7987	6343
Adjusted R^2	0.270	0.262	0.420	0.239	0.279	0.258	0.272	0.259
Sample	Far	Near	Across Region	Within Region	Across Province	Within Province	Non-Java	Java

Note: See Table 9; Column 1 and 2 present subsample regression results by migration distance where the median distance is 127 miles. The far sample includes migrants whose origins and destinations are at least 100 miles apart. The near sample includes migrants whose distances between origins and destinations are less than 100 miles; Column 3 and 4 show results from subsample regressions among migrants moving across and within regions; Column 5 and 6 show results from subsample regressions among migrants moving across and within provinces; Column 7 and 8 show results from subsample regressions across migrants' ethnicity, specifically their Javanese mother tongue, available in survey year 1995 only. 65% of the population are Javanese. About 54% of the new migrants (this sample) are Javanese. However, the unweighted count of non-Javanese exceeds those of Javanese since the non-Javanese is over-sampled.

The Role of Network across Migration Costs

The role of migration networks in selection varies in migration costs, as shown in Table 10. Communities that face higher migration costs might depend more on migration networks³⁸. For example, long-distance, across-region, and across-province migrations involve higher

³⁸Further revisions could provide related theories.

transportation costs and assimilation costs and should yield coefficients in larger magnitudes. The results are consistent with this claim, except for across-province migration in column 5, in which the coefficient is larger than within-province migration in column 6. The table does not present a formal statistical test when comparing the differences of the coefficients since they are quite different in magnitudes.

In column 7 and 8, the coefficient among the non-Javanese is significant and larger in magnitude than the coefficient of the Javanese. Non-Javanese includes residents who have mother tongues other than Javanese such as Sudanese, Balinese, and Madura languages. This finding suggests that network might benefit minorities such as non-Javanese more than the Javanese majority, which is consistent with the narrative that the minorities tend to face larger psychological and assimilation costs.

Table 11: The Role of Network across Origin Communities with Different Connectivity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Years	Years	Years	Years	Years	Years	Years	Years	Years
<i>Individual characteristics</i>									
Male	1.251*** (0.131)	1.559*** (0.104)	1.374*** (0.083)	1.607*** (0.084)	1.401*** (0.113)	1.243*** (0.108)	1.350*** (0.100)	1.451*** (0.101)	1.428*** (0.085)
Married	-0.104 (0.145)	0.152 (0.128)	0.039 (0.110)	-0.006 (0.120)	0.247 (0.160)	-0.047 (0.099)	-0.075 (0.144)	0.018 (0.137)	0.155 (0.105)
Age	-0.102*** (0.008)	-0.111*** (0.007)	-0.094*** (0.006)	-0.118*** (0.006)	-0.094*** (0.008)	-0.087*** (0.005)	-0.088*** (0.008)	-0.102*** (0.007)	-0.102*** (0.006)
<i>Origin-destination characteristics</i>									
Network size	-1.717 (5.137)	-24.285** (9.507)	-7.275** (3.494)	-18.434** (7.181)	-28.644*** (7.665)	6.377** (2.549)	1.804 (4.500)	-14.793*** (4.588)	-3.569* (1.929)
Distance (logged)	-0.012 (0.072)	0.098 (0.094)	0.151* (0.080)	0.231** (0.105)	0.248*** (0.077)	-0.060 (0.052)	0.342*** (0.079)	0.128 (0.082)	0.285*** (0.056)
Wage ratio (dest/origin)	0.403 (0.387)	-0.425 (0.296)	-0.087 (0.453)	0.033 (0.369)	0.061 (0.372)	0.198 (0.456)	-0.459 (0.537)	0.268 (0.303)	0.510* (0.295)
Observations	8412	8624	11787	11258	7528	10048	7039	9977	11812
Adjusted R^2	0.206	0.286	0.247	0.263	0.248	0.154	0.218	0.276	0.296
Sample	Small	Medium	Large	Very rural	Rural	Urban	Not diverse	Med div	Diverse

Note: See Table 9; Column 1-3 present subsample regression results by 1980's historical population size with cutoffs at 500,000 and 1,000,000 persons. The average historical population among migrants is 914,460 and among unique origins is 648,518; Column 4-6 show subsample regressions by 1980's historical urban rate with cutoffs at 0.1 and 0.4. The average rate across unique origins is 0.263; Column 7-9 show subsample regressions by 1980's historical mother tongue diversity rate using Herfindahl index (HHI) calculation with cutoffs at 0.4 and 0.9. The average language HHI among migrants is 0.60 and among unique origins is 0.63.

The Role of Network across Origin Communities with Different Connectivity

Lastly, the role of migration network in selection patterns may vary across the characteristics of the network, particularly the connectedness or connectivity of the origin communities. Prospective migrants from origins with low connectivity can rely less on migration network when making decision to migrant, compared to those in highly-connected communities. For example, McKenzie and Rapoport (2010) examines the role of network in selection patterns across origin population sizes and rural rates. Knowing one additional established migrants

is likely to be more impactful to a small-town prospective migrant than a big-city individual.

Table 11 presents results from subsample regressions across origin population sizes, rural rates, and diversity rates. The role of network in selection patterns is the largest in medium-sized origins, moderately-rural origins, and moderately-diverse origins. These findings are consistent with the previous reasoning when compared to coefficients of large, urban, and diverse origins. However, these coefficients are larger than their small-sized, very-rural, and homogenous origins. There is evidence that the role of connectivity may not always be linear (Chay & Munshi, 2014) especially when the network size is very small. Network size may need to surpass a certain threshold to start functioning and self-reinforcing. Also, migration network could break down when the size gets too large. In sum, the results in Table 11 supports the claim that the role of network in selection pattern is less salient in large, urban, and diverse origins, where the residents tend to be less connected.

2.7 Conclusion

This study provides empirical evidence of the role of migration network on the self-selection patterns in the internal migration context in Indonesia. The results suggest that migrants from origins with larger network sizes are less positively selected with respect to years of schooling. The role of network in reducing the degree of positive self-selection patterns are more salient in the case of high-cost migrations, such as long-distance and across-region migrations, as well as for the non-Javanese minority. Similar results are found among communities with larger connectedness, specifically smaller, more rural, and less diverse communities. These results contribute to a better understanding of migration patterns. For example, it is implied that as communities accumulate migration experience and grow network size, the migrants are less positively-selected since networks are facilitators that allow individuals who might not be able to migrate on their own to emigrate. Additionally, for communities with the same network sizes, relative to their population, networks' roles still vary depending on the associated migration costs and the level of connectedness.

As for policy implications, as immigrant pools from certain origins grow, receiving or host communities should expect the average quality of new migrant streams to be slightly lower. Employers and policymakers in the host communities should take this point into consideration when hiring migrants and planning migration policies. For example, while hiring through referrals has many advantages, a migrant applicant with a large network tend to be less qualified than a migrant applicant with a small network, based on the results in this study. Policymakers may have an incentive to facilitate migration from communities with small network since the average quality of migrants from this group is higher than those from

communities with large network. However, it is important to note that this interpretation applies for the positive and intermediate selection cases.

To generalize the findings for the international migration context, several differences between internal and international migrations need to be considered. For example, the costs and risks of international migration tend to be higher than those of internal migration due to long distance, etc. Based on the results in this study, the international migrants are expected to rely more on prior experiences of the origin communities, such as family ties, compared to the internal migrants. Thus, the magnitude of the network effect on self-selection patterns should be higher in the international migration context. Similar to the earlier interpretation, for the cases of positive or intermediate selection patterns, policymakers should expect less positive selection when migrants migrate via less restrictive visa criteria such as via family ties, as opposed to via skill-based visa types. On the contrary, for the case of negative selection patterns, policymakers should expect less negative selection, i.e. better quality of migrants, via family-related visa. The sending countries should also monitor the nature of migration flows and self-selection patterns over time in order to address potential issues of brain drains and long-term development problems.

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3 Do Migrants Demand In-kind Remittances?: Experimental Evidence among Kenyans in the U.S.

Abstract

Cash may not necessarily be a preferred means of remittance transfers if migrants (givers) have paternalistic motives to influence how the remittance transfers are allocated. This study examines this paternalistic motive of migrants in the international remittance context, using experimental data. The paper tests whether there is a demand for in-kind (non-cash direct goods) transfers, specifically whether the ability to transfer remittance in form of in-kind, as opposed to cash, change migrants (givers) behaviors. The study focuses on two following questions: whether migrants use in-kind transfers and whether migrants increases total amounts of remittances. The experiments were conducted among Kenyan immigrants living in the U.S. and consists of multiple rounds of dictator games, in which participants were asked to split certain amounts of endowments with their most closely-related relatives in Kenya. The analysis compares the behaviors in rounds that allow and do not in-kind giving. Cash transfers are still allowed in all rounds. The study finds that the availability of in-kind giving significantly decreases the values of cash transfers, indicating that there is a demand for in-kind remittances. Migrants are 55% likely to give in-kind when this channel is allowed. Among participants who give in-kind, the average fraction shared as in-kind is 41%. However, while this channel changes the composition of remittances, it does not statistically change the totals value shared or the fractions shared to relatives. There is evidence that migrants with low trust measures and migrants who usually give instructions to remittance recipients are more likely to use this channel and share larger values.

3.1 Introduction

Remittances are a growing source of capital for developing countries. According to the World Bank, the value of international remittances is about \$583 billions in 2014, of which \$436 bil-

lion flow from developed to developing countries. The inflows and growth of remittances have also been steadier than those of foreign direct investments, which fluctuate more strongly with the economic cycles of both home and host countries. The impact of remittances on the economic development become political debates, causing rising interests in issues like the transfers system and its efficiency. Studies of behaviors related to gift-giving, resource allocation incentives, and efficiencies are key theories and evidence to further understand remittance transfers.

This study focuses on understanding migrants' remittance decision when facing with different means of remittance transfers, specifically cash or in-kind. Since there are theories supporting both a preference for cash transfers and a preference for in-kind transfers, empirical evidence can shed some light on the theory that is more applicable to the real-world issue. The paper, thus, contributes empirical evidence to the literature about gift-giving model, specifically testing the extent to which incentives of migrants are paternalistic.

A study by Batista et al. (2015) is closely related to this study. The author find that the ability to give in-kind, i.e. "directed giving", in an experiment among Mozambican internal migrants increases the total amount of giving and conclude that givers seek control over the transferred resources. While the research question and experimental design are similar, the paper find different results, which may stem from the difference in international and internal remittance contexts. These two types of remittances differ in values of flows, purpose of the fund, and the ability to share information between givers and recipients. For example, households usually receive larger remittance from international migrants than domestic migrants (Adam, 2008). Households in Vietnam spend larger portions of international remittances on savings and investment but spend most of domestic remittances on consumption goods (Nguyen, 2009). These studies suggest households may have different spending behaviors depending on the sources of gifts. Thus, the ability to control spending could have different impacts depending on the context.

Salient giving motives include altruism, paternalism, and exchange. In altruism model, givers maximize the weighted sum of their own and the recipients utilities (Becker 1974), make giving in the form of cash weakly preferred to in the form of in-kind since cash allows recipients to optimally choose how to spend the gifts to maximize their utilities. Giving cash and in-kind are equally preferred only when givers have perfect information regarding the recipients preference and utilities. This scenario should still result in the same monetary values of gifts. Only in the case that givers are able to acquire certain goods unavailable in the recipients locations, giving in-kind may help improve the efficiency of gift-giving by raising recipients' utilities.

In a paternalism model, the utilities of givers depend not only on the values of the gifts

but also on the types of recipients' consumption. For example, the givers may prefer when the recipients spend cash gifts on education or business investment, as opposed to on gambling activities and alcohol consumption. The utility of a paternalistic giver increases with the recipient's consumption of virtue goods and decreases with the recipient's consumption of vice goods (Pollack 1998). In this framework, givers may choose to give partially or entirely in form of in-kind. They may send the same or less amount of cash. They also may not necessarily increase the total amount of gifts. However, compared to cash transfers, in-kind transfers usually incur larger transactional costs such as shipping and handling fees, making in-kind transfers less attractive even for a paternalistic giver. With better logistics and technology that lower shipping and transactional costs can help improve the efficiency of gift-giving, allowing more givers to give in form of in-kind and increase the values of giving.

Information asymmetry and heterogeneity in preference across household members are among the main factors that explain the inefficiency in resource allocation within households (Udry, 1996; Dublo and Udry, 2004; Mazzoca, 1997; De Mel et al, 2009; Robinson, 2011). Ashraf (2009) shows that observability and communication between spouses has a significant impact on household financial decisions. Schaner (2013) provides experimental evidence that households reach an inefficient level of savings due to the heterogeneity of time preferences across household members. Thus, with information asymmetry and preference heterogeneity, both givers and recipients seem to have incentives to influence each other's financial decision.

Several studies provide evidence of a paternalistic giving incentive. A lab-in-field experiment result by De Arcangelis et al. (2015) shows that migrants raise remittances by over 15% when remittances are labeled as for education. They also remit 2.2% more when the money is sent directly to schools. An experimental study among El Salvadorian domestic migrants by Ashraf et al. (2013) finds that bank accounts with the ability to monitor recipients expenditure lead to higher savings in bank accounts. However, it is unclear whether the increase in savings is a result of the migrants' increases in giving or the recipients' reduction in frivolous spending. De Laat (2008) also finds that Kenyan migrants value financial tools that help them monitor their spouses' financial activities. Ambler (2013) studies the observability on the migrant side and finds consistent evidence where migrants remit significantly more when their choices are observed and punishable by recipients. Thus, the ability to monitor and control, either through information sharing or spending commitment, seems to play a role in household resource allocation.

To test whether migrants have paternalistic motives, multiple experimental rounds of dictator games are run among 186 Kenyan migrants living in Minneapolis and Dallas. Participants were first asked to identify their most closely-connected relatives in their home country, Kenya. Then, they were interviewed about their remittance activities to these rela-

tives in the previous twelve months. A dictator game in each round asks participants to split a certain value of endowment with their relative counterparts. The experimental rounds vary in terms of endowment size, rate of returns, and payout periods, which are key determinants of gift-sharing. The focus of this experiment is that some rounds instruct the participants to split the endowment only in the form of cash while other rounds allow the participants to partially give in the form of cash and partially in the form of in-kind (non-cash goods). In the second set of rounds, participants can still give entirely in the form of cash if they wish.

The results suggest that there is a demand for in-kind giving among these migrants since the cash allocation to recipients significantly drops when the in-kind giving is available. 55% of the responses use the in-kind channel when available. On average, respondents drop about \$186.7 of cash giving and increase about \$184.5 of in-kind giving. Overall, the value shared and the fraction shared to relatives do not statistically change, controlling for other determinants of giving in each round.

Across characteristics of migrants, the results suggest that migrants who have low trust measures, calculated from a trust game ³⁹ information in the experiment, share significant more to recipients, both in terms of total values shared and fraction shared, compared to migrants with high trust measures. Migrants who usually give instruction to relatives on how to spend remittances also significantly more likely to use the in-kind channel and share more values (insignificant). Lastly, across characteristics of recipients, living outside Nairobi increases (insignificant) chances that migrants use the in-kind channel and increases (insignificant) values shared and fractions shared, which is in line with the narrative that the in-kind channel in this experiment help lower the delivery and transportation cost of in-kind transfer.

In sum, the results suggest that migrants have paternalistic motives, which contradict the alternative model of altruism. The results, however, could weakly be influenced by the free-delivery aspect of the in-kind channel, which could undermine the paternalism claim. However, the test for this concern is insignificant. The results suggest that since migrants have paternalistic motives, there are demands for financial tools that allow monitoring or withdrawal restrictions, as well as gift vouchers and grocery stamps, which will help improve the efficiency in the international remittance setting. These products, however, may not necessarily increase the flows of remittances.

The remainder of this paper is organized as follows. Section 2 describes a theoretical framework of altruistic and paternalistic gift-giving models and how the in-kind channel

³⁹A trust game asks participants to split \$20 with their relative counterparts, in which the amount shared has 100% rate of returns. They are informed that the relatives will be asked to share the gifts back to the participants after the returns are realized.

affects gift-giving decisions. Section 3 describes the experimental design and summary statistics. Section 4 presents the identification strategy. Section 5 presents results and discussion. Lastly, Section 6 concludes the study.

3.2 Theoretical Framework

Following Becker (1974)'s altruism model, let the utility of an altruistic giver, u_i , increase in his own consumption level, x_i , and the recipient's utility, u_{-i} . Let the utility of a recipient increase in the recipient's own wealth, w_{-i} , and a value of gift-giving, c_i . It is optimal for the giver to transfer cash to the recipient since the recipient has perfect knowledge of his own consumption preference. Without perfect information between the giver and recipient, giving in form of non-cash goods may lead to a suboptimal outcome. Thus, for an altruistic motive, giving in form of cash is weakly preferred to in-kind. Additionally, for a special case of perfect information sharing, the giver may choose to give in-kind but the total value of giving should remain the same, regardless of the means of giving.

$$u_i = u_i(x_i, u_{-i}(w_{-i} + c_i)) \quad (11)$$

Following Pollack (1988)'s paternalism model, a giver values not only the recipients utility but also the recipient's consumption types. The giver may prefer that the recipient spends the gift transfers "virtue goods" such as education, durable goods, and business investments, instead of "vice goods" such as alcoholic beverages, gambling, and entertainment. In this model, the utility of the giver increases in his own consumption and the recipient's consumption of virtue goods (G). Let G be an increasing function of gift values and recipient's wealth. Let also assume that the recipient's consumption of vice goods has no impact on the giver's utility.

$$u_i = U(x_i) + V(G(w_{-i} + c_i)) \quad (12)$$

An option to give in the form of in-kind can raise the giver's utility, even when the total values of giving remain constant. It can also decrease the total values of giving, as well. Let g_i be the monetary value of in-kind (direct goods) transfer to recipients. The recipient's consumption of virtue goods will become $G(w_{-i} + c'_i) + g_i$, where c'_i is a new value for cash transfer. x'_i refers to a new own consumption level of the giver.

$$u_i = U(x'_i) + V(G(w_{-i} + c'_i) + g_i) \quad (13)$$

The in-kind gift directly raises the recipient’s commitment to consuming virtue goods, which effectively lowers the price of virtue goods through this means of giving. For example, when receiving \$100 in cash, a recipient may spend merely \$50 on virtue goods while with the ability to directly give in-kind, the same amount of virtue goods will only cost the the giver \$50, instead of \$100 in the cash-only transfers. Thus, g_i should be non-zero. Due to the giver’s degree of controls and information asymmetry, c'_i , could be zero or positive.

However, the total values of giving in this setting, compared to the altruistic setting, is ambiguous. In the case where the giver has a targeted consumption of virtue goods for the recipient, this commitment ability can decrease the total values of giving, as in the mentioned example. On the contrary, this commitment ability lowers the effective price of virtue goods, which possibly results in an unambiguous change (increase) in quantity of recipient’s virtue goods but an ambiguous change in quantity of own personal goods. The substitution effect, i.e. a relatively higher price of own consumption, drives down the consumed quantity of own personal goods whereas the income effect drives up the consumed quantity of own personal goods. Given that the price of personal goods remain the same, this leads to an ambiguous change in the value of own personal consumption and, hence, an ambiguous change in the total value of giving. In sum, the change in total value of giving should remain ambiguous.

3.3 Data and Experimental Design

186 Kenyan Migrants ⁴⁰ are randomly selected to participate in the experiment. Table 12 provides summary statistics of the sample. 59% is male with the average age of 38. 54% is married and 22% is born in Nairobi, Kenya’s capital city. In terms of education, over 90% of participants completed at least high-school from Kenya or in the U.S. As for employment and earnings, 91% are employed and 45% earn the annual household income of over \$50,000.

The actual remittance activities are reported in Table 12 and Figure 7. 94% of the participants made cash transfers to their most closely-connected households (MCCH) in the last 12 months. The average value of total remittances is \$2,850. In Table 13, the relationships of MCCHs to the participants (migrants) were mainly mothers and siblings. On average, they sent cash to MCCH 9.1 times in the last 12 months with an average value of \$601 each time (in Figure 7). 61% of the participants instructed households in Kenya on how to spend the transfers. 44% of the participants made in-kind transfers in the last 12 months. The average value of the in-kind transfers was \$864 in Figure 7. 70% also made transfers to households other than MCCH and 62% provided educational supports in MCCH in the last 12 months. Thus, most of the participants have experienced sending remittances to relatives

⁴⁰from existing survey pool in Minneapolis and Dallas

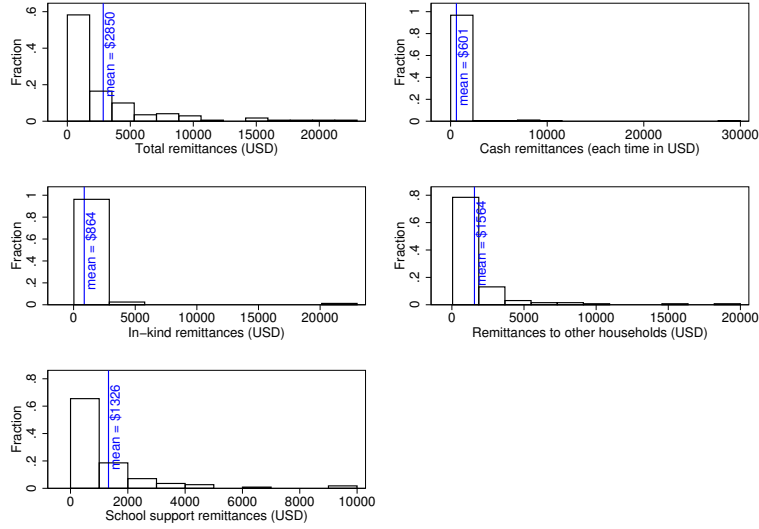
Table 12: Summary Statistics

	mean	sd	count
Migrant Survey			
Male	0.591	0.493	186
Age	38.07	9.848	186
Born in Nairobi	0.220	0.416	186
Married	0.543	0.499	186
Less than high school	0.0161	0.126	186
High-school	0.0645	0.246	186
More than high school	0.919	0.273	186
Employed	0.914	0.281	186
≤ 25,000 USD household income	0.177	0.383	186
25,001-50,000 USD household income	0.366	0.483	186
50,001-75,000 USD household income	0.253	0.436	186
75,001-100,000 USD household income	0.129	0.336	186
> 100,000 USD household income	0.0753	0.265	186
Remittances in Last 12 Months			
Cash transfers	0.941	0.237	186
Frequency of cash transfers	9.102	8.949	186
In-kind transfers	0.441	0.498	186
Give instruction for the use	0.613	0.488	186
Transfers to other households	0.704	0.458	186
Support students in MCCH	0.624	0.486	186
Relative Survey			
Male	0.553	0.499	152
Age	42.73	13.35	149
Live in Nairobi	0.454	0.500	152
Household size	4.599	2.423	147
Students in HH	0.675	0.470	151
No. Students in HH	2.539	1.467	102
Observations	186		

Table 13: Relationships of Most Closely-Connected Relatives to Migrants

	count	percent
Spouse	11	5.9
Son	4	2.2
Daughter	7	3.8
Father	16	8.6
Mother	39	21.0
Brother	39	21.0
Sister	44	23.7
Others	26	14.0
Total	186	100
Observations	186	

Figure 7: Reported Remittances in the Last 12 Months



Note: Conditional of sending remittances in each category and reporting non-zero values

Table 14: Correlation of Reported Values of Actual Remittances and Fractions Shared in the Experiment

VARIABLES	(1) Cash (reported)	(2) In-kind (reported)
Percent shared	1,238** (541.9)	791.2** (388.5)
Constant	-19.16 (323.5)	-22.90 (231.9)
Observations	186	186
R-squared	0.028	0.022

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

Notes: Percent shared is fraction shared in round 1 with small endowment, zero rate of returns, and near payout period.

in their home country although the main means of transfer is via cash. Sending in-kind is not that uncommon among these participants, but the values are not that high relative to the total value of giving. Table 14 also shows that there is a strong correlation between the reported values of remittances and the percentage shared to relatives in the experiment, suggesting that the experimental responses are representative of their real world behaviors.

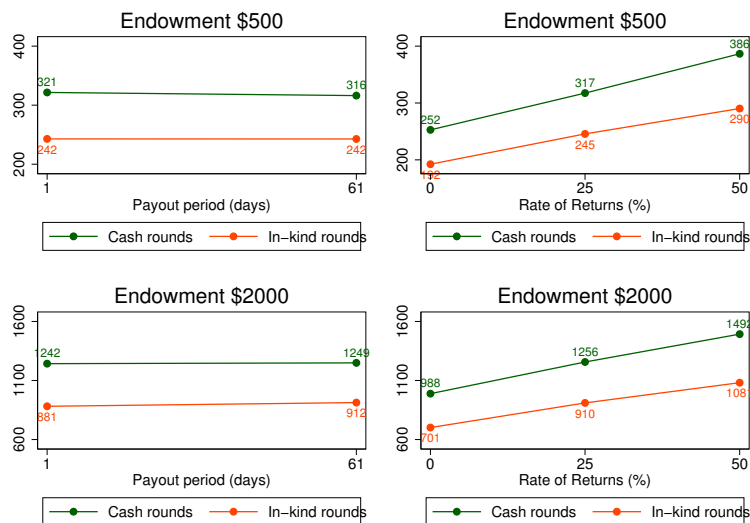
Experimental Design

The experimental design includes multiple rounds of dictator games asking a participant to allocate endowments to self and MCCH. Participants went through 24 rounds of dictator games that randomly vary in terms of endowment sizes, rates of return, payout periods, and the ability to give in-kind. The participants followed instruction on computer screens

and answered questions through a computer interface. This step should not cause erroneous results since most participants were highly-educated and were likely able to read and use a computer. 93 observations are dropped due to missing data. The sample size is 4,371 individual-round observations.

In one set of rounds, participants were asked to split the endowment to be kept for himself and to be sent to MCCH in the form of cash. In the other set of rounds, participants had an option to transfer endowment to MCCH in the form of cash and in-kind where they had to specify the cash and in-kind amount to be sent to MCCH. For both sets of rounds, the games varied in terms of basic giving determinants such as endowment size (\$500 and \$2,000), rates of returns (0%, 25%, and 50%), and payout period (1 and 61 days) to also test responses from different incentives ⁴¹. In in-kind rounds, participants were informed that there was no delivery or transaction cost associated with the in-kind transfer ⁴². The participants were also given a list of items available both in and outside of Kenya to be sent. Similar to the cash rounds, these in-kind rounds also varied in terms of the endowment sizes, rates of returns, and payout periods.

Figure 8: Cash Values Shared in Experiment



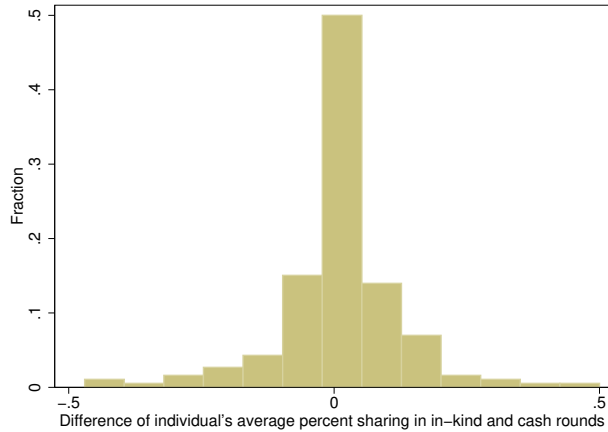
⁴¹The examples of questions were the followings. You have \$500 to allocate between yourself and your nearest relative, how much do you want to keep and how much do you want to give? You have \$2,000 to allocate between yourself and your nearest relative. For each dollar, you give to your relative, we will give 50% extra. How much do you want to keep and how much do you want to give?

⁴²For example, the question says You have \$500 to allocate between yourself and your nearest relative. The money that you give to your relative can either be given as money or in-kind gifts that will be delivered directly to your relative. How much do you want to keep and how much do you want to give, either as money or in-kind gifts?

Figure 9: Total Values Shared in Experiments

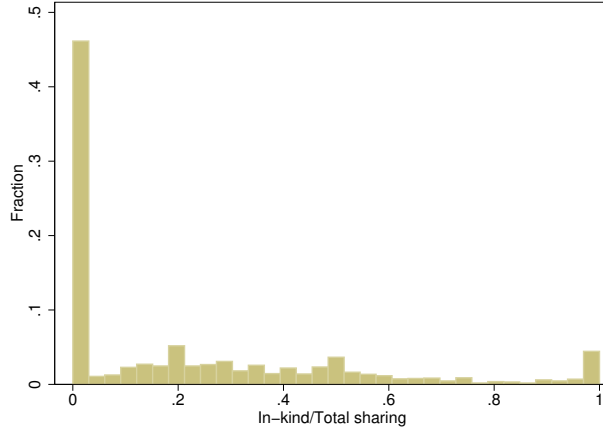


Figure 10: Distribution of Difference of Average Fraction Shared in In-kind and Cash Rounds



The summary of cash shared to relatives by round characteristics is presented in Figure 8. The figure clearly shows that there is a reduction in cash transfers when the in-kind option is available. However, in Figure 9, as predicted by the model, it is unclear if the total shared changes when the in-kind option is available. Figure 10 presents the distribution of participant-level difference in fraction shared (total valued shared plus returns divided by endowments plus returns) in in-kind and cash rounds. About 50% of the participants do not change the fraction shared when the in-kind option is available. About equal fractions of the participants decrease and increase their fractions shared. Lastly, in Figure 11, about 45% of the observations do not give in the form of in-kind even when the in-kind channel is available.

Figure 11: Distribution of In-kind Fraction Shared



Note: The values of in-kind giving divided by the total values of giving

3.4 Empirical Analysis

The outcomes of interest include cash values shared, in-kind valued shared, total values shared, and fractions shared (total values shared plus returns divided by endowment plus returns). The explanatory variables include the giving determinants which are endowment size, rate of returns, payout period, and the availability of in-kind option. The main regression equation is presented below where Outcome_{ir} represents the outcomes of interest for participant i in round r . In-kind_r is an indicator for rounds that allow in-kind giving. Endowment_r is 1 and 0 for rounds with endowment size of \$2000 and \$500, respectively. HighROR_r and MedROR_r are indicators for rounds with 50% and 25% rate of returns, respectively. Payout_r is 1 and 0 for rounds with payout period of 61 days and 1 day, respectively. The analysis controls for participant fixed effects, λ_i , to control for unobserved characteristics at individual level. ϵ_{ir} represents individual-round error terms, which are clustered at participant level. Since, the variation of explanatory variables across rounds is randomized by the experiment, the coefficient estimates of these variables can be interpreted as causal.

$$\begin{aligned} \text{Outcome}_{ir} = & \beta_0 + \beta_1 \text{In-kind}_r + \beta_2 \text{Endowment}_r + \beta_3 \text{MedROR}_r + \beta_4 \text{HighROR}_r \\ & + \beta_5 \text{Payout}_r + \lambda_i + \epsilon_{ir} \end{aligned} \quad (14)$$

Based on the theoretical framework, the ability to give in-kind should raise in-kind values shared if the participants have paternalistic motives or have control preference. The cash values shared are likely to drop in in-kind rounds for paternalistic participants since the virtue goods consumption of recipients through in-kind giving has relatively lower prices than through cash giving. The in-kind channel effect on total values shared should be

ambiguous as previously discussed in the theory section. Thus, β_1 should be positive for in-kind values shared outcome, negative for cash values shared outcome, and ambiguous for total values shared outcome and fraction shared outcome.

For rounds with large endowment, holding other factors constant, participants are expected to share larger values to MCCH due to income effects. The effect of endowment on the fraction shared is ambiguous since while values shared goes up and endowment goes up as well. Thus, β_2 is expected to be ambiguous for fraction shared outcome and positive for cash values shared, in-kind values shared, and total values shared outcomes.

In rounds with large rate of returns, participants are expected to share larger values (post-returns)⁴³ to MCCH due to both substitution and income effects from relatively lower price of sharing. The effect of rates of returns on the fraction shared (post-returns) remains ambiguous. Thus, β_3 and β_4 are expected to be ambiguous for fraction shared outcome and positive for cash values shared, in-kind valued shared, and total values shared outcomes.

In rounds with far payout periods, the price of sharing to MCCH is relatively more expensive to the price of own consumption. The far payout period also causes a negative income effect. Both the substitution and income effects suggest that participants should allocate more endowment to themselves. The effect of this determinant on the fraction shared is expected to also be negative. Thus, β_5 is expected to be negative for all outcomes including fraction shared outcome, cash values shared, in-kind valued shared, and total values shared outcomes.

3.5 Results and Discussion

Table 15 shows the baseline results of the ability of giving in-kind on several outcomes including the total value shared, the cash shared, the in-kind shared, the fraction shared, and indicators for positive in-kind sharing. The probability that participants will use the in-kind channel to transfer goods directly to relatives is about 0.547 when this option is available. When in-kind sharing is available, there is a significant reduction of about \$186.7 in cash values shared and an increase in in-kind values shared of about \$184.5. However, the in-kind option does not significantly change the total values shared and the fractions shared, consistent with the theoretical prediction that the in-kind channel effects on these outcomes are ambiguous. Thus, when participants have the ability to give in-kind (direct goods) to households, they use this channel and change the composition of the transfers, indicating a demand for in-kind transfers. However, it is inconclusive if there is any change in total values of transfers or resource allocation between givers and recipients.

⁴³The pre-return values shared, i.e. before returns are realized, could drop

Table 15: Main Regression Results

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Value shared	Cash shared	In-kind shared	Positive In-kind	Fraction shared
In-kind option	-2.223 (14.38)	-186.7*** (22.99)	184.5*** (19.95)	0.547*** (0.0335)	0.00307 (0.00898)
Large endowment	903.5*** (41.08)	793.4*** (39.02)	110.1*** (12.29)	0.0192** (0.00741)	-0.0196*** (0.00709)
High ROR	315.0*** (20.28)	275.6*** (19.69)	39.41*** (8.031)	0.00956 (0.00664)	0.00398 (0.00820)
Medium ROR	157.8*** (11.71)	146.5*** (12.73)	11.23* (6.628)	0.00111 (0.00639)	0.00242 (0.00583)
Far payout	0.288 (7.291)	3.997 (7.393)	-3.707 (4.316)	-0.00514 (0.00463)	-0.000457 (0.00459)
Constant	160.9*** (30.10)	230.3*** (30.07)	-69.43*** (18.44)	-0.00897 (0.0179)	0.504*** (0.00755)
Observations	4,371	4,371	4,371	4,371	4,371
R-squared	0.734	0.687	0.351	0.625	0.801
Outcome mean	770				0.498
Cash rounds	782.4	782.4	0	0	0.504
In-kind rounds	757.1	571.1	185.9	0.550	0.491

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: The regressions control for participant fixed-effect and cluster standard errors at participant level; In-kind option = 1 if an experimental round allows in-kind giving; Large endowment = 1 in rounds with endowment size of \$2,000 endowment and 0 in rounds with endowment size of \$500; High rate of returns is 1 in rounds with rate of returns of 50% and 0 otherwise; Medium rate of returns is 1 in rounds with rate of returns of 25% and 0 otherwise; Far payout is 1 in rounds with payout period of 61 days and 0 in rounds with payout period of 1 day;

The coefficients of the large endowment and rate or returns indicators are positive for the values shared outcomes in column 1-3, as expected. The coefficients of payout period for the values shared outcomes are not all negative as expected, suggesting that the payout period variation may not be a key determinant is gift giving decision among these participants.

The effect of in-kind channels, especially on the value shared, may vary by endowment size, rate of returns, and payout period. I test this claim by controlling for the interaction terms of in-kind option and indicators for endowment, rate of returns, and payout period, as presented in Table 16. The total values shared become significantly responsive to the in-kind option when rounds have small endowment, low rate of returns, and near payout period. In these specific rounds, the total values of transfers increase by \$30.95 when the in-kind option is available. This increase is driven by \$40.90 increase in in-kind values shared and \$9.95 decrease (insignificant) in cash values shared. In large-endowment rounds, participants drop cash shared (-\$273.4) significantly more than they increase in-kind shared (\$225.2) when in-kind option is available, which drives down the total values shared in these rounds. These results seem to imply that when facing limited resources, sharing in forms of in-kind allows givers to share more in total by increasing in-kind transfers but may not necessarily reduce cash transfers. On the contrary, when the initial resources are larger, the total values shared

Table 16: Heterogeneity of In-kind Channel Effect by Endowment, Rate of Returns, and Payout Period

VARIABLES	(1) Value shared	(2) Cash shared	(3) In-kind shared	(4) Positive in-kind	(5) Fraction shared
In-kind option	30.95** (13.73)	-9.951 (15.03)	40.90*** (9.773)	0.525*** (0.0346)	0.0146 (0.0120)
In-kind option*Large endowment	-48.22** (21.99)	-273.4*** (30.16)	225.2*** (25.04)	0.0394** (0.0151)	-0.0168** (0.00734)
In-kind option*Medium ROR	-17.56 (18.92)	-40.66** (16.27)	23.10* (13.56)	0.00230 (0.0131)	-0.00607 (0.0110)
In-kind option*High ROR	-8.329 (19.22)	-89.34*** (18.41)	81.02*** (16.49)	0.0196 (0.0136)	-0.00551 (0.0102)
In-kind option*Far payout	-0.760 (15.76)	7.186 (15.00)	-7.942 (8.845)	-0.0106 (0.00948)	0.00149 (0.00833)
Constant	144.7*** (30.87)	144.0*** (30.04)	0.662 (9.782)	0.00164 (0.0164)	0.499*** (0.00902)
Observations	4,371	4,371	4,371	4,371	4,371
R-squared	0.734	0.696	0.393	0.626	0.801

Note: Regressions control for explanatory variables and cluster standard errors at participant level; Indicators for large endowment, medium ROR, high ROR, and far payout are included in the regressions as in the baseline results

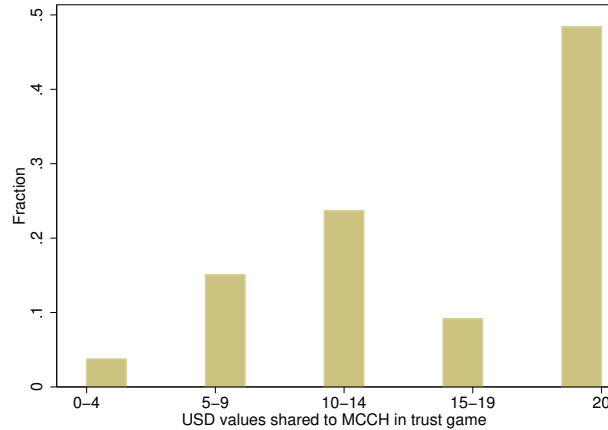
seem to go down.

In addition to rounds' characteristics, the in-kind effect on outcomes of interest may also vary across participants' traits, such as the level of trust on their counterparts, whether they give instruction to their counterparts, and the locations of their counterparts. The trust and instruction aspects reflect participants' desire to control or monitor the recipients while the location aspects reflect if participants make decisions based on free delivery or unavailability of products in the MCCH's areas. I explore the heterogeneity of the impact of the in-kind option on outcomes across these traits by adding interaction terms of these traits with the in-kind option indicator to the main regressions.

In-kind Channel Effect and Trust Level

The trust measure is constructed from an additional question in the experiment. Participants were asked to split \$20 between themselves and their counterparts, in which the amount shared with the counterparts will double, i.e. rate of returns is 100%. Participants were informed that the counterparts would have to answer what fractions of the gifts to give back to the participants. For example, if a respondent shares an entire amount, \$20, the counterpart will receive \$40 and can decide the amount ranging from \$0 to \$40 to be returned to the respondent. In a unitary household model, the respondent maximizes both his own and his counterparts utilities. Thus, it is optimal to give all \$20 to the counterpart. In a game theory framework, the respondent and the counterpart maximize their own utilities separately. Hence, the equilibrium is where the respondent gives zero and the coun-

Figure 12: Distribution of Trust Game Responses



Note: Participants are asked to split \$20 with their counterparts, in which the amount shared have 100% rate of returns. They are informed that the relative will be asked to report the values that they want to give back to the participants.

terpart returns zero. When participants share positive amounts, it suggests that participants trust that their counterparts would share these amounts back. Thus, a large sharing in this question can be taught of as having high trust in their counterparts.

Figure 12 shows that 48% of the participants answered \$20. Table 17 also shows that high answered values in the trust game question have a weak positive association with high household income and actual cash values shared in real life. Variables that signify ties to home country such as living in the U.S. for a short time, spouse living in home country, and have long-term investment in home country are positively (insignificant) related to the trust game measure. Variables that indicate a desire to control or monitor such as give instruction on how to spend remittances and high in-kind shared in round 25 ⁴⁴ are negatively (insignificant) related to the trust level. Fractions shared in round 26 ⁴⁵ also suggest that trust game measure is positively (insignificant but large) associated with allocation to health expense, more likely to be considered virtue goods, and negatively (significant and large) associated with allocation to clothing expense. These results suggest that a high trust level signifies a strong tie to home country and a strong paternalistic motive due to preference in virtue goods.

With a paternalistic motive, givers with low trust levels can view in-kind giving as a paternalistic tool to influence the recipients' types of consumption, in which an in-kind option may end up raising the total values shared for these low-trust individuals. The

⁴⁴Round 25 asks participants to allocate \$2,000 for their counterparts into cash and six in-kind categories: education, housing, health inputs, agriculture inputs, groceries, and clothing

⁴⁵Round 26 asks participants to allocate \$2,000 into six in-kind categories for their counterparts.

Table 17: Relationship of Trust-game Measure and Participants' Characteristics

VARIABLES	(1) Trust game	(2) Trust game	(3) Trust game	(4) Trust game	(5) Trust game
Male	-0.705 (0.943)	-1.573 (1.010)	-0.649 (0.956)	-1.243 (1.046)	-1.829 (1.109)
Married	-0.0230 (1.046)	1.472 (1.671)	0.175 (1.045)	0.0186 (1.127)	1.122 (1.687)
Age	0.0569 (0.0505)	0.0433 (0.0584)	0.0631 (0.0505)	0.0483 (0.0545)	0.0529 (0.0639)
Household income > 75,000	2.139* (1.139)	2.195* (1.273)	1.687 (1.188)	2.101* (1.179)	1.921 (1.350)
Minneapolis	-0.300 (0.948)	-0.00655 (1.002)	-0.207 (1.045)	0.0481 (1.033)	0.226 (1.182)
At least college degree	0.601 (0.968)	0.630 (1.036)	0.587 (0.992)	0.542 (1.029)	0.569 (1.146)
Live in US < 10 years		0.0847 (1.167)			0.456 (1.242)
MCCH is sibling		-0.818 (1.231)			-0.829 (1.365)
MCCH is parent		0.717 (1.476)			0.534 (1.564)
Spouse lives in US		-1.541 (1.571)			-1.233 (1.643)
Have bank accounts in Kenya		-0.102 (1.067)			-0.374 (1.159)
Have long term investment in Kenya		1.638 (1.087)			1.706 (1.165)
Give instruction for the use			-0.771 (1.044)		-1.288 (1.254)
Support students in MCCH			0.385 (1.063)		1.122 (1.138)
Cash transfers (actual)			0.000652*** (0.000185)		0.000403* (0.000223)
In-kind fraction shared in Round25				-2.115 (1.496)	-1.576 (1.597)
Fraction allocated to education in Round26				-0.691 (2.764)	-0.749 (2.875)
Fraction allocated to health in Round26				2.438 (3.213)	1.983 (3.486)
Fraction allocated to housing in Round26				0.920 (2.909)	0.0527 (3.053)
Fraction allocated to groceries in Round26				0.236 (3.217)	1.878 (3.483)
Fraction allocated to clothing in Round26				-7.984* (4.154)	-7.931* (4.503)
Constant	11.93*** (1.961)	12.09*** (3.078)	11.52*** (1.925)	13.94*** (3.709)	12.98*** (4.729)
Observations	186	186	185	179	178
R-squared	0.041	0.071	0.057	0.079	0.113

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Trust game outcome is ranging from 1 to 20; Round 25 asks participants to allocation\$2,000 for their counterparts into cash and six in-kind categories: education, housing, health inputs, agriculture inputs, groceries, and clothings; Round 26 asks participants to allocation\$2,000 for their counterparts into six in-kind categories, as mentioned.

Table 18: Heterogeneity of In-kind Channel Effect by Trust-game Measure

VARIABLES	(1) Value shared	(2) Fraction shared	(3) Positive In-kind	(4) Value shared	(5) Fraction shared	(6) Positive In-kind
In-kind option	25.27 (20.43)	0.0178 (0.0129)	0.660*** (0.0436)	58.44 (36.34)	0.0361 (0.0223)	0.743*** (0.0839)
Inkind-offer*20 USD inTrust Game	-57.66** (28.39)	-0.0319* (0.0176)	-0.238*** (0.0649)			
Inkind-offer*Trust Game (1-20)				-4.242* (2.279)	-0.00234* (0.00140)	-0.0137** (0.00543)
Constant	160.7*** (30.36)	0.503*** (0.00739)	-0.00972 (0.0172)	160.7*** (30.42)	0.504*** (0.00741)	-0.00949 (0.0175)
Observations	4,371	4,371	4,371	4,371	4,371	4,371
R-squared	0.734	0.798	0.643	0.734	0.798	0.634

Note: 20 USD in trust game is an indicator if participants share \$20 USD in trust game question; the trust game variable is ranged from 1 to 20.

results in Table 18 are consistent with this reasoning. When the in-kind option is available, the likelihood to share positive in-kind values are higher (lower) among participants with low-trust (high-trust) level, as shown in column 3 and 6. Among individuals with low-trust, e.g. giving < \$20 in trust game, their total value shared and fraction shares go up, but insignificant, by 25.27 and 0.018 when in-kind option is available. As trust level increases, the in-kind channel does not play a part in increasing values or fractions shared. Thus, the in-kind giving option can increase values or fractions shared among a group of migrants with low trust levels, who seem to have strong ties to home country and have paternalistic viewpoints, as discussed.

Table 19: Heterogeneity of In-kind Channel Effect by Instruction Behavior and Relatives' Locations

VARIABLES	(1) Value shared	(2) Fraction shared	(3) Positive In-kind	(4) Value shared	(5) Fraction shared	(6) Positive In-kind
In-kind option	-11.29 (20.01)	0.00370 (0.0127)	0.474*** (0.0534)	7.564 (23.51)	0.00603 (0.0149)	0.543*** (0.0511)
Inkind-offer*Give instruction to MCCH	14.91 (28.15)	-0.00174 (0.0176)	0.119* (0.0682)			
Inkind-offer*MCCH lives in Nairobi				-10.48 (31.62)	-0.00116 (0.0201)	-0.0158 (0.0749)
Constant	160.9*** (30.09)	0.504*** (0.00742)	-0.00880 (0.0177)	159.3*** (32.74)	0.510*** (0.00810)	-0.0134 (0.0201)
Observations	4,371	4,371	4,371	3,592	3,592	3,592
R-squared	0.734	0.797	0.629	0.736	0.791	0.623

Another Paternalistic Variable vs. Free Delivery/Availability of Products

Lastly, it is important to distinguish whether the effects from the in-kind channel are

driven by the participants desire to control or the participants value in other aspects of the in-kind option such as the free delivery and the ability of products outside relatives' regions. Table 19 shows that the in-kind option effect is larger among participants who give instructions to their relatives on how to spend the remittances. In column 3, they are 11.9% more likely to give positive in-kind values to their counterparts. This evidence suggests that the participants desire to control, consistent with the evidence from the trust level. As for the free delivery aspect, column 4-6 shows that when MCCH lives outside Nairobi, participants tend to share more and more likely to give in-kind. However, the coefficients are not insignificant. These results together suggest that the desire to control is more likely to drive the in-kind effect.

3.6 Conclusion

The paper uses an experimental dataset from Kenyan migrants living in the U.S. to study the effect of the ability to give in-kind (direct goods) transfers for free of charge on gift-giving behaviors such as likelihood to use this in-kind option, in-kind values shared, total values shared, and fraction shared. When the in-kind giving option is allowed, about 55% of the participants use this channel, suggesting paternalistic motives. The cash values shared decrease by 23.8%, \$186.7 out of the average cash shared at \$782.4. However, the availability of this channel does not statistically increase or decrease total values shared or fraction shared, except in rounds with small endowment, low rates of returns, and near payout periods. Among participants with low trust level, the in-kind option increases (insignificant) total values shared and fraction shared. These low-trust individuals tend to be those with strong ties to home country and paternalistic motives. For example, they tend to give relatives instructions on how to spend remittances and they prefer relatives to consume virtue goods such as healthcare. Lastly, both the desire to control and the free delivery (or availability of goods outside relatives' region) aspects could play a role in driving the in-kind channel effect. However, the role of desire to control seems to be slightly more salient.

In summary, the paper provides evidence that migrants have paternalistic motives when sending remittances internationally. The channel to facilitate in-kind transfers should help raise household allocation efficiency but does not necessarily change total values of remittance flows. Policymakers should consider lowering transactional costs of in-kind transfer or implementing financial products that allow for better monitoring or information sharing among household members and migrants.

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