Political Instability and Labor Income Shocks in Madagascar

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POLITICAL INSTABILITY AND LABOR INCOME SHOCKS IN MADAGASCAR

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ABSTRACT

Political instability causes the widespread loss of income for nearly all subpopulations of a country. However, it is not the case that all people lose a constant share of their income. Using a case of political instability in Madagascar that caused incredible disruption to the economy, I analyze the effect of political instability on two groups, women and the well educated. I find that women are more vulnerable to income loss and that this may be the reason political instability leads to worse human development indices than would be predicted solely by income. I also find the well-educated have some form of coping mechanism that allows them to better assess the economic environment and find a way to maintain their labor income.

BIOGRAPHICAL SKETCH

Mitchell Morey was born in Santa Clara, CA on July 19, 1986. He is the son of Gary and Nancy Morey and has one younger sister, Maureen. Mitchell is engaged to be married to Alexandria Blute. He attended primary and secondary school in California. Mitchell attended Cornell University and received his Bachelor of Science in Industrial & Labor Relations in 2007 after three years of study. He then served as a Peace Corps Volunteer in Madagascar, teaching English as a foreign language in a rural town. After returning to America, he enrolled in the Graduate School at Cornell University, achieving his degree of Master of Science in Industrial & Labor Relations in August 2010. He also enrolled in the doctoral program in Economics at the University of Wisconsin-Madison.

To Alex

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Introduction

Political instability (PI) in the developing world, particularly Africa, is an unfortunately common scourge that causes great destruction of human life, physical infrastructure, and economic productivity. With people potentially losing their livelihoods following PI, there will naturally be widespread income loss. However, there is no reason to conclude that every person will lose the same proportion of his or her income. Taking subpopulations of interest and determining whether they fared relatively well or relatively poorly following the PI can inform us about the nature of their employment.

Using a coup d'état that occurred in December 2001 in Madagascar as the instance of PI, this paper generally examines the effects of the instability on women and people with high levels of education.

It has already been demonstrated that PI leads to a greater drop in human development indices than would be expected based solely on aggregate income loss. In this paper, I show that the intermediate link between PI and the unexplained development gap is due to women's inability to maintain their labor income as readily as would an otherwise similar man. Since it is also true that a mother will typically spend money on more productive uses than a father, this disproportionately large loss of income can explain why PI particularly degrades nonmonetary development.

Given that PI often causes people to be unsure of future economic security and policies, their optimal behavior may be unclear. Those who are quite adept at assessing a situation and coping with prevailing conditions would be better able to find economic activity when it may be scarce. This would be a valuable skill that, like many skills, might be attained through successful education. I also show that people with high levels of education do not lose as much income following PI, presumably

due to a superior ability to seek employment and adjust to suboptimal economic conditions.

Political instability is a significant issue for many countries throughout the world. As a result of this study, we can conclude that women are more susceptible to income loss than men. We also know that the large drop in female income has significant effects for the welfare of children and wider development indicators. Additionally, we can confirm from this study that educated people better cope with the economic unpredictability caused by PI. Thus, education may be seen as a way of smoothing economic performance if a country is at risk of experiencing uncertainty in its economy.

Background

Following its independence from France in 1960, Madagascar was riddled by frequent changes of presidential power often marked by military intervention. In 1975, the military installed Didier Ratsiraka, a career politician, as the president. True to the form of his ascent to power, Ratsiraka's administration never demonstrated a great respect for democracy. The government held several elections over the years he was in power. He claimed victory in each, but there were always significant protests of the legitimacy of those elections. In 1991, a march against Ratsiraka turned deadly when dozens of the protestors were killed. This initiated a gradual transition of power to the opposition. Ratsiraka fled to exile in France. However, Ratsiraka regained power following the impeachment of the intermediary president.

Marc Ravalomanana was born into a poor family in a small town approximately 30 kilometers west of the capital, Antananarivo. He was able to parlay a small business, selling yogurt off the back of his bicycle, into a dairy and food product empire. As one of the most successful businessmen in Madagascar,

Ravalomanana's first foray into politics was a successful one, as he was elected the mayor of the capital. He was always a sharp critic of Ratsiraka and stood as an opposition candidate in a presidential election during December 2001.

Ravalomanana was popular entering the election and expected to outpoll the incumbent president. When the votes were tallied, election officials announced that Ravalomanana had, indeed, received more votes (46%) than Ratsiraka (40%) but not enough to avoid a runoff, as is necessary in the French electoral system. Ravalomanana's supporters claimed that the votes had been manipulated. Independent electoral observers concurred and declared that Ravalomanana should have been the outright winner.

Ratsiraka refused to concede power even in the face of mounting opposition. After a few months of strikes and protests, Ratsiraka was forced to flee the capital, which is located in the central highlands, when the military refused to intervene, saying the problem was a political issue and not a military one.

Ratsiraka was born in and remained fantastically popular in the eastern coastal region. So, he attempted to reestablish a new capital in the eastern port city of Toamasina while Ravalomanana took control of the government in Antananarivo. With the country split into two factions, giving allegiance to two separate governments in two separate capitals, Madagascar was teetering on the edge of civil war.

In order to regain power, Ratsiraka attempted to prevent supplies from reaching the capital by erecting a series of road blocks and blowing up bridges on the national routes leading from the coasts to the capital. This assault was somewhat successful, as supplies grew increasingly scarce and prices increased drastically. In particular, the price of petrol became exorbitantly expensive. As a result, even locally produced goods could not be shipped to or from the capital as the trucking industry essentially stopped operating.

Figure 1: Political Map of Madagascar

As the standoff continued, Ratsiraka began to lose support and the effectiveness of his blockade against the central highlands waned. Eventually, Ravalomanana was finally sworn in as the new president nearly six months after the election date. Shortly thereafter, Ratsiraka was forced to flee to exile in France once again.

Things gradually returned to normal for Madagascar but the PI left an indelible mark on the Malagasy economy and its people. The economy languished during the PI with the GDP falling by 12% in 2002.[1] This represents a significant loss of income for any country, especially one comprised of people who already were living on dollars a day.

Literature Review

The basis of this study builds on the findings and theories of several other authors. The two foci of my study draw heavily on already established conclusions of writings primarily regarding the topics of human capital and the connection between maternal income and child welfare.

Political instability is a topic that has been investigated in many different lights. The most common manifestation is the study of the link between PI and economic growth or inequality. The general consensus is that PI has a negative effect on growth and causes inequality to rise, although the link to inequality is typically more contentious. These assertions typically hold regardless of the form of the PI event—whether coups d'état, civil wars, or other forms of rebellion. Thus, given a history of PI, one would expect to find lower income on average throughout the affected area.

Even though PI has been demonstrated to cause lower economic growth, the distribution of income loss has not been extensively researched. It has not been shown that any particular subpopulation bears a greater or lesser cost.

It is recognized that, in developing nations, a mother's control of income is a far better indicator of a child's welfare than the father's. Maternal income is important for such measures as child nutrition, health, and education as well as fertility rates. In turn, it is also accepted that the first few years in a child's life, during which the maternal role is particularly influential, have long-lasting productivity implications for both the individual and, subsequently, the nation as a whole.

The Human Development Index (HDI) is a more holistic approach to evaluating the development level of a country. It incorporates income, life expectancy, and school attendance rates. Augustin Fosu has researched the topic and shown that PI leads to even lower levels of HDI than would be predicted by the decreased income. That extra gap has been documented but not explained.

With respect to the second topic, education can generate many different skills in a person. Of particular interest for this paper is the potential increase in adaptability that occurs as a person invests in their human capital. Theodore Schultz concludes education improves one's ability to deal with job disequilibria since "education—even primary schooling—enhances the ability of students to perceive new classes of problems, to clarify such problems, and to learn ways of solving them." Since PI often accompanies great economic uncertainty, political instability can be said to induce the type of disequilibrium of which Schultz spoke.

In summary, there are three main points from past research that should be considered for the rest of this study. The first is that a mother's income is more significant for a society's nonmonetary development than a man's. Second, HDI falls by a greater amount than would be expected based simply on income lost following

PI. Finally, when a student invests in education they become better able to adjust to economic disequilibria.

Model

The basis of this study can be divided into the examination of two primary hypotheses. It has been repeatedly shown that, based on earlier research, PI causes widespread income loss throughout a country's people. However, just as one finds that income is not distributed on an equal basis, one cannot assume that income will be lost on an equal basis. Certain subpopulations will lose a disproportionately greater portion of their income after facing PI. As a pedagogic example, following the deposition of a president, a person who holds a high government position solely due to a familial relationship with the president will likely lose more income than a person whose ethnic group had been repressed. It is the goal of this study to analyze gender and educational characteristics to determine whether the people possessing those traits lose more or less income than would be expected based on their other characteristics.

Given that a woman's income is quite important for the overall welfare of a child relative to a man's income, any event that causes women to lose a disproportionately large portion of her income would be significantly worse for children than would be expected based solely on the change in aggregate income. This corresponds with the findings of other, earlier studies that find PI causes HDI values to fall more than would be expected based on income losses. I seek to demonstrate that the reason human development indices are particularly sensitive to political instability is that women are among the groups that disproportionately suffer as a result of PI.

As is the case with many countries, Madagascar is a patriarchal society in which women and girls often must subordinate their needs so their male brothers, fathers, or husbands can fulfill their needs and goals. This could manifest itself

through dietary, educational, or other deprivations. These things that could inhibit a woman's productivity, along with potential discrimination (even those as common as housekeeping and childrearing obligations), could cause women to have more tenuous connections to markets and thus be more susceptible to market disruptions. If I show that women are more vulnerable when faced with a large shock to the economy produced by PI, then I will have demonstrated a credible link between PI and exceptionally low HDI.

The second aspect of this study is an examination of the effects of education on a person's ability to cope with significant disruptions to the economic order. PI often causes an economy to sputter, as normal activity must be suspended for security concerns or because dysfunctional government institutions generate significant impediments to normal business transactions. Madagascar certainly experienced disruption given the large drop in GDP. In these situations, it is reasonable to assume that successfully earning a livelihood becomes a much more complicated task. In the face of great economic uncertainty, those who are better prepared to adjust to rapidly changing conditions will fare better. A person who can adapt to the prevailing job market will be more likely to find available positions or acquire new skills and thus maintain their labor income.

The most common method thought to build the set of skills possessed by a person, which could also make him a more flexible worker, is a person's education. So, if education makes people more adaptable and PI creates a great deal of turmoil and uncertainty, then the more educated would be in a better position to find new or additional work that would supplement their decreased income from their primary source of work. If, other things equal, people with higher levels of education who face worse political instability retained more of their income, then there would be evidence that peoples' educations do, in fact, assist them as they attempt to cope with PI.

In order to establish that women lose more income and the educated retain more income than would otherwise be expected I use a collection of demographic data, community-level data, and crisis-related data. Labor income will be the dependent variable in this analysis. Due to the skewed income distribution, the logarithm of income is a more appropriate form. Since income is such a straightforward metric, little explanation is needed as to the rationale for its inclusion. A corollary related to income should be included to explain some of the variation. Due to the structure of the survey, the frequency of pay was used to construct people's annual income. But, pay frequency may also reveal something about the nature of a person's employment. For instance, a day laborer would presumably be more likely to report daily wages while a business owner may be more likely to report income based on monthly or annual profits.

Many of the other demographic variables have an equally clear reason to be included in this regression and equally clear implications. Age is typically associated with higher income as work experience is considered an opportunity to build productivity. Even if there were no compounded effect of being a specific gender, a person's sex by itself would have a significant influence on a person's income. In Madagascar, as in many places, women systematically earn less money than men. Especially with respect to investigating the effect of PI on women, it is important to keep in mind that women will already have lower incomes. I also choose to control for a person's housing status—whether their household owns their house or obtained lodging through alternate means. Since holding a deed to a piece of property could be indicative of a person's access to credit, it might also be indicative of their ability to finance income-generating activities. Another dimension of one's living situation that creates variation among respondents worth noting is the difference between urban and rural dwellers. Previous research has demonstrated that people living in urban areas

have a systematically higher standard of living than do those living in rural areas. So, by identifying those in rural and urban areas, I need not be concerned about structural differences in labor income and employment. Madagascar is a very large island (about the size of California and Oregon) and has 22 different ethnicities so each part of the island has its own, distinct characteristics. In order to compensate for these contrasting environments in the context of this study, I include indicator variables for the three provinces that are included in this study. This will account for some of the variation in income based solely on geographic location. Because one may reasonably expect the effects of the PI to dissipate over time, I have generated a variable that captures the passage of time by measuring the number of years that have passed since the 2002 PI disturbance. This assumes that the PI does not force people below some form of a poverty threshold, after which they are in a poverty trap. The creation of poverty traps by PI is worthy of study but beyond the scope of this paper.

There is significant variation in development that exists among areas. There are (few) places that approach the levels of middle-income countries and there are places suffering from poverty as severe as in any other African nation. Places at different levels of development could feasibly react differently to PI. Since the development in Madagascar is not randomly assigned, the characteristics of the area partially determine the nature of the place. Several important descriptive variables can be employed that will approximate the effect of the town on the survey respondent's income.

Among the available community-level data, I have decided to include the population of a person's region. While I do not have a specific hypothesis as to how PI will vary with population, it is feasible that a heavily populated area allows a person a greater degree of anonymity to avoid involvement or it could be that a larger population increases the likelihood of ethnic mixing and thus fighting. Also of

potential interest would be the population density of a town, since a large population spread over a large geographic area would be similar to a small area with a small population. However, the incredible detail of the Ilo survey makes it difficult to incorporate other data sources, as the surface area for each of the hundreds of regions is unavailable. Even if it were available, it might not prove useful since geographical boundaries in Madagascar are often poorly defined. Also, even within a town's jurisdiction, there are typically large swaths of uninhabited agricultural land or undeveloped wilderness, both of which would be included in town acreage. Therefore, a constant population variable across residents of a region will help isolate the variance arising from the size of a town's population.

In order to estimate the government's influence in an area, which could indicate preferential treatment if the government selectively place their offices, I include the number of government ministry offices. The presence of these branches could alter peoples' reactions to the PI by creating a more tangible link to the government. Finally, I also take into account the likelihood that a person will face a natural disaster. This is a vitally important characteristic of Madagascar, given that it suffers from violent cyclones and frequent droughts. If a town faces frequent natural disasters, it may be more difficult for people to rebuild a living or undertake income-generating activities if the natural disasters are compounded by a man-made PI disaster.

When including education in the regressions, there are two ways to measure educational attainment, each of which is more compatible with its own theory of education's value. The first method of determining educational status, years of successful schooling, is most compatible with a human capital accumulation since each year of schooling supposedly increases the productivity of a worker. The second method of measuring educational achievement, which reflects the highest school

degree completed, is more compatible with signaling since a person who completes a certain number of years of schooling and passes an exam did not necessarily learn appreciably more than a person who had learned marginally less over the same number of years but did not pass the exam. In the end, though, it may not be of great consequence through which frame we view education since both yield the same fundamental results.

In the context of this study, I employ a structure used by Joan Esteban to define political instability, or "conflict" in his terms. He defines a political system as "a particular way of choosing among alternatives" for the distribution of public goods, which are valued to varying degrees by individuals. Political instability is "a challenge to such a system, which is costly." I use his definition and then create a new one for the severity of political instability: the degree of societal and economic disruption caused by a challenge to the prevailing political system.

I employ two separate methods to proxy the severity of the disruption caused by PI. Both are imperfect measures but do rely on changes in the economy that would be uniform except for the impact of the political instability. Both methods of estimation yield the same results, to different degrees of certainty, so it is not necessarily important which specific measurement is used.

The first metric of PI that I apply is the change in the price of rice. Since rice is undoubtedly the most important food product in Madagascar, the variation in the price of that good is going to have the greatest impact on the average person's welfare. By focusing on domestic rice, any changes in the global rice market are irrelevant. So, if the price of rice increases by a high percentage, then something is happening in Madagascar such that a given area has less access. Taking rice to be a normal good (income elasticity = .579, price elasticity = -.469) and assuming no change in preferences, given the significant loss of income/wealth, the demand for rice would

have decreased.[2] With a 4.5% increase in the price faced by the average customer and decreased demand, there must have been decreased supply. Thus, the relative price increase shows the change in the scarcity of rice. Whether PI decreases productivity or impedes distribution chains to cause this scarcity, it affects consumers in the same way. So, as PI becomes worse in this context, it will be increasingly disruptive to the supply of rice and the price will subsequently rise.

The second metric of PI that I apply is the percentage change in the fare for public transportation from the district's primary location to the provincial capital. Given that one of the primary forms of disruption caused by the PI were the road blockades that prevented the movement of goods and people, the cost of transportation would logically be directly affected by the relative strength of the political instability's impact. Fuel, being a primary determinant of the fare of transportation, can thus directly reflect PI. Another potential connection between PI and the cost of transportation is the imposition of a potential risk premium, where it may be dangerous to transport people due to bandits or risk of extortion. These factors will yield higher relative price increases for fares as PI grows more severe.

While the results for all of the aforementioned characteristics may be interesting simply due to their description information, they do not provide any particularly valuable conclusions, especially since some of the results are quite predictable, such as women earning less than men, the better educated earning more than the less educated. The most important aspect of this study—and the one from which the primary results are derived—are the coefficients on and significance of the interaction terms I include in each model.

In the case where I analyze the effect of PI on a woman's income, I essentially aim to assess the difference in income that occurs for a woman as the measures of PI imply that severity increases. I will have already included a standalone variable in the

regression for gender so any further analysis will take into account the lower mean income for women. I will also include the actual PI term so that I may account for systematic shifts in income experienced by the entire population. Thus, the interaction of sex and each PI term gives the direction of the shift in income caused by being a female who experiences great PI, given the separate gender and PI effects. So, a negative (positive) sign on the interaction term would mean that given the general effect of the PI and the lower income of Malagasy women, a woman would lose more (less) income than would an otherwise equal man. It is the sign of this coefficient that will give the answer to the primary question with respect to gender.

In response to the second question I ask in this study, I investigate whether educated people attain additional skills that allow an extra degree of flexibility and innovativeness. This adaptability would then allow a person to maintain their income in the face of PI. Essentially, this entails demonstrating empirically that the coefficient on the product of schooling and PI severity is positive, meaning that the drop in peoples' income is smaller with more education. People with higher levels of education will, as one might expect, have higher incomes than otherwise equal people with less education. This is logical as, in Madagascar, having completed more schooling allows for entry into more desirable and better paying jobs, such as a teacher or bush-taxi driver. Again, the widespread income change that occurs to the entire population will be addressed though the inclusion of the single PI variable. That will allow the interaction term to represent the effect of being well educated in an economically uncertain environment caused by PI, given that the educated already earn more money and that there are significant income shifts caused by PI.

When seeking the answer to these questions, I will employ the following OLS equations. The first of the below equations is for the case where education is measured by the years of schooling completed by the respondent. The second actually involves

three interaction terms for each of the three potential degree classes obtained by each person.

$$y_i = \alpha + \beta \cdot sex_i \cdot crisis_j + \gamma \cdot schoolyears_i \cdot crisis_j + \delta \cdot sex_i + \phi \cdot schoolyears_i + \lambda \cdot crisis_j + \sum_{l=1}^{8} \theta^l \cdot x_i^l + \sum_{k=1}^{6} \sigma^k \cdot comm_j^k$$

$$y_i = \alpha + \beta \cdot sex_i \cdot crisis_j + \sum_{n=1}^{3} \gamma^n \cdot diploma_i^n \cdot crisis_j + \delta \cdot sex_i + \sum_{n=1}^{3} \phi^n \cdot diploma_i^n + \lambda \cdot crisis_j + \sum_{l=1}^{6} \theta^l \cdot x_i^l + \sum_{k=1}^{6} \sigma^k \cdot comm_j^k$$

Where: i= individual, j = community
y = log income
x = individual variables
comm = community variables
sex = 1 for women, 0 for men
schoolyears = years of schooling
diploma = primary, secondary, university degree
crisis = PI severity variable, = 0 before PI $\forall j$

Therefore, in the context of this particular model, the value of β is the value from which I draw conclusions regarding being female. The sign of γ will answer the second question, regarding education. A positive value would correspond to the proposed hypothesis. The remaining variables are individual- and community-level variables. More specifically, the vector of individual variables (x) consists of rurality, education, highest degree obtained, age, housing ownership, number of years since the PI, and pay frequency. The vector of community variables (*comm*) includes the three province dummies, regional population, ministry offices, and the risk of natural disaster. Because many of the variables are constant for all people in the same community, I cluster the variables by region (roughly analogous to US counties), which is the most accurate level to which the respondents are identifiable.

In the context of this study, β and γ are the variables on interest because they represent the marginal effect of female gender and school completion respectively. If one lets:

s = *sex variable*
e = education variable
c = crisis variable
y = dependent income variable

then the following holds:

$$\beta = \frac{\partial^2 y}{\partial s \partial c} \text{ and } \gamma = \frac{\partial^2 y}{\partial e \partial c}$$

Thus, I will be seeking the change in income if a person "becomes" female or a person "attains" a higher degree as political instability becomes more severe. That will inform me whether women lost greater income and whether the educated maintained their income.

Through running these OLS regressions, I seek to identify the additional determinants of income following the political instability yielded by the confluence of higher PI severity and a particular trait, namely gender and educational status.

Data

In order to examine the differential effect of political instability on different groups of peoples' labor incomes, I will compile several separate sources to provide rich descriptive capability that will satisfy data needs.

The majority of the data for this econometric analysis is drawn from the *Enquête Périodique auprès des Ménages* (EPM). The EPM is a recurring household survey in Madagascar. It is conducted under the auspices of the *Institut Statistique* (INSTAT), the government ministry responsible for data collection and analysis. The EPM is conducted repeatedly, contingent on the political and financial support necessary to carry it out. Unfortunately, this may introduce an element of bias in that they are only conducted during relatively stable times. The EPM is designed in such a manner that it is representative of the entire country. While it does not survey every district throughout the country, it does survey thousands of people in most districts in each of the six provinces.

The EPM is unarguably the most comprehensive source of information on the population dynamics of the Malagasy people. The first EPM was carried out in 1993 and was relatively rudimentary. Subsequent EPMs occurred in 1999, 2001, 2002, 2004 and 2005. I choose to restrict my analysis to the data available from 1999, 2001, 2004 and 2005 EPMs. The 2002 EPM is not considered due to improper surveying techniques following the PI while there is too long of a gap between 1993 and the instance of PI under consideration here. The quality and detail of the surveys has evolved greatly over the years. Generally speaking, the questions present in the earlier surveys were still present in later surveys but had been expanded on or refined. All of the variables of interest for this study were included such that they were recorded in each of the four years.

For the analysis, I choose to pool the data so that I am essentially creating one very large collection of independent observations. However, since the observations preceding the PI and those following the PI should not be considered the same given the "treatment" of the PI, I differentiate between the surveys by assigning to them a variable representing the number of years that had passed since the PI. For the two surveys before the instability, the value of zero was assigned. This should account for any economy-wide shifts that would make survey responses differ among the years.

Since I use a pair of surveys before and after the particular case of political instability in question along with the fact that the surveys are not of panel form, there is no way to ensure the homogeneity of the samples before and after. A single house may be sampled in separate surveys but represent distinct households if it were the case that the original subject vacated the domicile, which was subsequently inhabited by a different set of people. This should actually pose minimal problems, as the sample size should ensure the representativeness of the sample for each area.

A migratory issue of greater consequence is the fact that there may have been selective emigration following the PI. However, this likely should not cause great worry either. There were relatively few emigrants, .9% of the entire population over 2000-2002, from Madagascar over the years in question.[3] This provides an upper bound to the number of people who could have left in the year following the PI, which would still be quite low by international standards. Additionally, given the nature of the likely emigrants, the relatively well educated would be the only people who could afford the exorbitant costs of travel. Taking this to be the case, the findings of this study likely would represent a lower bound to the estimates for education.

There is another issue of nonrandom internal migration where the PI directly causes people to systematically leave certain areas, presumably high-severity, for other areas, presumably low-severity areas. This yields two likely effects. The first is that the relocation of people to areas of different PI severity will dampen the treatment effect of the instability. This would seemingly imply that the PI had a more random effect on peoples' incomes than it actually had, with people who experience high levels of PI intermingling with people who experienced low levels. The second effect is that emigrants may not perfectly represent the population of a given area. If the most vulnerable leave areas of great PI upheaval, then the variation in income change caused by PI is likely a lower bound as those who fared the worst left the affected areas. However, if the least vulnerable had the capacity to and chose to leave the affected areas, then these values would provide an upper bound. Unfortunately, there has not been a comprehensive study of migration dynamics following the election violence. One might think that, given the primarily agricultural nature of the Malagasy economy and the disruption to business involving non-manual labor, many people losing jobs in the non-agricultural sector would be absorbed into family farms and become among those in the surplus agricultural labor force (see Lewis' Dual Sector

Model). Regardless of which types of people migrated it likely would not have a great effect on the overall results, as there were not widespread displacement or refugees.

Many of the variables I analyze were derived from the demographic section of the EPMs. This section of the survey covers a wide variety of topics but I picked a small subset. Gender is the most obvious selection from this group due to its significant predictive power and it's fundamental role in the model being analyzed currently. For the purposes of this study, the gender variable is set to zero if the person is a male and one if the person is female. Age is given in multiple forms, both through birthdates and through age in years. I chose to use the age in years because the exact date the survey was conducted was not given and a difference of weeks would likely make little difference for labor earnings. The demographic section of the EPM also gives the rurality of one's living environment. I again created a simple indicator variable where the value for urban dwellers is equal to one and rural dwellers takes the value of two. For the final two EPMs, the urban setting was divided into primary and secondary urban areas. I simply redefined both of these as generally urban, since I assume some degree of homogeneity among urban areas. In order to capture some of the significant variation (language, ethnicity, religion, etc.) among the provinces of the country, I also create an indicator variable for each of the provinces under analysis. The final demographic variable I drew from the EPM describes the housing status of each respondent's household. It goes into considerable detail as to the ownership of their living space—whether the survey respondent owns their home, rents, receives housing from their job, or a couple other situations. I simplify the measure so that the variable takes the value of one if the respondent's household is also the owner of the domicile in which they reside. I additionally created a variable measuring the passage of time since the electoral violence. To each response originating from the two surveys conducted before the PI, I assigned a value of zero. Then, for the two surveys

following the PI, every respondent was assigned the value of two for the 2004 EPM and the value of three for the 2005 EPM.

Another important section of the EPM from which I derived my data was information about income. There were several potential sources of income included in the survey. I chose to focus on labor income because alternative sources of income were rarely reported and it was impossible to determine the exact nature of that money whereas there is a relative degree of homogeneity across labor income source, although not necessarily the type of work. The structure of the EPM survey may unfortunately obfuscate the source of income received by individuals. The income reported in the EPM is from the person's primary employment. Because respondents self-report their income, the answers may be subjective if the person holds multiple types of employment, if they work for in-kind payment, or if they are self-employed. So, a person may report zero income because they actually owned their firm and thus did not technically receive a wage. However, it is unlikely that very many people would manage a business, as Madagascar is a difficult place to conduct business (134th most difficult worldwide).[4] Those who did not work for wages, most commonly children, had their observations simply treated as missing rather than assigning them values of zero. The actual format of the data required a bit of manipulation for comparability across survey respondents. Each person was asked for both the amount of money they receive per pay period and the frequency of pay period. In the first three EPMs, income was measured in Malagasy Francs. In 2005, the Malagasy Ariary replaced the Franc as the official currency so the final EPM was denominated in Ariary. I converted all four EPMs to Ariary by dividing the incomes from the first three surveys by five, the ratio of Ariary to Franc. Each respondent gave the frequency of pay; either their pay was per day, week, month, or year. I chose to convert all of the incomes to annual income. However, given Madagascar's labor surplus. It would be

inappropriate to assume that a person received their daily wage 365 times a year. So, I made the assumption that people would actually work two thirds of the time. So, a person reporting their daily wage receives that 240 times a year, a weekly wage 35 times and a monthly wage 8 times a year. This is admittedly a somewhat arbitrary assumption but not necessarily unreasonable given that there are likely some working more often and some working less often. For the actual analysis, using the log of income is a more appropriate statistic to use given the income distribution. However, replacing log income with the actual value for income does not fundamentally change the results.

Another determinant of income and primary focus of this study is the educational achievement of the survey respondents. There are two separate ways to measure this given the data available from the EPM, each reflecting a different perspective on education. The first source of information on the education of each person is a question in the Education section in which each person is asked to identify the highest grade of the Malagasy school system they successfully completed. Some people never attended school and are thus listed at zero years. The alternative method of measuring educational status is through analyzing the highest degree obtained by each person. In Madagascar, there is an exam following each level of school: lower elementary, upper elementary, and secondary (see Figure 2). In some cases, there are different exams for each level, depending on the track in which the student studies. For simplicity of analysis I have combined all degree holders into three dummy variables—those with a primary school degree, those with a secondary school degree, and those with a university degree.

Another important source of variation in incomes of people both before and after the PI is the town in which a person lives. There is great inequality across regions in Madagascar, with the central highlands generally experiencing much higher

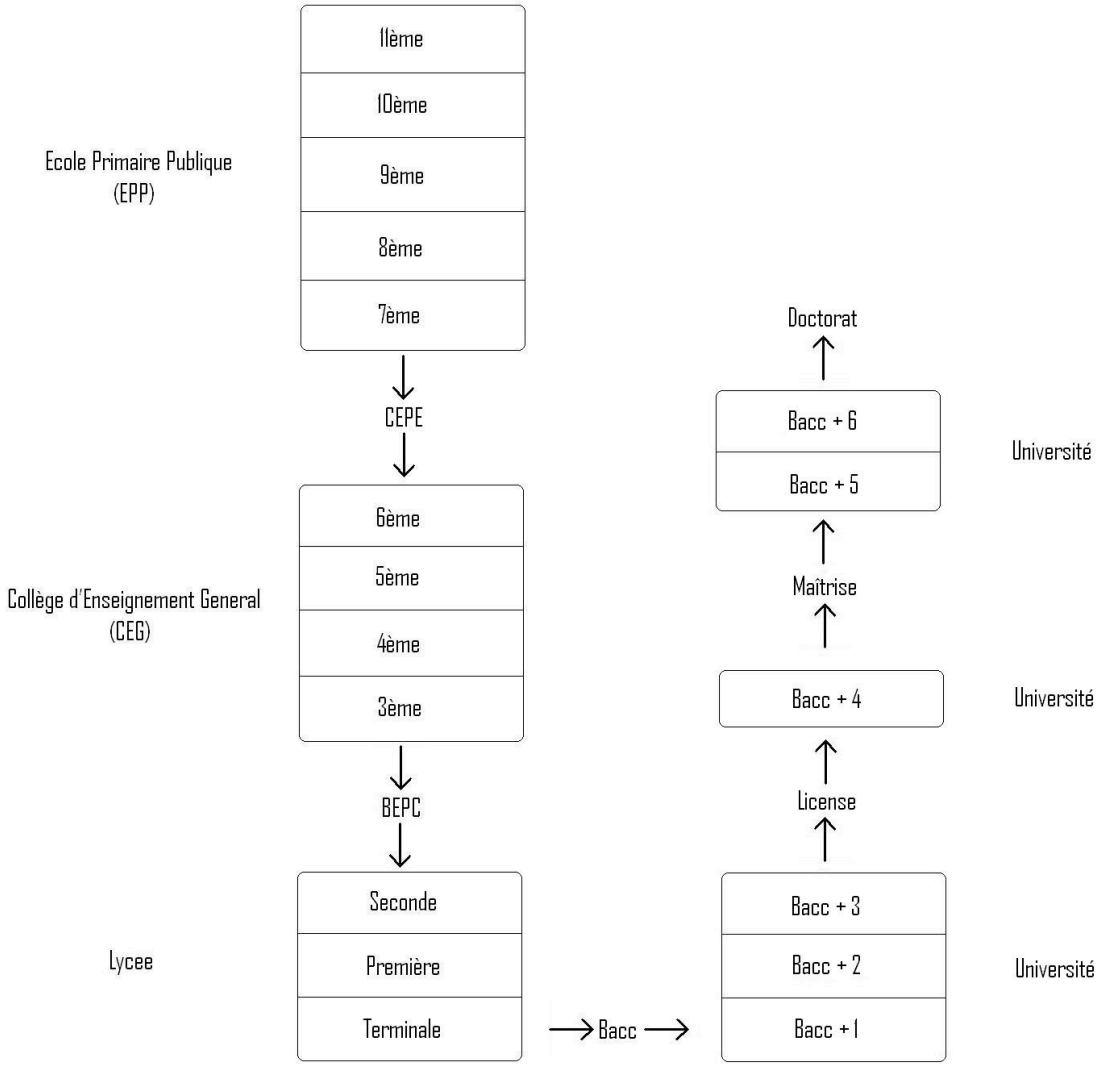

Figure 2: Malagasy School System

standards of living while the coastal areas of Madagascar generally suffer more abject poverty. This is particularly relevant with respect to the urban-rural divide. Additionally, different areas with similar living standards may vary significantly in other dimensions. In order to attempt to control for these potential sources of variation, I include a set of descriptive variables that give the predominant conditions in each location.

Six weeks before the PI in question occurred, the Ilo program based out of Cornell conducted a detailed survey of 1385 of the 1395 towns in Madagascar. By convening focus groups in each village, the Ilo team was able to collect a wide set of primarily descriptive details ranging from economic to health to government presence variables. While I can identify town characteristics accurately for each village, I cannot reliably assign these values to the individual characteristics from the EPMs because that data is only identifiable to the district level. So, for each of these districts, the values were determined by combining the towns in that district by population.

In this analysis, I have included several straightforward variables. The first variable I include is the total population of the district. This is calculated using the simple sum of the populations in each town. Using a similar method, I calculate the total number of government ministry offices by summing the number of offices located in each town. Finally, I derive the average number of natural disasters faced by inhabitants of each district. In this case, natural disasters are defined to be significant weather-, plague- and agricultural-related disruptions to production. I weighted the town's frequency of natural disasters by the population to attain an accurate representation of the number of disruptions to production a typical resident will face in a given year.

The final source of data for my analysis is the most unusual. Following the incredible shock to the economy and political system caused by the PI, the Ilo

researchers returned to Madagascar to catalog how prevailing conditions had changed throughout the island. In each district, key informants were selected to answer questions, the responses of which should be identical for all townspeople. Due to logistical constraints the follow-up survey was only carried out in three of the six provinces. However, the two provinces with the largest populaces were included and the total percentage of the population is greater than 60%. In an ideal world, each town in all six of the provinces would have been surveyed with a similar degree of rigor to that of the survey conducted prior to the PI. Unfortunately, that is not the case so the scope of the analysis is limited to the three surveyed provinces (Antananarivo, Fianarantsoa, Mahajanga, see Figure 3). In several cases, there were regions that did not have an observed value for one or both of the PI estimates. When this was the case, I imputed the value for PI by taking the average of each bordering region for which the value was measured. The severity of the PI is a vital component of the analysis, without which meaningful results cannot be derived in this context.

Since there is no standardized metric for PI, I must use something that can be measured but also is directly related to PI. It may be impossible to use a universal measure of PI since its effects are quite contingent on the country and context. Given the methods used to create instability in Madagascar, a good measure might be the number of roadblocks per mile of road or the number of reported bombings. However, the primary function of the survey was not to explicitly measure PI but rather to catalogue the conditions that arose following the PI. Based on the available question-response pairs, two prime candidates emerge. The first way I choose to measure PI is through the change in the price of domestic rice in the May (the height of the harvest season) of the year preceding the PI and the May of the year following the PI. Taking the price of rice at the same time of year removes problems of seasonality. Rice is the staple food for the Malagasy people and has the most inelastic price and income

Figure 3: Included Regions

demand of all food categories.[5] The price of rice is for one "kapoaka" (metal can the size of a soup can) of domestically produced white rice. The *kapoaka* is only sold at the retail level, as kilograms are used for wholesale distribution. This is a sufficiently specific product that the units of rice should be perfectly comparable across regions.

The second method I use to estimate the severity of the political instability is to look at the increase in the price of the cost of transport for one person from the chief regional town to the provincial capital. This would most likely constitute public transportation on a minibus. On most routes, the price is fixed through an oligopoly of the companies operating that route. However, there are occasionally several companies that operate at different prices given the capacity of their vehicles. Again, this was asked as a comparison of May of the year preceding and following the PI, so seasonality of gasoline prices would also not be an issue.

The PI value holds constant for a given region for the two surveyed years following the electoral violence. However, for regressions to measure the true effect of the PI rather than incendiary nature of the area, the values for PI are set to zero for the years of 1999 and 2001. Thus, the values of the variables associated with the coefficients β, γ, and η will take the value of zero since they equal the PI value or a product involving PI. This leaves only the values for 2004 and 2005 to determine the three coefficients (β, γ, and η).

Results

A look at the primary regression tables (Tables 1-2) gives a result that is generally favorable for my hypotheses. In some cases, the results support my propositions in a more nuanced way.

For each set of interaction terms, I ran two regressions. The first involves the interaction terms, which will produce the conclusions of this paper, and the standalone

variables that are involved in the interaction. To that regression, I then add control variables in the form of both individual variables and community level variables. Because the first equation will not account for all of the great deal of variation that will exist in income, it is possible, and extremely likely, that the values for the interaction terms will differ between the two forms. Because the regressions involving the set of controls should better isolate the effect of being female or well educated during PI, they will be the preferred form, although I will allow the uncontrolled results to inform me as well.

For simplicity of viewing, I exclude the values for all control variables from the regression output tables (available upon request). While the coefficients and their statistical significance do not directly affect my conclusions, I will briefly summarize those that were statistically significant

All education controls were statistically significantly positive when the price of rice was used as the PI measure. In the full model, the education variables were positive but not significant. All appearances of the frequency of pay were statistically significant at the 99% level. But, this is likely a product of the construction of income rather than necessarily showing the effect of a given type of employment. The age of the respondent is also significantly positive, as would be expected, at the 95% level when the change in the price of rice is used. Incomes were statistically significantly higher as time passed following the PI, which could be the result of new policies or the dissipation of a negative shock. Interestingly, government ministry offices were associated with lower income (significant at 99% level), which would correspond to a situation in which the government selectively places offices in areas of great need or a situation where ministry offices drain funds from otherwise productive uses.

The variable that provides the clearest results is that indicating a person is female. In each of its four appearances, women have are found to have a lower

income, other things equal, significant at the 99% level (see Tables 1-4). While this is not surprising, it is still a significant result. If women were to have *higher* incomes, then the assumption that women would lose income due to weaker labor market connections would appear flawed. However, the regressions resoundingly support the assumption that women systematically have lower incomes.

All of the variables that were included in order to control for the effects of simply possessing a certain characteristic may be informative or they may simply reinforce an already accepted tenet. However, none of them inform at all about the effects of PI on the groups of interest—women and the highly educated. In order to investigate those questions, I will focus on the coefficients on the interaction terms, or in the above model, the values represented by β and γ.

The results for the coefficient measuring the effect of PI on a woman's labor income (β) provide an answer supportive of my hypothesis. When the change in the price of rice was the preferred method of estimating PI severity, the coefficient was statistically significantly negative when some of the variation was controlled for by inclusion of personal and community variables. In those cases, the coefficients were significant at the 95% level (top row, Tables 1, 3). For each of the other forms of the regression, the coefficients are statistically insignificant yet uniformly negative (Tables 2, 4). This only serves as further evidence that, as PI became more severe, women were increasingly at risk of losing their income.

With respect to the question of whether people with high levels of education were able to maintain their labor income, I am able to conclude in a nuanced manner that education did assist people in coping with the economic volatility. While the education measure using the years of schooling completed does not attain statistical significance, both of the controlled regressions yielded positive coefficients with the coefficient involving the price change drawing very near to statistically significant

(row 2, Tables 1-2). When the alternative measure of education is employed, it becomes clear that those with the very highest levels of education are the primary drivers of a positive relationship between labor income and education in a politically unstable environment. With the price change of rice used as the measure of PI, possessing a university-level degree significantly improves a person's ability to maintain labor income while dealing with PI (fourth row, Table 3). While none of the other interaction terms for education assume a statistically significant value, each of the controlled regressions take a positive value. This leads me to conclude that all forms of education likely better prepare a person to adjust to a PI-induced economically uncertain environment and a university education is a way to ensure better performance.

The regressions that were run for the entire sample were also run for the subset including only the women and a subset including only the men (Tables 5-8 and Tables 9-12, respectively). In the case of women, the coefficients on education generally reflect the same conclusions. Nearly all of the appearances of education carry a positive coefficient and the university-price change term again takes a statistically significant coefficient for both the controlled an uncontrolled regressions, these times at the 99% level (third row, Table 7). Thus, the more general conclusion that university degrees allow people to maintain their income holds true for women in particular. The results for men did not conflict with those for women. The coefficient on a university degree, this time with the cost of travel used to measure PI, is statistically significantly positive (third row, Table 12). Furthermore, the interaction of the years of schooling with the PI variable is also significantly positive, strengthening the argument that all education can benefit people if they face PI (row one, Table 10).

One factor that has been assumed to be true throughout the paper but is only now found to be true is that PI is destructive of income. The PI measures are negative

in three of the four inclusions with the one positive instance quite statistically insignificant. Additionally, with the price change taken as the PI measure, it is shown to be significantly negative for women (row 3, Table 5 and row 7, Table 7). On the other hand, travel cost is shown to have a negative effect on males' incomes (row 3, Table 10 and row 7, Table 12). Taken with the many negative yet insignificant coefficients, it reasonable to conclude that all groups' incomes were hurt in an absolute sense by the political instability.

I choose to use the log of income as the dependent variable in the majority of my analysis because one would expect the nature of the income distribution to prove problematic in analysis of income without the log being taken. This seems to be the case given the lack of evidence for any kind of statistically significant effect for many variables (Tables 13-16). Furthermore, the few variables obtaining statistical significance coincide with the findings of the regressions obtained using the log of income. That indicates that the results of the regressions do not hinge on the treatment of income. Hence, I choose to employ the log of income as the preferred form of the dependant variable.

Conclusions

A mother's income is far more important for the wellbeing of a child than a father's income. Thus, a loss of a mother's income will yield worse outcomes for their children than would an equal loss of the father's income. So, if political instability causes a disproportionately large drop in female income, it will also lead to even worse human development indicators than would be expected based solely on aggregate income changes.

Along with political instability often comes economic instability and uncertainty. There is typically a widespread loss in productivity and income associated

with PI. If a person were able to adapt to newly prevalent conditions and seek solutions to unresolved problems and impediments, then they would be in a better position to maintain their income levels, or at least mitigate income loss. According to my theory, people attain this flexibility through schooling or at least are perceived to have acquired these skills by demonstrating their ability to pass a national exam.

I investigate the validity of these two distinct but related claims through the lens of the aftermath of a coup d'état that occurred in Madagascar during 2001-2002. The economy was badly damaged during this period, as the GDP dropped by 12% in the year following the PI. This corresponds to significant income loss for the Malagasy people. While the vast majority of people did lose income, there is no known rule as to the distribution of income lost. Surely, there must have been individuals who suffered worse than others, and the results of this study confirm this assertion.

By taking the change in the price of rice or by taking the increase in travel costs to be a reasonably accurate measure of the degree to which the local economy was disrupted, I find that PI causes women to lose income at a greater rate than would otherwise be expected. I also find that people with higher levels of education are more likely to retain their income. Therefore, an instance of PI may cause a disproportionately large fall in human development indicators where the loss of maternal income in the intermediary link. Also, these findings provide evidence that schooling equips people with some form of skills or more intimate connection to the market so that the educated are better prepared to cope with the accompanying disequilibrium induced by PI.

The prime contribution of this paper is to identify the differential impact of PI and peoples' responses to those events. However, this paper is focused on just one of many forms of PI in one country. Since PI is widespread throughout the developing

world, it would not be terribly difficult to replicate this model with respect to a separate PI event in another country if a reasonably reliable measure of political instability is available. There are many other characteristics that could potentially affect a person's ability to cope with political instability. Further research is needed to determine exactly who is affected and how are they affected. From these identities, we may draw more conclusions regarding peoples' reaction to economic disequilibrium induced by PI.

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APPENDIX

Regression Results

Primary Analysis

Years of Schooling

Table 1: Price Change

(β) PriceChange*Sex	**-1.561 (1.329)**	**-2.033** (0.831)**
(γ) YearsOfSchooling* PriceChange	**0.3217 (0.2004)**	**0.228 (0.154)**
Sex	-0.951*** (0.252)	-1.359*** (0.258)
YearsOfSchooling	-0.024 (0.030)	0.050*** (0.014)
PriceChange	0.094 (1.686)	-0.761 (1.420)
		and controls
Observations	6925	3105
R-Squared	.114	.384
F Stat	53.60	56.02

Table 2: Travel Cost

(β) TravelCost*Sex	**-0.238 (0.222)**	**-0.077 (0.203)**
(γ) YearsOfSchooling* TravelCost	**-0.018 (0.034)**	**0.0245 (0.034)**
Sex	-1.041*** (0.341)	-1.700*** (0.296)
YearsOfSchooling	-0.020 (0.047)	0.019 (0.048)
TravelCost	0.303 (0.484)	-0.3663 (0.415)
		and controls
Observations	4775	2086
R-Squared	.156	.371
F Stat	28.24	23.55

Highest Degree Obtained

Table 3: Price Change

(β) PriceChange*Sex	**-1.546 (1.336)**	**-2.086** (0.884)**
(γ^1) PrimaryDegree* PriceChange	**1.239 (0.803)**	**0.280 (0.892)**
(γ^2) SecondaryDegree* PriceChange	**5.660 (3.536)**	**0.845 (3.753)**
(γ^3) UniversityDegree* PriceChange	**4.526 (3.956)**	**9.104** (4.032)**
Sex	-0.955*** (0.237)	-1.358*** (0.260)
PrimaryDegree	-0.383** (0.185)	0.326*** (0.1164)
SecondaryDegree	-0.200 (0.242)	0.734*** (0.177)
UniversityDegree	0.3275 (0.27)	0.717*** (0.177)
PriceChange	1.544 (2.194)	0.599 (1.537)
		and controls
Observations	6939	3105
R-Squared	.122	.384
F Stat	26.67	61.32

Table 4: Travel Cost

(β) TravelCost*Sex	**-0.237 (0.214)**	**-0.077 (0.205)**
(γ^1) PrimaryDegree* TravelCost	**-0.085 (0.2156)**	**0.1283 (0.2202)**
(γ^2) SecondaryDegree* TravelCost	**-0.182 (0.323)**	**0.325 (0.337)**
(γ^3) UniversityDegree* TravelCost	**-0.210 (0.351)**	**0.438 (0.381)**
Sex	-1.024*** (0.321)	-1.700*** (0.299)
PrimaryDegree	-0.243 (0.296)	0.081 (0.317)
SecondaryDegree	-0.044 (0.461)	0.459 (0.507)
UniversityDegree	0.255 (0.462)	0.124 (0.535)
TravelCost	0.252 (0.332)	-0.274 (0.330)
		and controls
Observations	4796	2086
R-Squared	.157	.372
F Stat	26.30	26.37

Note: * 90% Confidence, ** 95% Confidence, *** 99% Confidence
Standard Error in parentheses
Dependent Variables: Log Income

Women Only

Years of Schooling

Table 5: Price Change

(γ) YearsOfSchooling* PriceChange	**0.140 (0.184)**	**0.250 (0.226)**
YearsOfSchooling	0.050* (0.028)	0.056* (0.028)
PriceChange	-1.568* (0.897)	-2.555* (1.383)
		and controls
Observations	3736	1552
R-Squared	.023	.143
F Stat	15.11	11.95

Table 6: Travel Cost

(γ) YearsOfSchooling* TravelCost	**0.011 (0.0491)**	**0.009 (0.0488)**
YearsOfSchooling	0.038 (0.064)	0.037 (0.081)
TravelCost	-0.129 (0.583)	-0.114 (0.666)
		and controls
Observations	2892	1190
R-Squared	.008	.122
F Stat	1.91	5.96

Highest Degree Obtained

Table 7: Price Change

(γ^1) PrimaryDegree* PriceChange	**0.476 (0.736)**	**0.044 (0.793)**
(γ^2) SecondaryDegree* PriceChange	**3.713 (2.751)**	**5.079 (6.816)**
(γ^3) UniversityDegree* PriceChange	**14.475*** (4.049)**	**17.891*** (2.902)**
PrimaryDegree	0.092 (0.200)	0.213 (0.185)
Secondary	0.597** (0.280)	0.881*** (0.280)
University	0.737*** (0.256)	0.633** (0.259)
PriceChange	-0.928* (0.523)	-1.076 (1.028)
		and controls
Observations	3762	1552
R-Squared	.032	.149
F Stat	19.06	16.83

Table 8: Travel Cost

(γ^1) PrimaryDegree* TravelCost	**0.075 (0.310)**	**-0.073 (0.292)**
(γ^2) SecondaryDegree* TravelCost	**0.082 (0.571)**	**0.647 (0.590)**
(γ^3) UniversityDegree* TravelCost	**-0.156 (0.407)**	**-0.180 (0.692)**
PrimaryDegree	0.050 (0.405)	0.183 (0.455)
Secondary	0.730 (0.773)	0.165 (0.757)
University	1.081* (0.617)	1.032 (1.002)
TravelCost	-0.084 (0.418)	-0.052 (0.505)
		and controls
Observations	2920	1190
R-Squared	.010	.124
F Stat	2.40	6.52

Note: * 90% Confidence, ** 95% Confidence, *** 99% Confidence
Standard Error in parentheses
Dependent Variables: Log Income

Men Only

Years of Schooling

Table 9: Price Change

(γ) YearsOfSchooling* PriceChange	**0.572 (0.384)**	**-0.037 (0.095)**
YearsOfSchooling	-0.067* (0.040)	0.042*** (0.011)
PriceChange	0.404 (2.275)	-0.484 (0.729)
		and controls
Observations	3189	1553
R-Squared	.063	.805
F Stat	6.03	310.39

Table 10: Travel Cost

(γ) YearsOfSchooling* TravelCost	**-0.046 (0.034)**	**0.038** (0.019)**
YearsOfSchooling	-0.055 (0.059)	-0.004 (0.021)
TravelCost	0.4739 (0.516)	-0.451*** (0.159)
		and controls
Observations	1883	896
R-Squared	.036	.818
F Stat	6.43	317.77

Highest Degree Obtained

Table 11: Price Change

(γ^1) PrimaryDegree* PriceChange	**2.839* (1.669)**	**-0.128 (0.710)**
(γ^2) SecondaryDegree* PriceChange	**8.3518 (6.688)**	**-3.954** (1.812)**
(γ^3) UniversityDegree* PriceChange	**1.409 (3.842)**	**1.743 (2.690)**
PrimaryDegree	-0.776*** (0.260)	0.188** (0.075)
Secondary	-0.705** (0.333)	0.546*** (0.112)
University	-0.027 (0.378)	0.692*** (0.181)
PriceChange	3.057 (1.959)	-0.610 (0.514)
		and controls
Observations	3177	1553
R-Squared	.074	.806
F Stat	7.38	269.18

Table 12: Travel Cost

(γ^1) PrimaryDegree* TravelCost	**-0.311 (0.218)**	**0.140 (0.116)**
(γ^2) SecondaryDegree* TravelCost	**-0.338 (0.285)**	**0.274 (0.165)**
(γ^3) UniversityDegree* TravelCost	**-0.349 (0.443)**	**0.905*** (0.262)**
PrimaryDegree	-0.467 (0.357)	-0.036 (0.221)
Secondary	-0.549 (0.481)	0.234 (0.306)
University	0.110 (0.616)	-0.521 (0.447)
TravelCost	0.325 (0.346)	-0.270*** (0.095)
		and controls
Observations	1876	896
R-Squared	.034	.820
F Stat	2.65	279.61

Note: * 90% Confidence, ** 95% Confidence, *** 99% Confidence
Standard Error in parentheses
Dependent Variables: Log Income

Alternate Analysis

Years of Schooling

Table 11: Price Change

(β) PriceChange*Sex	**36900000 (93400000)**	**106000000 (153000000)**
(γ) YearsOfSchooling* PriceChange	**15700000 (24600000)**	**13700000 (47300000)**
Sex	-34400000*** (11300000)	-72900000* (36400000)
YearsOfSchooling	-552225.8 (1825460)	800256.9 (2567978)
PriceChange	-147000000 (134000000)	-402000000 (350000000)
		and controls
Observations	6928	3105
R-Squared	.003	.027
F Stat	13.53	4.18

Table 12: Travel Cost

(β) TravelCost*Sex	**8678115 (9527580)**	**7675768 (18300000)**
(γ) YearsOfSchooling* TravelCost	**-228583.6 (1708645)**	**3396711 (3415540)**
Sex	-52500000** (21200000)	-104000000* (54400000)
YearsOfSchooling	486699.2 (3923686)	-2340305 (5984181)
TravelCost	-5527324 (14100000)	-56300000 (41500000)
		and controls
Observations	4778	2086
R-Squared	.0040	.0296
F Stat	4.60	4.33

Highest Degree Obtained

Table 11: Price Change

(β) PriceChange*Sex	**34900000 (81900000)**	**82100000 (133000000)**
(γ^1) PrimaryDegree* PriceChange	**36200000 (52200000)**	**125000000 (148000000)**
(γ^2) SecondaryDegree* PriceChange	**-186000000 (1700000000)**	**-4430000000 (4590000000)**
(γ^3) UniversityDegree* PriceChange	**834000000 (684000000)**	**4330000000 (3690000000)**
Sex	-33200000*** (11000000)	-72100000* (37100000)
PrimaryDegree	-17700000 (13500000)	5732002 (23000000)
SecondaryDegree	37100000 (53400000)	122000000 (119000000)
UniversityDegree	24000000 (33500000)	26800000 (50700000)
PriceChange	-59500000 (128000000)	-326000000 (292000000)
		and controls
Observations	6942	3105
R-Squared	.006	.060
F Stat	49.37	1.83

Table 12: Travel Cost

(β) TravelCost*Sex	**9010893 (10100000)**	**5033938 (18300000)**
(γ^1) PrimaryDegree* TravelCost	**-1638794 (12400000)**	**16800000 (21200000)**
(γ^2) SecondaryDegree* TravelCost	**-31300000 (26400000)**	**-54700000 (64800000)**
(γ^3) UniversityDegree* TravelCost	**64900000 (61000000)**	**172000000 (121000000)**
Sex	-53400000** (22100000)	-101000000* (54200000)
PrimaryDegree	-14600000 (28600000)	-21100000 (43300000)
SecondaryDegree	80600000 (107000000)	238000000 (222000000)
UniversityDegree	-65200000 (44000000)	-87900000 (80800000)
TravelCost	-7800041 (13200000)	-37900000 (33900000)
		and controls
Observations	4799	2086
R-Squared	.005	.031
F Stat	8.06	4.13

Note: * 90% Confidence, ** 95% Confidence, *** 99% Confidence
Standard Error in parentheses
Dependent Variables: Income

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