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Spring 2011

In this issue of *The Visible Hand,* we focus our attention to the economies around the world. Christopher Slijk's article "Barter and Brute Force: China's Growing Influence in Africa" discusses the expansion of China's influence in the African economies and its subsequent implications. He argues that, beyond the immediate economic benefits, this growing influence raises some concerns regarding corruption and exploitation of African workers. Christopher Louney, in his article "Chinese Currency: A Classic Dichotomy of Views," explores several consequences of the Chinese RMB's fixed exchange rate system. He suggests that RMB's fixed exchange rate system can have detrimental effects to economies such as Brazil, India and Southeast Asia, much more than to the U.S. Suthinee Buranaphong's paper "Hard Disk Drive Industry: The Case of Thailand" explores the unique history of the electronics industry in Thailand. With the rise of other developing economies such as China, Thailand in recent years faces growing competition in the production of electronics. The author concludes that the Thai government must invest more on technological development as well as improve transparency in order to retain the nation's standing as world's largest producer of hard disk drives.

We also publish a few shorter articles and columns in this issue of *The Visible Hand*. Peter Park reflects on the simplifying nature of economic models in the column "Tired of Simplifying Assumptions?" He presents an interesting and entertaining take on the balance economics must seek between theory (simple for ease of analysis) and practice (relevance to the real world). Zachary Schubert writes his internship experiences in his article "What I Learned at First Midwest Securities Incorporated." He also discusses the challenge of reconciling the gap between theory and application of economics.

We publish three longer papers that focus on more general topics of economics. Quip Turner's paper "Religion and Female Labor Force Participation" finds that religious affiliation has a significant and negative estimated effect on the female labor force participation. In the regression, the author also controls for individuals' education attainment, which is found to be positive and significantly associated with work participation. The paper concludes with a number of policy and social implications of the results. Julan Hsu's paper "Ability Signaling in Unemployment Histories: Adverse Effects of Being Unemployed?" provides a review of extensive economic literature on the effects that having been unemployed has on future salaries. While some details differ across studies, it is generally found that having a history of being laid off from low productivity has a significantly adverse effect on future earnings losses. A number of other factors are also found to be significant predictors of earnings losses, including economic conditions and education attainment. Finally, my paper "On the Theory of Justice: Altruistic Utilitarianism" reviews several prominent theories of justice and proposes a small extension to utilitarianism that helps avoid one standard criticism of classical utilitarianism.

As the official publication of the Cornell Economics Society, *The Visible Hand* publishes undergraduate economics papers and columns biannually through a blind peer-review process. By providing an opportunity for undergraduates to publish their work, we hope that more students will read papers by leading economists and experience some of the rigor necessary in research. We invite students of any major who are interested in economics to submit their columns, articles, or research papers for publication at our journal.

Finally, we would like to thank Professor Wissink for her invaluable guidance and support of *The Visible Hand*, and The Student Assembly Finance Commission of the Cornell University for their generous financial support.

Lawrence Jin
Editor-in-Chief

Barter and Brute Force: China's Growing Influence in Africa

Christopher Slijk
Economics, '12

The past three decades have seen China rise from an underdeveloped country rife with political turmoil to a preeminent global economic powerhouse. With this rapid growth, of course, come the fears amongst established industrial economies of massive trade deficits with China and the continued fueling of Chinese expansionism. What has gone largely unnoticed; however, are the massive inroads that China has been making in Africa: from the oil fields of Sudan to the coal mines of Zambia, the Chinese government has used its influence to secure new sources of natural resources. Among its activities thus far have been the securing of bilateral investment treaties with 18 separate African nations, the purchasing of 25% ownership in the Standard Bank of South Africa (the largest bank on the continent), and the escalation of overall investment fourfold since 1996 to over $20 billion annually.

While the global implications of this remain to be seen, the immediate, superficial effects upon the economies of China and African countries receiving this investment seem to be largely positive. China has benefited enormously from having reliable sources of natural resources to fuel the ever-expanding industrialization of its economy while opening up potential new markets for its goods. Likewise, African countries have gained enormously from the billions of dollars spent on infrastructure improvements and investment in local industries. Yet, in such a lawless part of the world, Chinese firms have resorted to utilizing business methods that, while rather resourceful, carry a great deal of risk for both sides and can endanger the safety of the local population.

A number of factors have contributed to China's successes in investing in this part of the world. While many western nations have strict policies as to what minimum safety standards must be met and what their aid workers may and may not do, Chinese workers have no such restrictions, thus allowing Chinese firms to engage in more dangerous, but potentially more profitable, enterprises.

Photo courtesy: Africaanalysis
http://lfort.files.wordpress.com/2010/02/china-africa.jpg

Yet, recent incidents point to Chinese exploitation and mistreatment within local African communities; in particular, a gruesome incident took place wherein Chinese executives of a Zambian mine fired upon and wounded 11 miners after they protested their poor pay and working conditions. Such incidents may merely be exceptions to the rule, but they do indicate that, unlike the West, China is willing to go to much further and more brutal lengths to achieve its goals.

Yet, for all of its harsh and domineering strategies, China has implemented many procedures which will in time be immeasurably beneficial to

the African people. With the weakness of many of the local economies in Africa, securing a contract that is denominated in local currency can be incredibly risky due to its instability. Thus, many Chinese firms have taken to using resource bartering in their trades with local governments. This allows the Chinese to directly obtain what they are there for to begin with, cutting out the additional expense which would come with receiving currency which must then be traded for resources. This type of bartering has an additional unmeasured benefit; with the level of corruption in many of these developing African countries, it is typically very easy for those in on the deal – especially government officials – to siphon off parts of the transactions for themselves. However, with a barter system which trades infrastructure and industrial development for raw materials, theft and corruption within the trade deal has been made much more difficult and impractical; after all, stealing coal or timber is very different than simple theft of cash, and warlords cannot easily 'steal' infrastructure improvements for their own personal uses.

Of course this system carries risks: resources and commodities, unlike currency, can fluctuate wildly depending on their demand on the world market, and when negotiating contracts that involve the exchange of hundreds of tons of materials, even a small change can cost either side the equivalent of millions of dollars. However, such risks can be accounted for when drawing up the contract, and overall this system is one which is much fairer and keeps both parties much more honest. Most importantly, however, it ensures that, unlike much of the foreign aid and investment which ends up solely in the hands of the politically connected, these investments will improve the quality of life for everyone in the country.

The implementation of this barter system, among other things, on such a large scale indicate the unorthodox methods that China is willing to undertake in order to secure the vast resources it needs. Yet, the lengths to which China will push its exploitative behavior in order to achieve these objectives still remain to be seen.

Chinese Currency: A Classic Dichotomy of Views

Christopher Louney
Economics & China and Asia-Pacific Studies, '12

Leading up to Chinese President Hu Jintao's January 2011 diplomatic visit with President Barack Obama, a controversial debate sizzled on the international stage. Amid the congressional election season's usual chest pounding, many members of the US government, in both the executive and representative branches alike, called out China on its undervalued currency. While much of the argument coming from politicians was political rhetoric directed at drawing in votes for upcoming elections, there was some substance to the calls for currency revaluation.

Economists worldwide largely agree on the idea that the Chinese yuan (RMB) is starkly undervalued. While the US dollar is perhaps the world's closest currency to having a true floating exchange rate, the Chinese yuan is on the opposite end of the spectrum: pegged to the US dollar, the Chinese yuan has a fixed exchange rate. While it may not be the only currency with fixed exchange rates, with an economy as large as China's, a fixed exchange rate can cause major international disputes.

Floating and fixed exchange rates are characterized by three determinants: economic factors, political conditions, and market psychology. Economic factors include government policies, central bank policies, inflation, productivity, economic growth rates, and government budgets and surpluses. Exchange rates are also susceptible to political conditions as political instability and anticipation about future economic fluctuations can

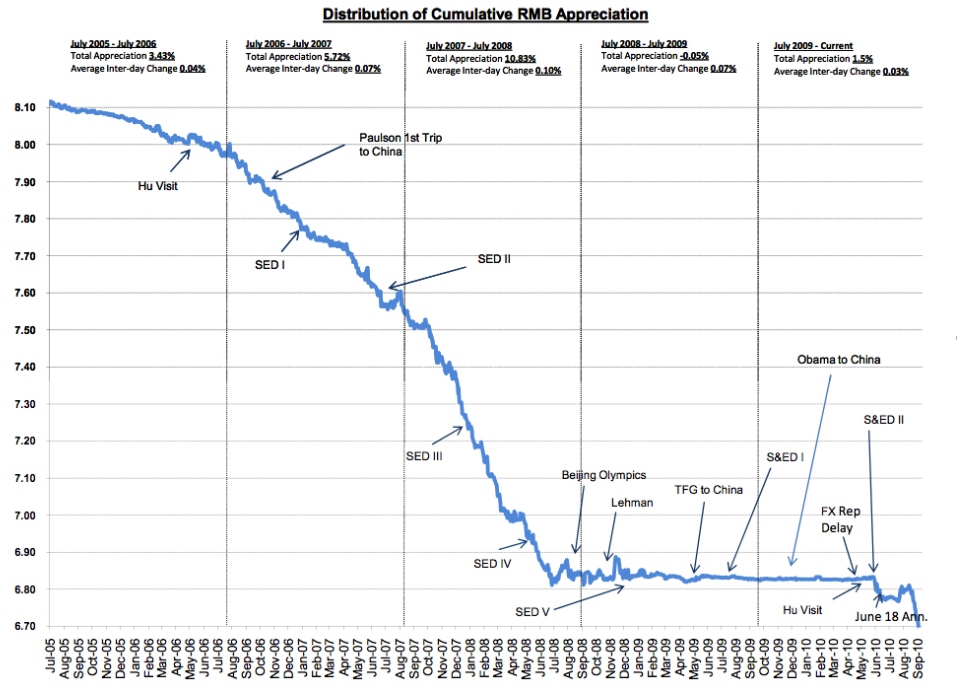
affect the value of a currency. Market psychology also has a huge effect, especially on the US dollar. People tend to identify long-term trends and act on them; for example, during uncertain economic times people often flock to currencies as the US dollar for safety.

Many critics accuse China of utilizing government policies to manipulate its currency in order to keep it substantially undervalued. As seen in the graph, when the world economic system collapsed, the yuan nearly froze. While most currencies faced instability and fluctuated wildly by historical standards, the RMB remained stable with respect to the US dollar. Many argue that when the rest of the world economies collapsed, and China still managed to post respectable growth rates, the value of the yuan should have risen. Popular arguments against China's current currency policy regime are that an undervalued yuan makes US goods artificially more expensive and thereby less competitive on the Chinese market, and conversely the undervaluing makes Chinese goods unfairly competitive in the US market and further contributes to the trade imbalance.

These arguments have one major flaw: Chinese goods largely do not compete with American goods. While China produces many low-end exports, and assembles more complex goods for export, they tend not to compete with the United States' high-end exports such as processors and airplanes or its cultural exports such as music and movies. While this argument may seem to discount the U.S.'s calls for currency revaluation, there is another reason for China to alter its current policy.

When China undervalues its currency, it is not the U.S. that loses out; rather it is other emerging economies that suffer. Economies like Brazil, India, and other South East Asian countries often produce exports similar to that of China (such as shoes, clothes, etc). These economies, which tend to favor floating exchange rates, do not posses the artificial advantage of an undervalued currency. As such, their goods are less competitive on the global market. This disadvantage is especially destructive for emerging economies as these nations rely heavily on economic growth to pull people out of poverty and modernize their infrastructure and political systems.

While the congressional calls for labeling China a "Currency Manipulator" are largely by-products of the political election climate, these calls did give more publicity to an important issue. While currency evaluation is "on the agenda" for the Chinese government, it could not come quicker for some emerging economies. China, for its own good, is doing right by taking the process on slowly. Some argue that they are taking action too slowly, but the process is happening and needs to continue to do so nonetheless.



Tired of Simplifying Assumptions?

Peter Sunghyun Park
Economics, '14

Let us assume that the quality of this writing is dependent on only three factors: the writer's command of English *c*, the writer's knowledge of Economics *k*, and the scrutiny of editors *s*, where *c*, *k*, and *s* are all greater than or equal to zero. Denoting the quality of writing as *W*, we may suppose a function $W = f(c, k, s)$. Now, in order to simplify the effect of these three factors on the quality of the writing, let us assume that the three factors have equal weight in the final quality of the writing and hence $W = f(c, k, s) = Acks$, where *A* is a constant. Furthermore, because the writer's command of English and his knowledge of Economics is fixed in the short run, we can treat them as constants. Since we have already established that *A* is a constant, what this equation suggests is that in the short run, $W = f(s)$, i.e. the quality of this writing is solely dependent on *s*, the scrutiny of editors.

You must be full of rejections by now; what about the writer's laziness, what about the time constraint which the writer was subject to, what about the lack of ink in the printer? What if the writer was overjoyed by the unexpected warm weather and decided to go out and enjoy the sun rather than ponder over an article in a small windowless room? All of these are valid factors which can doubtlessly affect the quality of this writing, perhaps even jeopardize the writing despite the fact that *c*, *k*, and *s* are all positive.

Similar rejections seem to abound in the minds of students taking introductory or intermediate micro- and macroeconomics, who feel more than ready to engage in theories that can more readily be applied to the real world. I myself am just a freshman majoring in Economics who frankly knows next to nothing about what sorts of complex economics models await in the major of Economics or when I will get to learn them. But I don't think that should be taken as a sign that Economics is a subject that deals overwhelmingly with numbers and assumptions with little application for the real world. I hope that by reading the rest of this economic journal, you would be able to get a grasp of what Economics is capable of once it gets past the period of simplifying assumptions after simplifying assumptions.

Before you turn the page, I would just like to remind you once again that in the short run, the quality of this writing cannot change in any way as long as the scrutiny of editors does not change; I am in no way to blame.

Editor's note: *If any of the constants* c *and* k *are zero, then* W = *0 regardless of how high* s *is. Thus editors are also in no way to blame.*

Photo courtesy: http://realagriculture.com/category/economy/

What I Learned at First Midwest Securities Incorporated

Zachary Schubert
Biometry and Statistics, '12

My summer at First Midwest Securities Incorporated (FMSI) was the perfect gateway into the stock market world. Although I was interning at a branch in Nassau County, Long Island, FMSI has expanded greatly since its first office in Wisconsin in 1989. It has now grown throughout the continental United States and even has locations in Italy and the Virgin Islands. It's probably the best brokerage house you have never heard of. I was able to work alongside two experts in the fields of stocks and bonds and learned a great deal in the two major disciplines of being an FMSI representative.

I was very fortunate to learn the craft from Mike Gimeli and Barry Gold, who have a combined experience of forty-three years. Mr. Gimeli had formerly worked at Lehman Brothers and GKN Securities and Mr. Gold had worked at Lehman Brothers, Prudential, and Morgan Stanley before coming to FMSI in 1999.

My limitations at the firm were both a gift and a curse. While I was not able to talk directly to clients because I was not licensed to do so, I was given a great deal of freedom in the work that I did from day to day. On some occasions, I followed up on promising leads and found out how interested potential clients were in opening an account, or as we called it, "beginning a new way of life." But most of my time was spent doing research on my own. I used original programming code in an attempt to predict stock movements. My statistics major proved useful when I was able to isolate a stock or bond which seemed interesting and model it with several predictors. My only regret is not taking a multivariate analysis class before this past summer. I now know how to use multiple variables to give predictions on more than one response variable, which can be something very esoteric outside of statistics majors, but this was not the case in the summer of 2010. I would present the findings I thought were most promising to Mr. Gimeli or Mr. Gold at the day's end and they would tell me if they had similar feelings about my stock picks. It was a very good back and forth we had. Whether or not they agreed with my picks, I would need to explain my reasoning behind each decision and they would tell me what reasoning was sound and what could not hold water. Sometimes the predictor variables that were key in my reasoning were factors that the two senior account executives knew were not substantive from experience. Even though I was coming at this from a very empirical approach as my major at Cornell has taught me, there were subtle faults in my thinking that Mr. Gimeli and Mr. Gold were able to shed light on because of their two decades apiece of instinct and experience.

But as Mr. Gold said, research is only 20% of the trade. Selling business to clients is vastly more important. This is the case with new clients. Mr. Gold told me that once you have established a bond with a client and there has been success making money in the past, 90% of the time the client will go ahead with your next recommendation. But I can remember one instance in which a fellow intern and I stopped our work to observe Mr. Gimeli sell a recommendation to a new client. We could tell that the hours of watching CNBC and delving through companies' balance sheets was simple compared to how difficult it was to have a client okay a recommendation, even if Mr. Gimeli had recently made a significant sum for the client. We listened for fifteen minutes, but Mr. Gimeli was ultimately unable to reel in his white whale.

And that was a real eye-opener for me. That you can spend days on research, do every empirical step soundly, bring your recommendation to a client whom you have made money for in the past, and still not get the green light from him – and have to start from scratch. After that day I truly appreciated the work Mr. Gimeli and Mr. Gold have done for over twenty years.

Religion and Female Labor Force Participation

Quip Turner
Industrial and Labor Relations, '12

1. Introduction

The extent to which women apply and/or work for income-earning jobs in America has increased dramatically in the last half century. In 1950, only 33.9 percent of American females aged sixteen and older were included in the labor force – that is, in the cohort of American workers who were either employed or searching for employment. By 1998, this figure grew to nearly 60 percent. Interestingly, as women have entered the labor force, the number of men who participate has declined (albeit, modestly), thus further closing the gap between male and female participation. While in 1950 this gap was over 50 percentage points, some studies predict that by 2015 it will have dwindled down to a little over 10 percentage points.[1]

This growth in female participation in the labor force has been attributed to many variables. For one, American movements such as women's suffrage in the 1920's and "feminism" starting in the 1960's challenged the traditional normative values of society by pushing for women to have equal rights, equal pay in employment, and, most importantly for our case, freedom to decide when (if at all) they wanted to start a family. Such movements paved the way for the passage of laws such as the Civil Rights Act of 1964, with such provisions as Title VII, that made it illegal for companies not to hire women on the basis of their gender. In fact, in the decade following the passing of the Civil Rights Act, female labor force participation experienced a sharp increase of 8 percentage points. Additionally, more service-oriented jobs – which typically require less brute strength than industrial jobs – have greatly increased as America has grown more affluent and people now have more money to afford luxuries such as house-keeping or childcare. This introduction of service-based jobs provided women with the opportunity to earn income while doing much of the same work that they were doing for free in their roles as mothers and housewives. Women are also now more likely to seek higher education after high school, which enhances their skill-set and value proposition to hiring firms.

On the other hand, it could be argued that increases in female labor force participation can largely be attributed to a shift in America's religion-based norms. Fundamental religious influence has been the foundation of many normative ideologies that have retarded female employment. Protestant traditions, for example, define the roles of men and women in the family; men serve as the primary "bread-winner" and the family's financial provider, while the role of women as the family's care-giver is more domestic. However, over the past half-century, Americans have re-examined and departed from these assumed roles, and these traditional and fundamentalist influences have yielded to more liberal and open ideologies.

Therefore, this shift in normative ideologies has blurred the line between male and female "roles" in society and increased female preferences for income and career development over maintaining household priorities. What this suggests is that the religions with which American females identify may affect their decision to join the workforce. On the spectrum of highly conservative to highly liberal, females of fundamental Evangelical Protestant tradition (which I will define later) may believe that their role of bearing and rearing children and serving as the care-giver of the family is more important than having a job. In contrast, women with no religious affiliation may hold that earning an independent income is the better of the two choices, and may decide to delay childbirth, find other means of child-care (i.e. nannies), or not have children at all.

The purpose of my research and analysis, then, is to determine whether religion has any effect on female labor force participation. I hypothesize that affiliation with fundamental religions has a negative influence on female labor force participation rates.

1 Fullerton, Jr., Howard N. Labor force participation: 75 years of change, 1950–98 and 1998–2025. *Monthly Labor Review*. December 1999. http://www.bls.gov/opub/mlr/1999/12/art1full.pdf

2. What Economic Theory Says About Female Labor Force Participation

When women decide whether to work for pay, they are essentially deciding what they want to do with their time, because any time spent at work implies less time to spend on something else. Mothers, for example, have responsibilities that do not provide income, and, therefore, cannot be considered "jobs". Such responsibilities (we will call them "household priorities") include caring for children or other family members, cleaning around the house, cooking dinner, and so forth. As such, time spent at work entails less time to spend on household priorities. Therefore, when a woman applies for a job, she must decide whether work is a better alternative to fulfilling household priorities. This decision is based on two factors:

First, she considers how much money the employer is willing to pay her for each hour she spends working. When considering pay (or the wage), she is essentially putting an hourly value on what she would otherwise be doing if she weren't working. For example, a woman will take into consideration how valuable her time is at home. If an employer will not pay her a wage that exceeds the value of her household time, she will not work for that employer. This value that she places on non-work activities, then, is known as her reservation wage because she withholds, or reserves, her labor from the employer until the employer offers her a wage that exceeds the value she has placed on fulfilling household priorities.

Let us say, for example, that two women (Julie and Monica) can potentially earn the same wage if they join the labor force. If Julie decides to stay home while Monica decides to work, then Julie must have a relatively high reservation wage compared to Monica. Conversely, when she decides to apply for a job, Monica has come to the conclusion that having a job will make her happier, and that the wage the employer is paying exceeds her reservation wage.

But how does Monica determine her own reservation wage? Her reservation wage depends on the second factor that influences her decision to work; her personal preferences. In other words, Monica's preference for the benefits of having a job (i.e. the feeling of accomplishment or having something to put on her resume) is greater than her preference for caring for her children or preparing meals for her family at home.

One factor that may influence her preferences is her husband's income. Let's say that Julie's husband earns a substantial income (an income that suffices to support her family), while Monica's husband's income is barely enough to pay the bills. Julie is less likely to join the labor force than Monica (or a single mother, for that matter), because her husband brings in enough income to pay for the family's needs, thus decreasing her incentive to work. Essentially, then, there is a trade-off between the husband's income and the mother's decision to work (or, an income effect), where a higher income from her husband means a lower incentive to work.

Another factor that influences a mother's preferences, one which is most important for our purposes, is religious affiliation. As mentioned earlier, traditional religions, such as Catholicism or Evangelical Protestantism[2], promote women as the primary caregiver of the family: "Older women likewise are to…teach what is good, and so train the young women to love their husbands and children, to be self-controlled, pure, working at home…that the word of God may not be reviled."[3] Therefore, a woman of traditional Protestant belief will likely prefer to stay at home and take care of her children rather than seek employment.

3. Analysis

The two main variables with which my analysis is concerned are religious affiliation and female labor force participation in the United States. For female participation rates (ages 16 and older) I used data from the U.S. Census Bureau's 2009 American Community Survey. I recognized, however, that I needed to control for two confounding variables:

First, because wage rate is also influential in determining labor force participation, I had to control for the differences among wage rates that firms offered women. The difficulty here, though, is that unless a woman is actually part of the labor force, the wage rate she would be offered by employers is hard to assess. However, one good indicator of the would-be wage rate is the woman's education level, because as a woman's level of education increases, so does the wage that firms offer her in order to encourage her to work. For example, someone with a bachelor's degree in education will receive a better monetary offer as a

2 Mainline Christian tradition that upholds four commitments: 1) the need for personal conversion (or being "born again"), 2) actively expressing and sharing the gospel, 3) a high regard for biblical authority, especially biblical inerrancy, and 4) an emphasis on teachings that proclaim the death and resurrection of Jesus.

3 Titus 2:3-5, the Bible - English Standard Version, emphasis added.

teacher (and/or a more prestigious position) than someone with only a high school diploma. With this in mind, I used the female population of each state with a bachelor's degree or higher to control for wage rate differentials.[4]

Second, I controlled for race. Religion is typically a significant part of black and Hispanic culture, so their share of the population may increase the percent population of each state affiliated with either Evangelical Protestantism or Catholicism. However, due to low socio-economic standing (and therefore a greater need for income) the labor force participation of their female cohorts is less likely to be affected by traditional doctrine. With this in mind, I gathered each state's white female labor force participation rates for ages sixteen and older.

In order to gauge the influence of religious affiliation, I wanted to use a highly conservative religious denomination that would likely have a more restrictive view of the role of women in the workforce. I felt that Evangelical Protestantism would be a good representative of highly conservative tradition, so I tracked the percent of population by state that was affiliated with Evangelical Protestant belief using the U.S. Religious Landscape Survey on Pewforum.org. Traditional Catholic doctrine may also be an influential factor, so I accounted for this religious demographic as well by using the same source.

Using a simple regression analysis, I calculated the relationship between my dependent variable (% white female labor force participation rate (Y)) and my independent variables (% Evangelical Protestant (X), % Catholic (XC), and % female population with a bachelor's degree or higher (XEd)). The results of the regression are as follows:

$Y = 0.\ 0.606 - 0.162(X) - 0.0635\ (X^{C}) + 0.210\ (X^{Ed})$.

Independent Variable	Coefficient	SE Coeff.	T	P
Constant	0.60614	0.02088	29.03	0.000
X	-0.16185	0.02932	-5.52	0.000
X^{C}	-0.0635	0.03468	-1.83	0.069
X^{Ed}	0.20961	0.04723	4.44	0.000

As suspected, with a coefficient of 0.21 and a T-value of 4.44, we see that female level of education is highly and positively correlated with female labor force participation rates (LFPR). The greater the level of education (and consequently the greater the firm's wage offer) the more likely a woman will decide to enter the labor force. Somewhat surprisingly, Catholic affiliation has significant negative influence on female LFPR, although, with a T-value of -1.83 and a coefficient of -0.064, its influence is not as extensive as that of the Evangelical Protestant tradition. With a T-value of -5.52 and a coefficient of -0.16185, the regression shows that Evangelical Protestantism has a very large and negative influence on female LFPR.

In summary, results show that Catholicism and, to a much greater extent, Evangelical Protestantism both place downward pressure on the labor force participation rates of white females who are at least sixteen years old.

4. Conclusion

The regression analysis confirms my hypothesis: the participation rate of females in the labor force is negatively influenced by fundamental religious affiliation. This has tremendous implications for further labor force participation studies. The advent of beneficial legislation, such as the Civil Rights Act, has allowed American females the opportunity to pursue and secure income-earning jobs. Whether or not women want to work, though, is affected by the wages that firms offer them and their personal preferences. In the future, as wages offered to women become more competitive with those offered to their male counterparts, what role will religious preferences play in the individual female's decision to work? Will religious affiliation continue to stymie female presence in the labor force? If the government wishes to encourage female participation, should it attempt to appeal to their religious ideologies and/or should it legislatively encourage husbands to substitute their wives as the primary care-givers? The answers to these questions could be very influential to American labor relations.

4 As mentioned earlier, the husband's income is also influential in female labor force participation decisions. Unfortunately, I was unable to find data concerning male incomes by state. However, women tend to marry males who have a similar education level, and therefore a similar would-be wage offer. I thus account for husbands' income when controlling for female level of education.

On the Theory of Justice: Altruistic Utilitarianism

Lawrence Jin
Mathematics, '12

In this paper I outline some prominent theories of justice and their respective limitations. I then propose an alternative theory that incorporates altruism into traditional utilitarianism. Calculations reveal that such an extension can help avoid one standard criticism of utilitarianism. Investigations into the fuller implications of such extension are left for future studies.

1. Introduction

Many decisions affect multiple individuals. Some decisions are made collectively by a group; for example, students may collectively decide when to meet and how to distribute the workload for a group project. Other decisions have effects on a much larger group of individuals, often beyond the original group of decision-makers. For instance, a company may decide to build a plant in a new location, which may create jobs as well as pollution to the residents. The residents, while they are affected, have little or no say in the company's decision. To complicate matters further, disagreements can arise within the group of affected individuals as to whether such decisions are just. What, then, justifies these decisions?

Economists often approach the issue with the concept of externalities (for instance, see Varian, 1987). In the above example with building a new factory, the resulting extra jobs and pollution are considered to be positive and negative externalities imposed on the society, respectively. These externalities are not accounted for in the firm's initial decision-making, and thus results in an inefficient market clearing. A possible solution from the economic perspective, then, is to let the firm build a new factory, calculate the net external costs or benefits in dollar terms, and have the government impose appropriate measures to account for the calculated disparities.

The above economic approach is intentionally amoral in that it makes no explicit judgment on the justice of any decision. Rather, the approach implicitly assumes a decision can be justified as long as all the externalities are paid for, and conversely, governments should only intervene when there is market inefficiency. Such idea can be troubling and unsatisfying for many non-economists, including scholars from philosophy, law and public health, as well as the general public (for a discussion from a legal philosophy perspective, see Rawls, 1971; from a public health perspective, see Buchanan, 2008). A thorough discussion is beyond the scope of this paper, but in essence, many people feel that there should be some harsher criteria for justice beyond mere externalities.

In this paper, I present several existing theories of justice – including Pareto criterion, utilitarianism, and Rawls' theory of justice – and discuss some of their limitations. I then propose an extension of utilitarianism to incorporate altruism, which may potentially alleviate some problems associated with the traditional utilitarian approach.

Before I begin, let us define a truth function T and expected utility function EU:

(1.1) T[claim] = 1 if claim is true; 0 otherwise

(1.2) $EU_i(D)$ = expected utility that individual i derives from a societal decision D

The number of individuals affected by D is n, and $\neg D$ denotes "not D".

2. Pareto Criterion

Pareto criterion, or Pareto improvement criterion, is satisfied if a certain change in the allocation of resources results in at least one individual being better off with no individual worse off (for instance, see Barr, 2004). Let us write this condition using the notations introduced in the preceding section.

Consider an individual j. The individual is better off by a decision D if $EU_j(D) > EU_j(\neg D)$. The Pareto criterion first requires that this is true for at least one individual out of n people. This can be written:

(2.1) $$\sum_{i=1}^{n} T\left[EU_i(D) > EU_i(\neg D)\right] \geq 1$$

Another component of the Pareto criterion is that

no one in the population is made worse off by *D*. In other words, no one in the population prefers not-*D* over *D*. We can thus express:

$$(2.2) \qquad \sum_{i=1}^{n} T\left[EU_i(D) < EU_i(\neg D)\right] = 0$$

These two conditions together define the Pareto improvement criterion. For convenience, one may simply consider the following expression:

$$(2.3) \qquad \sum_{i=1}^{n} T\left[EU_i(D) \geq EU_i(\neg D)\right] = n$$

The only difference occurs when everyone is indifferent regarding *D*, in which case (2.3) is satisfied while a combination of (2.1) and (2.2) fails.

The main limitation of Pareto criterion is that it may be a sufficient but not a necessary condition of justice. Pareto criterion fails to account for many elements of justice, such as equality or overall well-being of a society (Sen, 1993). Further, since most decisions cannot satisfy such a tough criterion, it may be desirable to come up with a more lenient condition of justice for application in the real world.

3. Utilitarianism

Utilitarianism is often characterized as a principle that seeks "the greatest good for the greatest number of people," a phrase often credited to Jeremy Bentham (1789). There is some ambiguity in this phrasing, since we are trying to maximize two variables at once, i.e. the degree of goodness and the number of people. One possible interpretation of utilitarianism is to overlook the number of people and maximize instead the degree of goodness. This gives us the following condition:

$$(3.1) \qquad \sum_{i=1}^{n} EU_i(D) \geq \sum_{i=1}^{n} EU_i(\neg D)$$

This criterion sums up all the expected utilities derived from *D* across all individuals, compares that to the sum of ¬*D*, and considers *D* justified if the former is greater than or equal to the latter. The notable problem with this, however, is that it makes little sense to add someone's utility "value" to that of someone else, since there is no easy way to standardize different individuals' utilities.

A more reasonable calculation of utilitarianism is to fix the degree of goodness and only consider the number of people, in which case the condition becomes:

$$(3.2) \qquad \sum_{i=1}^{n} T\left[EU_i(D) > EU_i(\neg D)\right] > \frac{n}{2}$$

In other words, between two choices *D* and ¬*D*, *D* is justified by utilitarian principles if it makes more than half the population happier. This in essence reflects democracy. For instance, in a Presidential election (assume two candidates only), a candidate wins if more than half of the voters choose him/her.

The above criterion is more applicable than the Pareto condition in real life due to its leniency, but many consider it too lenient. For instance, suppose a country with population of three: X, Y and Z. Consider a societal decision *D* = "take away all the money Z has and split it equally between X and Y." It is easy to see that (3.2) is satisfied, while our sense of "justice" seems to indicate that *D* is not just; hence contradiction.

4. Rawls' Justice

A more widely accepted theory of justice in legal philosophy comes from John Rawls (1971; 2001). Rawls proposes a thought experiment that is commonly called the original position as a method of clarifying and explicating the fundamental principles of justice. The thought experiment requires us to imagine ourselves in a position where we must choose the principles of justice for the society we are about to live in. We are assumed to be in a 'veil of ignorance' where we have limited knowledge regarding our personal characteristics and circumstances. This restriction of knowledge is to ensure impartiality in the construction of justice. Then, we are presented with various political ideologies and attendant forms of government and are to pick one that seems best behind the veil of ignorance. Once the choice is made it is not renegotiable.

Rawls contends that, given the circumstances of the choice we are to make, the most rational choice would be to adopt a maximin strategy. Rawls presents three reasons why a maximin strategy is desirable. First, there is very little basis for estimating probabilities associated with the choice. This uncertainty behind the veil of ignorance makes one more insecure about the utilitarian estimations and thus makes a risk-aversive alternative preferable. Second, the minimum condition guaranteed by the maximin strategy is an acceptable alternative we can live with, and so there are relatively less incentives to seek for more. Third, other alternatives to the maximin rule could potentially lead to intolerable situations. For instance, opting for a choice with higher expected utility risks one to be the least well-off in the situation that may not be an acceptable condition to

live with. Rawls argues that these three reasons, and particularly the latter two, present a compelling argument as to why a maximin strategy is unanimously preferable behind the veil of ignorance. Rawls then presents the following two principles of justice that provide a maximin solution in the original position:

(4.1) Each person is to have an equal right to the most extensive system of equal basic liberties compatible with a similar system of liberty for all

(4.2) Social and economic inequalities are to be arranged so that they are both:
(a) to the greatest benefit of the least advantaged… and
(b) attached to offices and positions open to all under conditions of fair equality of opportunity

According to his theory, a decision is considered just if it is in accordance with the above principles. When the two principles are in conflict, the first principle takes precedence over the second.

Rawls' theory is also not free of criticisms. Most of the criticisms of this theory are related to Rawls' claim that maximin is the most rational strategy in the given circumstances. While Rawls offers some arguments as to why maximin principle is desirable behind the veil of ignorance, some may contend that these arguments only support a weaker claim that a risk-aversive strategy is desirable behind the veil of ignorance, but not necessarily a maximin strategy. Suppose that you have to pick one of the following two games to decide the life you are about to live. First is that you will become a salary man earning $40,000 per year. Second is that you toss a coin, and if heads you become a salary man earning $39,900 per year, and if tails you become a company president earning more than a million dollars per year. A maximin strategy points to the latter. A more in-depth discussion on its criticisms can be found in Freeman (2009).

5. Alternative theory: Altruistic utilitarianism

Here I propose an extension of (3.2) that does not suffer from the typical drawbacks of utilitarianism. The approximate idea is that, instead of considering only the utility that individual *i* will derive from *D*, we "ask" *i* to calculate how *D* would affect everyone in the population. Let us denote $EU_{i,j}(D)$ to be the expected utility that *i* thinks *j* will derive from decision *D*.

We first let an individual *i* predict the expected utility that *i* will derive from *D*. Then, we let i predict to his/her best ability the expected utility that another person, say *j*, will derive from *D*. Let this process be repeated until everyone in the population is accounted for. Then, *i* comes up with the following:

$$(5.1) \qquad \sum_{j=1}^{n} EU_{i,j}(D)$$

One may consider this an 'altruistic' assessment of *D* by individual *i* in that, not only does *i* consider the outcome to him/herself, *i* also considers the outcome to everyone else with one's own utility function. Then, we can repeat the process to produce an altruistic assessment of ¬*D*. Now, if the sum for *D* is greater than that of ¬*D*, then we may say that *D* is altruistically desirable specific to *i*'s utility function. The condition can be expressed as:

$$(5.2) \qquad \sum_{j=1}^{n} EU_{i,j}(D) > \sum_{j=1}^{n} EU_{i,j}(\neg D)$$

If the above is true for more than half the population, then we say it satisfies the altruistic utilitarian condition. That is, the condition is satisfied if:

$$(5.3) \qquad \sum_{i=1}^{n} T\left[\sum_{j=1}^{n} EU_{i,j}(D) > \sum_{j=1}^{n} EU_{i,j}(\neg D)\right] > \frac{n}{2}$$

6. Example revisited

Here I verify that the proposed extension (5.3) helps avoid the typical criticism of utilitarianism mentioned at the end of section 3. Suppose we have a population of three in a country: X, Y and Z. Again, consider a societal decision *D* = "take away all the money Z has and split it equally between X and Y." Assume that Z has a sum of $*m*. Suppose for simplicity that all individuals derive utility according to the constant relative risk aversion (CRRA) utility function:

$$u(x) = \frac{x^{1-\rho}}{1-\rho},$$

where *x* = absolute wealth and $\rho > 1$.

Let us further assume that each individual has wealth $*m*. Now we check, without loss of generalization, the altruistic condition of ¬*D* for individual X. We have:

$$\sum_{j=1}^{3} EU_{X,j}(\neg D) = 3\frac{m^{1-\rho}}{1-\rho}$$

Now, for decision *D*:

$$\sum_{j=1}^{3} EU_{X,j}(D) = \frac{(3m/2)^{1-\rho}}{1-\rho} + \frac{(3m/2)^{1-\rho}}{1-\rho} + 0$$

$$= 2 \cdot 3^{1-\rho} \cdot 2^{\rho-1} \frac{m^{1-\rho}}{1-\rho}$$

$$= (\frac{2}{3})^{\rho} \cdot 3 \frac{m^{1-\rho}}{1-\rho}$$

But we know $(2/3)^{\rho} < 1$, and thus:

$$\sum_{j}^{3} EU_{X,j}(D) < \sum_{j}^{3} EU_{X,j}(\neg D)$$

Repeating the process to Y and Z we conclude:

$$\sum_{i=1}^{n} T\left[\sum_{j=1}^{n} EU_{i,j}(D) > \sum_{j=1}^{n} EU_{i,j}(\neg D)\right] = 0 \not> \frac{n}{2}$$

Thus *D* fails to satisfy the altruistic utilitarian condition, consistent with our intuition.

8. Conclusion

In the first several sections of this paper I have outlined some prominent theories of justice and their respective limitations. In section 5 I proposed an alternative theory of justice by incorporating an element of altruism. Calculations in section 6 have shown that the proposed extension of utilitarianism can avoid one standard criticism of utilitarianism. Investigations into the fuller implications of such extension are left for future studies.

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Hard Disk Drive Industry: The Case of Thailand

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Economics and Mathematics, '12

Thailand has become the world's largest hard disk-drive producer surpassing China and Singapore, the two others large HDD producers in Asia. This paper will analyze how and what Thailand have done to become successful in this industry.

1. Introduction

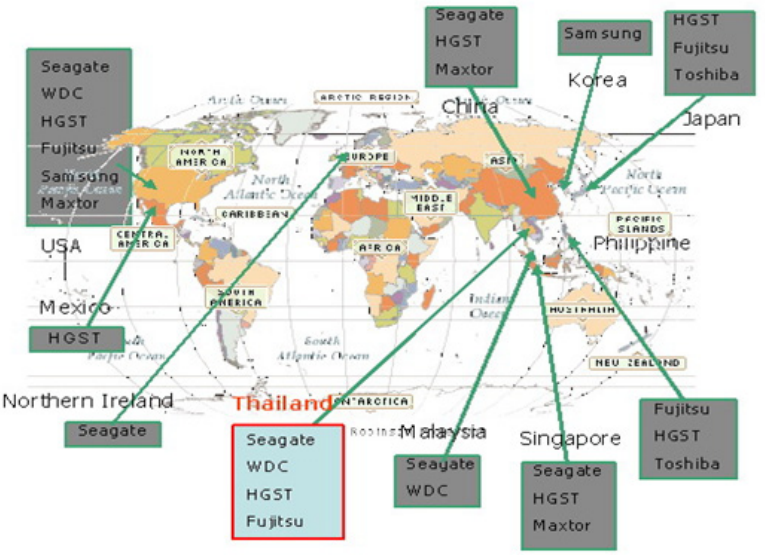
In the early days of hard disk drive (HDD) production around the 1970s, there were many firms trying to compete for the market share. Until now, only five companies gained most of the market share in the hard disk drive industry: Seagate, Western Digital (WD), Hitachi Global Storage Technologies (HGST), Fujitsu and Samsung. Seagate and Western Digital are the two interesting companies to investigate because they are American companies that have decided to use Asia as their production site. To avoid high wages in the United States, the hard disk drive industry – an industry that is labor-intensive – often requires firms to relocate, as having lower cost of production allows firms to gain competitive advantage over other companies. Asia is a possible solution due to low wages, low cost of production and the availability of labor. Seagate was the first company that decided to invest in Singapore. This seems to be the beginning of the prosperous future of HDD in Asia.

After Seagate came to Asia, the other HDD producers followed. Investments in Asia and Southeast Asia seem to follow the flying-geese paradigm popularized by Akamatsu Kaname of Hitotsubashi University. Pasuk and Baker (1998:311) demonstrates how the flying-geese image has been played in the following paragraph:

By the 1990s Asia looked less like a neat echelon of flying geese, and move like a diverse mass migration—the elegant Japanese goose, the lumbering Chinese albatross, the little humming birds of Singapore and Hong Kong, the boisterous ducks of Taiwan and Korea, the fledglings of Thailand, Malaysia and Indonesia—each flapping in its unique way, but together creating a slipstream that carries them all along.

The flying geese pattern of development explains how a developing country can become developed relatively quickly by adopting suitable labor-intensive industries from abroad. It starts off with small scale production – products tend to be simple, crude and cheap – but the level of quality gradually improves and firms begin to export once the industry has become strong enough. The procedure is repeated over and over again, ultimately leading to a rapid national economic development. We observe a similar phenomenon in the HDD industry in Asia. Figure 1 below illustrates the locations of production plants of HDD industry around the world. We can see that production is largely concentrated in Asia.

Figure 1: HDD Plant Locations



2. Historical Development of HDD Industry in Thailand

In 1982, Seagate opened its first volume manufacturing site outside the United States with its Disc Drive Operations in Singapore. The goal was to reduce the cost of production because of the high wages in the United States. Singapore was chosen due to a relatively high quality of labor and technology as well as lower wages. Singaporeans also speak English fluently, allowing easier communication between the main company and the production site. In addition, Singapore government supported HDD industry through training and investment policy. According to Jerry Glembocki, Senior Vice President of Recording Heads and Media Operations of Seagate in 2006, "the Singapore Government, through the Singapore Economic Development Board, has played a very proactive role in creating these advantages and continues to ensure that Singapore remains a location of choice for manufacturers like Seagate." Over the time, the company expanded vertically: firms in Singapore not only massed production but also invested into research and development as well as design.

Ten years later, Seagate and Western Digital expanded their plants to Thailand to increase production and further reduce their cost of production. Given the lower wages, Thailand served as a mass manufacturing site without R&D and design, while branches in Singapore specialized in technology and training. Engineers from Singapore were sent over from time to times to debug system errors and transfer necessary production techniques. However, companies in the two locations worked independently and reported their work to the common headquarters in the United States. Singapore and Thailand seem to have complementary role rather than supervising role in the beginning.

The significant move that shocked industrial policy analysts was the decision by Seagate to close hard disk production plant in Singapore in 2009. Seagate lay off two thousands workers – about 4% of their labor workforce – and planned to relocate its Ang Mo Kio HDD plant out of Singapore by the end of 2010. As reported, this shutdown yielded the savings of US$40 million per year, or break-even on restructuring costs in 2 years. The site that was closed down contained advanced automation production lines and test systems, and was responsible for production and assembly of Seagate's hard disks for mission-critical applications. However, two thousand workers were still employed by the Seagate Asia headquarters in Singapore. Seagate's product development and design centre and Recording Media Operations (RMO) media manufacturing facility are still operating.

Thailand, having the second longest HDD production in Asia, was chosen to be the next hub of HDD industry. Seagate expanded the plant in Thailand to cover mass manufacturing and substitute the plant in Singapore. Initially, the location of the company was Theparuck, Samut Pakarn, which is a province next to the capital city Bangkok. In 2007, Seagate opened another production site in Nakorn Ratchasrima, a province in the Northern part of Thailand. Later, they closed plants in Samut Pakarn and transferred production site and employees to the second plant. The reason behind this reallocation is that the costs of capital and labor in the Northearn part of Thailand were lower than that in the central Thailand. Seagate took advantage of the uneven income distribution and lower price level to cut cost even further. For WD, they have two plants – in Navanakorn Industrial Promotion Zone, Pathumthani and in Bang Pa-In Industrial Estate, Ayutthaya. Figure 2 illustrates the locations of the plants of Seagate and WD in Thailand.

Figure 2: Locations of Seagate and WD in Thailand

In January 2009, WD closed down the production site in Navanakorn Industrial Promotion

Zone, Pathumthani and transferred all the production to Ayuthaya. Currently, the active production plants are Seagate's plant at Nakorn Ratchasrima and WD's plant at Ayuthaya. Table 1 summarizes the years that HDD producers began investing in Thailand.

Table 1: Investment Years in Thailand

HDD Producers	Year
Seagate	1983
Fujitsu/Toshiba	1994
Western Digital	2002
Hitachi Global Storage Technology	2003 (including IBM)

Source: BOI

3. Current Statistical Data of HDD and Electronics Industry in Thailand

Electronics industry has become one of the most significant investments that have substantial effects on the economic growth of Thailand. Figure 3 shows steady increases in the index of total product in electronics industry in recent years.

Figure 3: Index of Total Products in Electronics

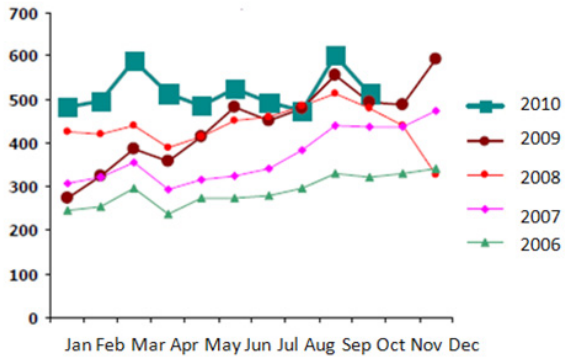
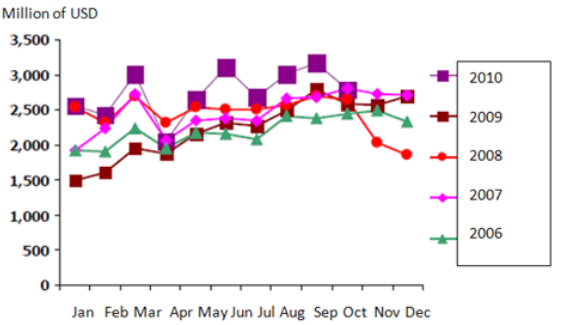


Table 2: Industrial Production Index

The electronics are usually produced for export or as components in assembly for some other final products. Therefore, the increase of index may be due to the world's increasing demand in electronics product. Table 2 breaks down the electronics production in Thailand into four main categories. Hard disk drive was ranked first in terms of the volume of production compared to other electronics products.

Figure 4: Total Value of Exports in Electronics



Considering the market for exports, the electronics product had a total value of 27,451 million US dollars, increasing at the rate of about 27 percent compared to the same period in the previous year. The increase in value originated from the increasing demand from the United States and China. Figure 4 shows the total value of export in electronics product in 2010, compared to earlier years.

Table 3 reports data in terms of the value of export by quarters and the percentage change of value compared to the previous year.

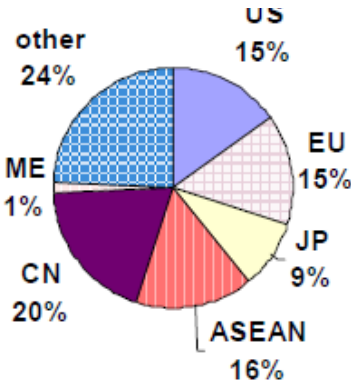
From January to October of 2010, among all exported electronics products, HDD had the highest value of exports, which increased 21.2% compared to last year. The markets for electronic product from Thailand are illustrated in Figure 5.

Industrial Production Index	Industrial Production Index				Changes compared to 2009 (%)			
	Q1 2010	Q2 2010	Q3 2010	Jan-Oct 2010	Q1 2010	Q2 2010	Q3 2010	Jan-Oct 2010
Electronic Product	522.9	508.03	523.25	517.5	59.1	21.3	5.52	22.52
Semiconductor devices transistors	155.6	176.93	190.39	175.43	112.63	36.17	22.12	41.24
Monolithic integrated circuits	136.83	156.07	173.8	156.75	97.94	25.73	5.67	26.64
Other IC	249.59	268.47	295.68	273.33	63.23	30.54	39.38	39.22
HDD	1049.8	999.5	1015.26	1019.28	56.45	19.94	2.6	20.57

Table 3: Value of Exports in 2010

	2010			
	Q1	Q2	Q3	Q4
Value of Export (Million of USD)	7995.84	7793.03	8873.39	27451.39
Change compared to previous year (%)	57.86	22.79	17.38	27.31

Figure 5: Markets for Thailand's Exported Electronics



In 2009, the HDD industry in Thailand was worth 413 billion baht, which is approximately 4.5 percent of the national GDP, and employed a workforce of around 220,000. The industry also provided local valued added to the country by about 100 billion baht. According to Jeff Nygaard, vice president and country manager of Thailand Operations, the worldwide HDD shipments were forecast to reach 650-670 million units in 2010, which represents a growth of 15 percent compared to last year's shipment of 590 million units. The bright future of HDD industry in Thailand seems to be shown by the data and also by the expectation of investors.

4. Thailand and its relevant characteristics to HDD industry

During the start-up stage, the production of hard disk drive in Thailand was not stable and systematic. It took much practice and training over time that Thailand eventually gained expertise. Table 4 reports the steady increase in the amount of production between the years 2003 and 2006, with Thailand eventually gaining almost half of the world market share of HDD production.

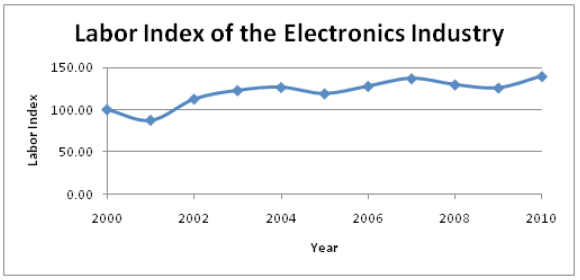
Moreover, the statistics of the employment in hard disk drive industry showed in Figure 6 reveals the steadily increase in labor pool from 2000 to 2010, signaling an expansion of the industry in Thailand.

Thailand has now become world's largest HDD producer, hosting Seagate, WD and HGST. There are three main advantages of Thailand being chosen as the hub of hard drive production. First, Thailand has begun HDD production relatively early compared to other countries in Asia. With a long experience in the HDD production, Thailand implements and improves the labor skills and technology that suits the investment of HDD industry, becoming more attractive to HDD producers. Second, Thailand has a wide availability of labor with low minimum wages while maintaining a decent quality of labor. Finally, the tax privilege from the government is another important factor drawing foreign investment as well. According to an interview of Mr. Kunawet Woraphu at Seagate, tax privileges are one of the most attractive features of Thailand. As indicated in conditions for electronics industry in the Board of Investment of

Table 4: Production and Exports of HDD in Thailand

Year	2003	2004	2005	2006
Volume of production (million piece)	84.1	74.1	119.8	169.1
The rate of production expansion (%)	-	37.0	61.7	41.7
Value of HDD and parts (million Baht)	303,230	329,291	415,711	497,456
- HDD	121,000	163,000	225,000	287,000
- Parts	182,230	166,291	190,711	210,000
Ratio of HDD exported to other electronics product	26	25	29	32
The market share of Thaialnd's HDD	19.5	19.90	42.00	48.00

Figure 6: Labor Index of Electronics Industry



Thailand, if the HDD producers pass a minimum requirement, then they are exempted from imported taxes of the machinery necessary for production.

Nevertheless, Thailand also has some drawbacks in the hard disk drive production. Considering the labor force, the attention from the foreign investment is mostly concentrated on the low minimum wages in of labor force. However, it is a challenge of Thailand to keep the wages low. As one of the developing countries with uneven distribution of income, the price levels and inflation rates increase at different rates across the country. One way is to relocate the plants with labor-intensive sectors to the cheaper parts of Thailand. Another solution is for the government to amend the rule of the limitation in immigration from neighboring countries to keep the wages in Thailand at the level that will still be attractive to foreigners.

Moreover, investors argue that the government policy of Thailand may not be open and attractive enough. Improvements in government policy infrastructure and new technology will help Thailand in the future. The government may need to invest in the development of new technologies, or at least enforce copyright and patent laws to reduce free-rider problems and thereby encourage private companies to invest in technological development.

5. Government Support

Undoubtedly, the HDD industry is largely responsible for Thailand's current economic growth and employment. Although Thailand is the largest producer of HDD in the world right now, the emergence of other competitors such as China and Malaysia threatens Thai government to continuously invest more into new technologies to support the production – either by decreasing the size of hard drives or increasing the capacity – as well as make the existing infrastructure more transparent for foreign investors.

In an effort to maintain the status as a largest HDD producer, the Ministry of Science and Technology of Thailand has assigned the National Science and Technology Development Agency (NSTDA) to accomplish four missions—research development, human resource development, supply chain development and policy development. The Hard Disk Drive Institute (HDDI) was established in 2006 by Lertsak Lekawat and Pansak Sirisattaphong to serve these purposes.

Table 5: Summary of the Budget used in SPA I

Activities	NSTDA	WD	STX	HGST	Others	Total
Managments	63.68	0	0	0	0	**63.68**
POLICY	9	0	0	0	0	**9**
RDE	78.7	35.6	10.17	18	1.76	**144.23**
Central Lab	47.5	0.45	0	0	0	**47.95**
SME	13.8	6.2	0	26	0	**46**
TT	60.14	38	76.2	8.8	0	**183.14**
Scholarship	187.15	18.41	5.23	0	8.75	**219.54**
Training	22.22	1.4	23.7	0	0	**47.32**
Total	**482.19**	**100.06**	**115.3**	**52.8**	**10.51**	**760.86**

The first project was issued under the name of Strategic Project Alliance (SPA) I with the budget of 482.2 million baht (about 16 million US dollars) funded by the government and 278.68 million baht (9.3 million US dollars) funded by private HDD producers. Table 5 above explains how the budget was spent in different areas. The RDE in the table stands for the Research Development and Engineering, which is responsible for research and technology development including technology transfer. By the end of June 2010, RDE has supported 174 projects that had an impact on the economy equal to about 8,641 million baht (288 million US dollars).

In addition, HDDI collaborated with Seagate, WD and Hitachi to support the training and transfer of hi-technology used in production process to develop the quality of Thai engineers. The training was funded by the private sectors with 123 billion baht, constituting 67.2% of the project, and the rest was funded by NSTDA. Figure 7 compares the budget spent and the economic impact of the project toward Thailand's HDD production.

Figure 7: Comparison of the Budget Spent and the Economic Impact of the Project

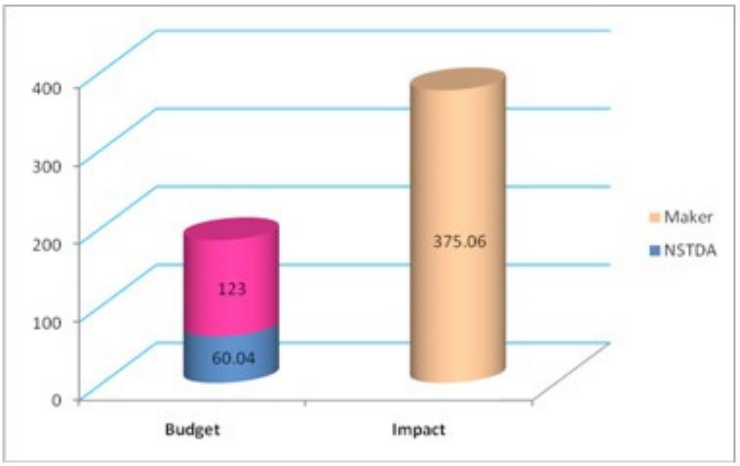


Figure 8: Human Research Development Budgeting and Impacts

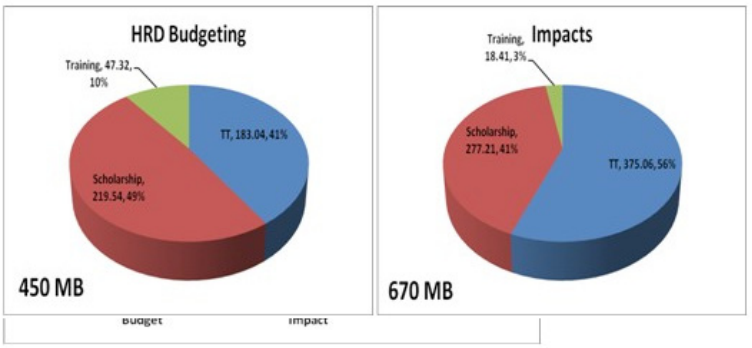
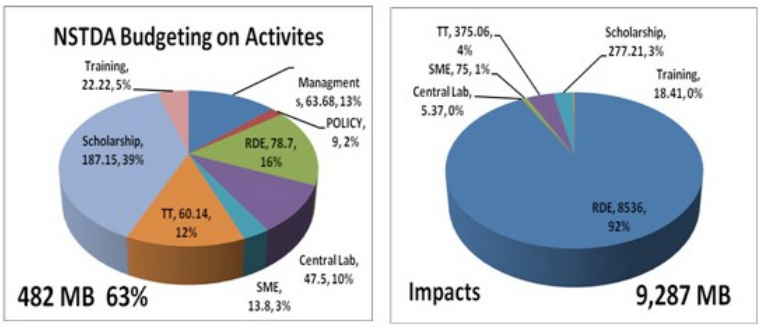


Figure 9: Summary of NSTDA Budgeting and Impacts



To enhance human research development, in 2006 the HDDI worked with other fifteen leading institutes and universities in Thailand to promote education of the HDD. In 2007, the Industrial University Collaborative Research Center was established. Until now, there are 111 educational programs about HDD development and production that are taught at 11 leading universities in Thailand. Figure 8 illustrates the ratio comparison of human research development budgeting and its impact to the economy.

For the supply chain development, NSTDA aimed to help develop the SMEs such as that in automation to support the hard disk production more efficiently. The main activities under supply chain development are creating the central labs. The overall picture of what NSTDA has done to develop the HDD production in Thailand is shown in Figure 9. It can be seem that RDE created the most significant impact compared to other segments.

However, some criticize that it is still not enough in term of policy development. It is still an ongoing challenge of Thailand to keep developing labor capability and R&D of HDD industry.

6. Concluding Remarks

In the future, the world demand of hard disk drive will be increasing due to the need of technological devices in the globalized world. With the advancement of technology, hard disk drives are decreasing in size while increasing in storage capacity. That is, in the production process, it is unavoidable that the producers will need to develop and learn new technology for production to remain competitive.

Thailand has become the world's largest HDD producers which hosted Seagate, WD and Hitachi. In the past, due to the availability of cheap labor and a long history in HDD production, the industry has become central to the nation's economic growth and employment. However, with the rise of competing nations such as China and Malaysia, Thailand now faces a challenge to maintain its lead in HDD production. Thai government must invest heavily on the development of new technology as well as make the infrastructure more transparent. The labor force quality must also be improved to remain competitive. Only then will Thailand retain its larg-

est share of HDD production in the world.

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Ability Signaling in Unemployment Histories: Adverse Effects of Being Unemployed?

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Workers who are unemployed for low productivity are laid off while workers unemployed from no fault of their own are unemployed from business shutdowns. Can economic conditions exacerbate this effect? Is there a stigma associated with being laid off for slack work? That is to say, do workers who are unemployed from layoffs suffer marginally more compared to workers unemployed from business shutdowns? What other factors can contribute to employment differences between jobs? I seek to answer these questions in a brief literature review examining how being laid off for slack work can adversely affect the differences in old and new employment terms.

1. Introduction

Let us consider how employers treat job applicants. Employers want to estimate applicants' performances, which is a very difficult task. Resumes and interviews can inform employers about applicants' abilities, but an even stronger measure is previous work history. Previous work histories allow employers to see how applicants actually performed on the job instead of guessing how applicants would perform on the job.

Now, if an applicant has a previous work history, the applicant must have either voluntarily or involuntarily left that job. For the purpose of this essay, let us only consider applicants' work histories where they have involuntarily lost their jobs through layoffs or plant shutdowns. The former case is typically due to low productivity of the workers, while in the latter case, workers are not at fault since shutdowns usually occur independent of workers' individual abilities. Therefore, workers unemployed through layoffs signal to employers that they may be of low productivity, while workers unemployed through plant closings send an ambiguous signal about their abilities. Employers may use this as an indicator to distinguish applicants by ability and consequently offer different terms of employment.

What about economic conditions? Employers must consider their own positions before hiring new workers. Employers tend to have smaller capacities to hire new workers during poorer economic conditions. In particular, when the unemployment rate is high and there is a greater supply of workers, employers can afford to be more selective of applicants than if the unemployment rate is low and there was a smaller supply of workers.

2. Literature Review

The literature concerning the effect of job unemployment is prolific. Researchers found that unemployed workers tended to lose earnings at reemployment, creating an earnings loss (Howland & Peterson, 1988; Jacobsen, LaLonde, & Sullivan, 1993; Podgursky & Swaim, 1987). I will spend the rest of the article examining how being unemployed from layoffs, human capital accumulation, and economic conditions affect this earnings difference.

Controlling other factors of unemployment, researchers found that workers unemployed from layoffs suffered a greater earnings loss than if they were unemployed from plant shutdowns. This effect was greater for blue-collared workers than white-collared workers (Podgursky & Swaim, 1987). Some researchers did not attribute this to the signals of the unemployed workers' abilities, but instead reasoned that workers who became unemployed from plant shutdowns were generally better than those who were laid off at an earlier stage before the plant is fully shutdown. This is perhaps because in the process of a shutdown, less productive workers are laid off first, while better workers tend to be kept until the very end. These unemployed workers would be better qualified than others and thus suffer smaller earnings differences.

More in line with my proposed explanation though, Gibbons and Katz (Gibbons & Katz, 1991) considered alternative reasons for different earnings losses for workers unemployed from plant closings and from layoffs. They looked at differences in hourly wages and measured the effect of being laid off compared to being unemployed from

plant shutdowns. Using data from the 1984 and 1986 Displaced Workers' Survey, they excluded white-collared workers from their sample in order to eliminate the effect of union rules, which are most prevalent amongst blue-collared workers. If a union has rules about unemployment, they are likely to be in conflict with the firms' ability to solely consider workers' abilities when laying them off. After seeing that pre-unemployment earnings between workers did not vary significantly, Gibbons and Katz found that reemployment earnings are lower for workers who were laid off relative to those unemployed through plant shutdowns.

Researchers have replicated Gibbons and Katz's model on different datasets and found generally consistent results, even with the inclusion of different effects for minority and female workers (Hu & Taber, 2005). They find that minorities suffer a greater earnings loss from plant closings than whites do, while whites suffer more from layoffs than minorities. They find no significant differences between genders. Analysis of the Canadian Survey of Displaced Workers (Doiron, 1995) showed similar results to that of Gibbons and Katz. Being laid off increased earnings losses for white-collared workers regardless of union status and had no significant effects on blue collared workers. The earnings loss lasted for up to three years of a post-unemployment job. Interestingly, the finding suggests that unions may not affect unemployed workers' earnings as Gibbons and Katz originally thought.

Studies on longitudinal data have garnered mixed support for Gibbons and Katz's results. Longitudinal data has the advantage of tracking individuals over time. Analysis on a longitudinal data set, the Panel Study of Income Dynamics, showed that unemployed workers overall suffer earnings losses that persist up to six years after unemployment (Stevens, 1997). Specifically, workers who experienced multiple layoffs suffer significantly higher losses. Workers unemployed through layoffs are more likely to suffer multiple layoffs. This could contribute to the effect of layoffs on earnings differences initially proposed by Gibbons and Katz.

Another study on longitudinal data looking at Pennsylvania workers found other objections to Gibbons and Katz. This study found that although workers suffer a drop in reemployment earnings after being unemployed for as long as three years, workers who were to be laid off also experienced a drop in pre-unemployment earnings (Jacobsen, LaLonde, & Sullivan, 1993), contradicting Gibbons and Katz's findings that pre-unemployment earnings for workers unemployed through layoffs and plant closings were similar. One interpretation of this is that firms may not immediately lay off a worker after observing that the marginal product of the worker is less than the workers' marginal cost to the firm. Instead, firms may start to decrease the workers' earnings to either induce the workers to leave or to give them time to increase their marginal products.

Research on unemployed workers has also considered human capital. Many researchers measure human capital through tenure and found that higher pre-unemployment job tenures increased the difference between post- and pre-unemployment jobs. (Podgursky & Swaim, 1987; Gibbons & Katz, 1991; Farber, 2003). The effect is more severe if workers change occupations and industries (Carrington, 1993; Jacobsen, LaLonde, & Sullivan, 1993; Neal, 1995), suggesting that there is industry- or occupation-specific human capital that is not transferable between industries and occupations. This would suggest that workers with higher tenure levels, or greater industry or occupation-specific human capital, would suffer smaller earnings losses if they find post-unemployment jobs in similar industries and occupations than those who change occupation and industry. However, this is not found among the literature controlling for industry wage and union wage premiums (Fallick, 1996). Unemployed workers with low and high tenure also act differently; lower tenured workers are more likely to seek reemployment in part time rather than full time jobs, which further explains earnings losses (Farber, 2003).

Researchers who consider education as human capital have also found the effects of education on earning losses. Evidence from examining longitudinal data from the Panel Survey of Income Dynamics showed that workers with lower education were more likely to suffer from multiple periods of unemployment and therefore exacerbate their earnings losses (Stevens, 1997).

Economic conditions have also played a role in the earnings loss for unemployed workers. Economic conditions have been measured through state and industry unemployment rates and employment growth. It has been found that unemployment rates adversely affect reemployment earnings (Carrington, 1993; Jacobsen, LaLonde, & Sullivan, 1993; Podgursky & Swaim, 1987; Farber, 2003). Reemployment earnings are

also more sensitive to industry than local labor market conditions (Carrington, 1993), suggesting that unemployed workers tend to look for a post-unemployment job in similar industries. However, researchers have encountered collinearity and insignificant coefficients when looking at multiple unemployment specifications (Howland & Peterson, 1988). This is unsurprising as many unemployment measures are highly correlated. After all, narrow unemployment specifications can be summed to form a larger unemployment specification.

3. Conclusion

What does this literature say about the effect of unemployment on future earnings? Unemployed workers are reemployed at lower earnings levels. This earnings loss can be attributed to various factors. If workers are laid off, this signals poor ability to future employers. These workers are consequently hired at lower employment terms than others who may have been unemployed through plant shutdowns, where such ability signals are ambiguous. The literature has shown that workers may not suffer as much from this effect as initially thought, instead finding that much of this earnings loss can be attributed to racial effects, union membership, multiple layoffs, and uneven earnings trends of workers.

The literature has also investigated the effects of human capital and economic conditions. Different sources of human capital have different effects. A greater amount of job tenure is associated with a larger earnings loss, while a greater amount of education is associated with a smaller earnings loss. Education does not have a direct impact on earnings loss, but rather, more education reduces the need to change jobs frequently and this decreases earnings losses. Economic conditions also play a large role in earnings loss, with poorer economic conditions exacerbating the earnings losses.

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