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**Co-Editor for Asia:
Bala Batavia
DePaul University**

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Tackling Rural Energy in India: An Institutional Way Forward

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Preface

A. G. Malliaris
Editor-in-Chief

Loyola University of Chicago

The focus of the **Journal of Economic Asymmetries** has been from its first issue on economic asymmetries defined broadly. Information asymmetries have received a lot of attention, particularly in financial markets because naturally what is known by managers need not be known to the same degree by market participants. However, in economics, asymmetries may arise for a variety of economic reasons. For example, small firms in comparison to larger ones may face dissimilar risks, different financing opportunities and constraints, limitations in terms of technological opportunities and innovations and the opportunity to attract managerial talent. Countries also, may experience asymmetric economic opportunities because of their economic size, political stability, cultural factors and stage of economic development. Economic analysis and research needs to address these issues.

We are pleased that our focus on asymmetries guided our journal and numerous conferences of the **Athenian Policy Forum** to address the economic consequences of integrating within the European Monetary Union large, and economically competitive countries like Germany, along with smaller and less competitive countries like Greece and Portugal. Little did we know just 5 years ago that these issues would come to dominate the daily financial press with global stock markets reacting to Greece's capacity to pay its public debt.

To further the effectiveness of our niche, we started in 2009 distinguishing economic asymmetries across broad geographical regions. It became clear that Europe's asymmetries needed individual attention by economists who specialized in this region. So, we decided to assign an editor for the Americas and a second one for Europe. So far we have produced four issues edited by Professor George Bitros who has done an excellent job as our European region co-editor. Professor Bitros was able to attract top experts on European economic asymmetries and also invite knowledgeable referees and associate editors. Professor Leo Michelis continues to concentrate on asymmetries in the Americas with emphasis on Canada, the US and Mexico.

With this issue we expand our coverage to Asia. I welcome and also congratulate Professor Bala Batavia who is our Asia co-editor for having organized three conferences for the **Athenian Policy Forum** in India in December 2006, 2008 and 2010 co-sponsored by the **Indian Institute of Management**. These conferences were successful and very well attended and have offered us a pool of valuable contacts to both write and referee papers. This issue is just the start of this new initiative.

We welcome new submissions by economists around the globe with an interest on economic asymmetries. Submissions can be sent to any of our co-editors for North America, Europe or Asia.

A.G. Malliaris,
Editor-in-Chief

Major Findings from *The Changing Body: Health, Nutrition, and Human Development in the Western World since 1700*

Robert W. Fogel

Center for Population Economics, University of Chicago Booth School of Business and NBER

Nathaniel Grotte

Center for Population Economics, University of Chicago Booth School of Business

Abstract. This paper discusses findings from *The Changing Body: Health, Nutrition, and Human Development in the Western World since 1700* (Cambridge University Press) The book is built on the authors' work with 300 years of height and nutrition data and discusses their findings in the context of *technophysio evolution*, a uniquely modern form of rapid physiological development, the result of humanity's ability to control its environment and create technological innovations to adapt to it.

JEL Classification: I1, N31, N33

Keywords: Health economics, Nutrition, Height

1. Introduction

In April, Cambridge University Press published *The Changing Body: Health, Nutrition, and Human Development in the Western World since 1700*, a collaborative work by Professor Sir Roderick Floud (Gresham College), Professor Robert W. Fogel (University of Chicago Booth School of Business), Professor Bernard Harris (University of Southampton), and Professor Sok Chul Hong (Sogang University). The volume, first conceived more than two decades ago by Floud and Fogel, incorporates the authors' recent research on human development, height, and nutrition in continental Europe, England and Wales, and the United States. This paper reviews some of the major findings of the book, which aims to show

...that the health and nutrition of one generation contributes, through mothers and through infant and childhood experience, to the strength, health and longevity of the next generation; at the same time, increased health and longevity enable the members of that next generation to work harder and longer to create the resources which can then, in their turn, be used to assist the next, and succeeding, generations to prosper.

The mechanism that underlies this proposition is *technophysio evolution*, a term coined by Fogel and Dora Costa in a series of papers published in the late 1990s and expanded further in Fogel's 2004 book *The Escape From Hunger and Premature Death, 1700–2100* (Cambridge University Press). The theory of technophysio evolution states that the interplay between humanity's ability to control its environment and to create technological innovations has created a unique form of physiological development, which is much more rapid than traditional conceptions of Darwinian evolution. According to proponents of the theory, the proof lies in the dramatic changes that the human body has experienced in the past 300 years, which surpass the scale and size of changes brought about during many previous millennia.

The degree to which human bodies have changed in the course of the last 200 years can be illustrated by the following example. Circa 1850, the average American adult male stood about 5-foot-7-inches and weighed about 146 pounds. During the 1980s, the typical American male in his early thirties was about 5-foot-10 and weighed about 174 pounds. The amount of energy required for baseline maintenance (the energy required for rest and vital hygiene) for the American body of the 1980s is 2,378 calories per day.

If the French had been that large at the beginning of the nineteenth century, most of the available food (around 2,400 kcal per capita) would have gone to maintenance, with relatively little available to sustain work. Similar changes in stature occurred in other European countries (see Table 1). *The Changing Body* links changes in European and American body size to technological changes for diet and disease control. It is also important to note that other ways of regulating energy expenditure through intensity and duration of work also played a major role. Malnourished French peasants may have worked particularly long hours during harvest time with an intensity that could not have been maintained over the course of the year. Maternal malnutrition had substantial consequences for offspring, some of which were not apparent until older ages—or even future generations.

The balance of the chapters in *The Changing Body* is arranged geographically, collecting the stories of Britain, continental Europe, and the United States. Height data for continental Europe extend back to the second half of the seventeenth century, and confirm that men of the period were very short. The available data show declines in the heights of Swedish men (around 2.5 centimeters for the cohort born between 1740 and 1760), and men living in five separate provinces of the Habsburg Empire.

Table 1: Estimated average final heights (cm) of men who reached maturity between 1750 and 2000 in six European populations, by quarter-centuries

Date of Maturity by Century and Quarter		Denmark	France	Great Britain	Hungary	Norway	Sweden
1	18-III	-	-	165.5	167.4	165.6	168.1
2	18-IV	165.7	163.0	168.6	166.6	165.5	166.7
3	19-I	166.2	163.7	167.9	163.1	166.6	166.7
4	19-II	166.7	164.3	171.2	163.5	167.4	167.3
5	19-III	165.3	164.7	167.2	162.3	168.7	168.0
6	19-IV	167.8	165.4	168.0	163.8	169.6	169.5
7	20-I	169.3	166.3	168.2	165.4	171.0	171.9
8	20-II	171.5	168.0	170.0	168.4	173.8	173.9
9	20-III	175.5	171.2	175.0	170.7	177.6	177.2
10	20-IV	183.2	174.7	176.6	-	179.5	179.2

Source: Floud et al. 2011. © Cambridge University Press. Reprinted with permission.

2. Major Findings from the Data

The eighteenth century was a difficult period in America. Settlers were burdened with rudimentary farming implements and limited agricultural knowledge. Harsh weather cut short the harvesting season. Opportunities to import and trade were limited, and the population was subjected to major fluctuations in food supply due to climate shocks. As a result, the supply of food was barely enough to sustain the agricultural laborers who were producing it. The diet was heavily composed of grains and cereals at first, and what little livestock was available was used more for milk and wool rather than meat. However, even in spite of these hardships, native-born American men were taller and had longer life expectancies than their European counterparts. The climate was well suited to agriculture, and the low population density resulted in less communication of disease.

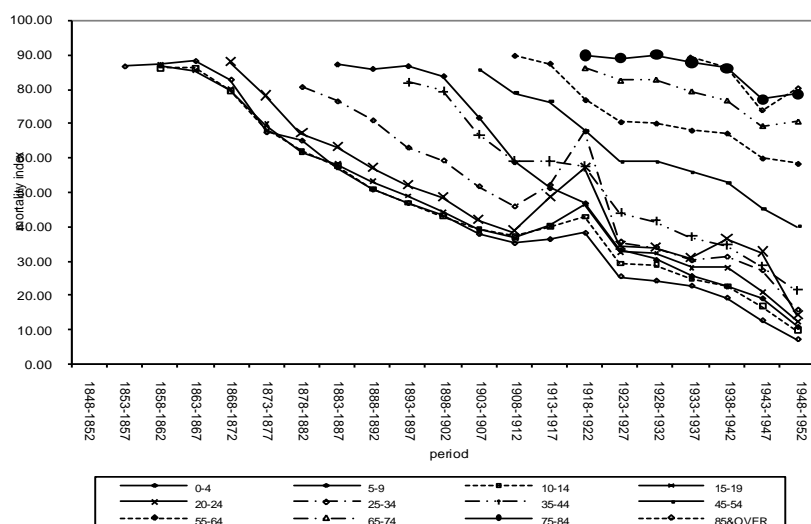
As for the nineteenth century, most scholars are in agreement that there was a general decline in the heights of British men and women between 1820 and 1850. Estimates put the extent of the decline (for men) at around 4.8 centimeters. Average heights began to rise once again after 1850, but even men who were born at the end of the nineteenth century were short by modern standards—about six centimeters shorter than British men in the 1980s.

In continental Europe, the average heights of French soldiers appear to have increased gradually over the nineteenth century, but heights decreased for

Dutch soldiers during this period. Moreover, height and social status were positively correlated. In France, students at the elite *École Polytechnique* were 4 centimeters taller than the men conscripted into the national army between 1819 and 1826, and wealthy soldiers (those able to afford to hire a replacement) were taller than those who could not. Similar patterns have been observed in the Netherlands and Spain.

As heights declined, a concurrent mortality increase has been observed. The reason for this “arrest of progress” is not agreed upon, but it likely has some connection to the increasing urbanization in the nineteenth century. As this decline in stature reversed itself, mortality improvements were seen first in children between the ages of 4 and 9 after 1850 and later among to older-age individuals (see Figure 1). Improvements in sanitation contributed to the reduced mortality. This decline in mortality may have been associated with a decline in the virulence of tuberculosis, but the evidence is wanting. There is further debate as to whether the decline was greater in rural rather than urban areas.

Figure 1: Age-specific Mortality in England and Wales, 1840/52-1948/52



Source: Floud et al. 2011. © Cambridge University Press. Reprinted with permission.

As for diet, the evidence suggests that the British became net importers of food during the first half of the nineteenth century. The most dramatic change was in sugar, where imports increased by 150 percent between 1700 and 1850. A number of researchers have suggested that population growth introduced the potential for a Malthusian crisis—an outpacing of the food supply by population—in the second half of the eighteenth century, but the data suggest

that domestic food production stayed constant and the number of calories derived from imported foods had increased. Still, it is possible that a significant proportion of the British population had diets below levels necessary to maintain weight. Furthermore, there is evidence that households compensated for a dearth of calories by distributing a greater share of food to adult male workers, which may have contributed to the undernutrition of children and women, and to the elevation of their mortality rates.

At the beginning of the nineteenth century in the United States, new agricultural techniques were introduced and the frontier expanded westward, which resulted in a large increase in crop production. However, the U.S. population increased by 338 percent during the same period, cancelling out much of the gross benefit of this additional food, and crop production could not keep pace with the food required by the burgeoning industrial centers. As a result, per capita crop production stagnated or decreased, which raised prices and contributed to the nutritional decline of the population in the first half of the nineteenth century. The authors estimate that the average American adult male between the ages of 20 and 39 consumed about 2,900 calories daily in 1800, which is roughly 20 percent higher than the average Englishman's intake at that time. A decline in the ability to produce wheat, rye, pork, and beef at levels that would maintain calories per capita in the face of population growth contributed to this deficit in available food: in 1850, daily caloric intake was 2,585 per adult male 20–39, or 367 calories less than was available 50 years earlier. At the conclusion of the Civil War, per capita food production again increased, and by 1880, the American diet had reached a level that would persist to the 1970s and 1980s.

The end of the Civil War also marked the beginning of a decline in the total number of hours spent at agricultural labor in the United States, although, paradoxically, the work year of ex-slaves increased. Most African-Americans stayed in the south but a migration to the north began gradually to unfold. Agricultural technology advanced to such an extent that an hour's labor in 1900 could produce five times as much wheat as a century earlier.

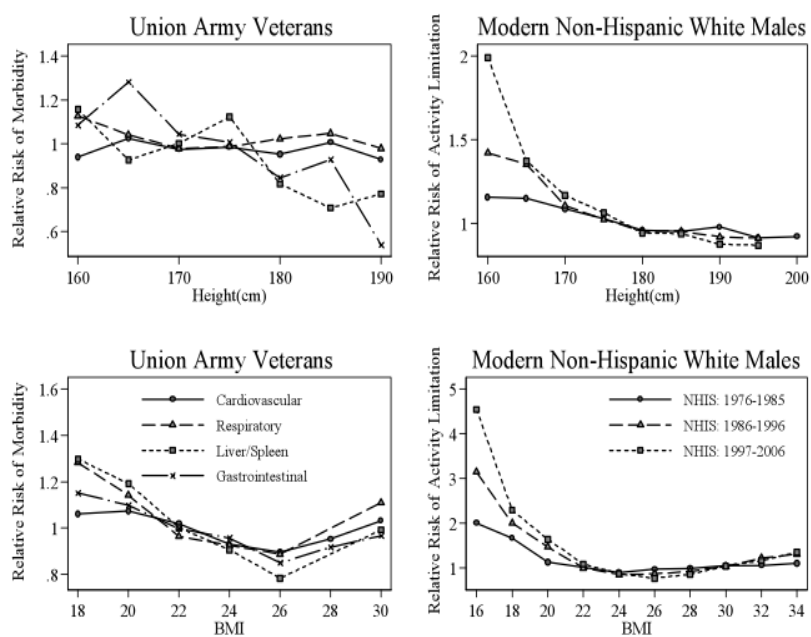
Nineteenth-century Americans were plagued by low life expectancies. In 1850, life expectancy was around 40 years for whites and 23 years for blacks. These figures improved over the following twenty years but declined again in the 1880s, because of increased immigration and urbanization, which contributed to a severe disease environment that afflicted early Americans harshly. The primitive sanitary conditions in American cities disproportionately affected infants and children: in 1900, the infant mortality rate (IMR) in urban areas was about 180 per 1,000 births and about 117 per 1,000 births in rural areas (in 2009, the U.S. IMR was about 6 per 1,000 births). Within cities, mortality rates varied greatly, closely following differences in sanitary conditions in different wards. Farmers and those living in rural areas faced a harsh battery of diseases that included hookworm and malaria. Malaria, which was poorly understood into the early twentieth century, afflicted many, especially African Americans. The lone treatment, quinine, often failed to cure patients completely, and relapses were common, limiting the capacity for work.

Available data indicate that British heights improved over the course of the twentieth century despite a lack of significant progress during that century's

first 20 years. Heights of children in continental Europe, which were below modern standards prior to World War I, improved as the century progressed. Germany, Greece, and Norway experienced these improvements between the World Wars; in other countries, improvements were not seen until 1945. Improvements in adult heights have been documented as well. The average heights of recruits in Bavaria, Belgium, Denmark, France, Italy, the Netherlands, Norway, Spain and Sweden increased between 3.1 and 11.1 centimeters during the first three-quarters of the twentieth century.

Mortality in Britain, which up until the beginning of the twentieth century was attributable primarily to infectious disease (between 25 and 30 percent of all deaths directly and more indirectly), fell sharply between 1901 and 1950. The greatest improvements in British mortality in the nineteenth century were between the ages of five and 44; the twentieth century saw improvements for infants and older adults. Elsewhere in Europe, life expectancies at older ages have increased significantly. In the middle of the twentieth century, a 65-year-old could expect to live for about another 14 years; by the end of the century, that figure had risen to 17.5. It appears that chronic disability is declining and healthy, high quality-of-life years are increasing.

Figure 2: Relative morbidity risk by BMI among Union Army veterans at ages 40 to 59 and relative risk of activity limitation by BMI among modern American non-Hispanic white males at ages 40 to 59

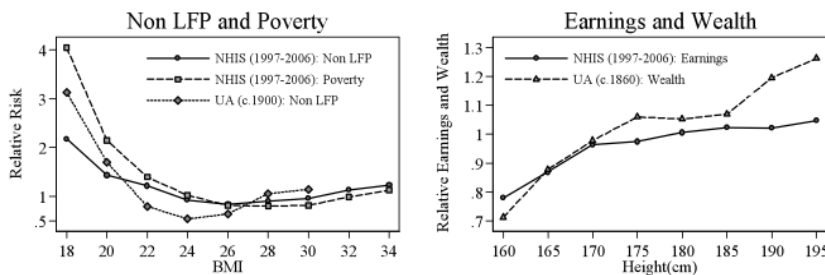


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The examination of medical and pension records of Union Army veterans collected and digitized by the Center for Population Economics at the University of Chicago provides some insight into the relationship between height, morbidity, and mortality. The likelihood of being diagnosed with particular chronic diseases decreases as body-mass index (BMI) increases, up to a BMI of between 25 and 26. The risk continues to increase beyond the optimum BMI (see Figure 2). The risk of morbidity was generally lowest for the tallest individuals.

Figure 3 illustrates the correlation between BMI and labor force participation (a measure associated with economic productivity) in 1900. Individuals with low BMIs had, on average, labor force participation rates that were only a third of the average rate. The BMI associated with the highest labor force participation rates is the same as associated with low morbidity and mortality. The same pattern exists for white males in America today, as the hours spent at work by individuals in the labor force have become fewer and more efficient. American workers today work 30 percent fewer hours than workers in 1900 did, and time spent at leisure increased accordingly.

Figure 3: Comparison of relative risk of low economic productivity (non labor force participation and poverty) by BMI and relative wealth and earnings by height, modern non-Hispanic white American males and Union Army veterans



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Acquisition of human capital flourished through the nineteenth and twentieth centuries despite health insults and other barriers, and the inequality between the rich and poor increased, and the effects (through pregnancy outcomes) could be observed for decades to come. This complicated relationship underscores a difficulty in measuring economic growth while trying to capture imprecise but important elements of the human condition, and why quality of life cannot easily be measured in narrow economic terms.

3. Implications for the Future

What do these trends suggest for the future? People have been getting taller: At the end of the twentieth century, average heights of native-born Americans had increased by about 5 centimeters since 1910. Taller people are working more and earning more: a cross-cultural study from the end of the twentieth century found

that an extra centimeter of height is associated with a gain in wage rates of about 5–10 percent (Schultz, 2005). People are retiring earlier: in 1900, 63 percent of males 65 and older were still on the job; by 2000, that figure had declined to around 17 percent. People are working less: those individuals who do work put in fewer hours (about 30 percent fewer than workers of 1900) but are more efficient. And people have gotten richer: real hourly wages increased 14 times over the twentieth century.

As a result, consumption patterns have changed. As technological advances have decreased the costs of food, clothing, and shelter, a larger proportion of income is today spent today on education and health care. Even as medical technology has improved and driven down the costs of treating certain diseases (especially those that can be prevented with inexpensive vaccines and antibiotics), the latest breakthroughs (such as advanced imaging techniques and organ transplants) demand high prices. Although life expectancies continue to increase and the average age of onset of chronic diseases is pushed later and later, the proportion of GDP that is spent on ever-improving health care will continue to increase because the income elasticity of the demand for health care is greater than one. It is no longer just undernutrition but also overnutrition that threatens to undercut medical progress and advances made in healthcare. The great availability of calories combined with modern sedentary lifestyles has meant an increase in the number of Americans classified as obese (sitting at or around a quarter of the population), putting them at greater risk for many diseases, including heart disease, stroke, hypertension, and some cancers. According to research on global BMI levels published recently in *The Lancet*, mean BMI has increased worldwide between 1980 and 2008 by .4 of a BMI unit for men and .5 of a BMI unit for women for women per decade (Finucane MM et al., 2011). The United States has the highest BMI of wealthy countries, but the British data mirror the trend. Although obesity emerged as a problem in an era of low mortality rates, in cross section, it is associated with increased risk of mortality and linked to diseases that include heart disease, stroke, hypertension, and some cancers.

4. Conclusion

In the conclusion, the authors acknowledge a certain tendency toward “the Whig interpretation of history: that history shows a constant improvement toward some ideal of human perfection.” The authors furthermore acknowledge that the course of economic growth has consequences, including the public health consequences that will stem from the burgeoning obesity epidemic. A section titled “Possible Constraints” introduces a few wrenches that could grind the gears of the technophysio machine (such as the previously described Malthusian crisis, or a continuing AIDS epidemic), but an enduring faith in the “plasticity, flexibility, and responsiveness of the human body” makes it clear that the authors are optimistic that the trend of larger bodies and longer lives will continue into the future. The volume of historical data synthesized in this book may be its great strength.

The quality of available data and their nuances are major issues in this book. Dispersed throughout are several discussions of the difficulty in acquiring and handling these historical data, especially the issue of extrapolating

information about the general population from the necessarily truncated historical records. For example, attempts to acquire heights of British children in the late eighteenth and early nineteenth centuries date back to the early 1980s (Floud and Wachter, 1982). Significant differences in the distributions of height were observed between the records of the poor boys of the Marine Society and the upper-class boys admitted to the elite Royal Military Academy at Sandhurst, highlighting significant physiological inequality. Military records provided a more representative picture of adult male heights of the period, which followed a generally upward trend, interrupted between 1825 and 1850 due to the “impact of urbanization.” As *The Changing Body* is careful to note, these findings were scrutinized and debated by multiple scholars, for various reasons. In some cases, the samples overrepresented certain segments of society (e.g., military enrollees were more likely to be from the lower classes). Another similar issue is that many of these samples contain data on truncated samples, as military and similar organizations had minimum (and sometimes maximum) height requirements. Moreover, different techniques aimed at correcting for this bias are not universally agreed to be sufficient. Yet another issue is that health insurance records are tricky because the “sickness threshold” may have changed over time, and increased incidence of disease is more a “measure of increases in health awareness and in the provision of preventive services” than evidence of increased morbidity. In addition to the audience of economic historians, demographers, and epidemiologists, these discussions will be useful to anyone with an interest in hard-to-manage data.

It may prove difficult for any reader outside of the discipline to know what to make of the various conflicting academic opinions. Much of the book is quite technical, but those readers more interested in the narrative of changing bodies can easily bypass the equations. The scale of the inquiry and data analysis has led to a unique volume, one that the authors hope will prove to be a good story and a significant reference for years to come.

5. References

- Finucane M.M. et al., (2011), “National, Regional, and Global Trends in Body-Mass Index since 1980: Systematic Analysis of Health Examination Surveys and Epidemiological Studies with 960 Country-Years and 9.1 Million Participants”, *The Lancet*, 377(9765), 557–567.
- Floud R., Fogel R.W., Harris B.H., Hong S.C., (2011), *The Changing Body: Health, Nutrition, and Human Development in the Western World since 1700*, Cambridge: Cambridge University Press.
- Floud R., Wachter K., (1982), Poverty and Physical Stature: Evidence on the Standard of Living of London Boys 1770–1870, *Social Science History*, 6, 422–452.
- Schultz, T.P., (2005), Productive Benefits of Health: Evidence from Low-Income Countries, in López-Casnovas, G., Rivera, B., and Currais, L., (eds.) *Health and Economic Growth*, Cambridge: MIT Press.

Adjustment in an Open Economy with Two Exchange-Rate Regimes

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Abstract. This paper examines adjustment in a model with three economies, two exchange-rate regimes, and varying capital mobility. In the benchmark scenario, the U.S. dollar fluctuates against the euro and the Chinese yuan, but capital mobility is high in the former and low in the latter case. This generates offsetting exchange-rate adjustments, which affect the efficacy of U.S. fiscal policy. In the next two scenarios, the yuan is fixed against the dollar. Rate pegging by a large country like China “interferes” with U.S. macro adjustment and undermines U.S. policy autonomy.

JEL Classification: F31, F32, F41

Keywords: Open economy macro, Exchange rate regimes, US-China payments adjustment, Production networks

1. Introduction

In recent years, the United States has operated under a mixed exchange-rate regime containing both fixed and floating elements. The country is officially classified as a “floater,” which accurately describes the nation’s official policy.² However, it has been unable to prevent a large country – China – from pegging its currency to the dollar.³ If China were a small country, this policy would have no meaningful consequences for the United States. But China is not small and hence its exchange-rate management does have implications for the U.S.

This paper explores the consequences of China’s exchange-market intervention for U.S. monetary and fiscal policy. It does so with an open-economy model of a country which has a floating rate with one trading partner and a fixed rate with a second trading partner. The two trading partners are the European Monetary Union (EMU) or “Euroland,” whose currency is the euro, and the People’s Republic of China, whose currency is the yuan or RMB. The dollar floats freely against the euro, while its relationship to the yuan is managed by the central bank of China. This gives the U.S. a *de facto* “mixed” exchange-rate regime.

Section 2 presents the model and works out a benchmark scenario in which both exchange rates are fully flexible. In Section 3, China fixes its currency to the dollar and recycles dollars accumulated in the process of intervention by purchasing U.S. Treasury securities directly from the Federal Reserve. This is the “non-sterilization” scenario. In Section 4, intervention dollars are recycled in the open market for U.S. Treasury securities. This is the “sterilization” scenario. Section 6 concludes.

What distinguishes China from the many other countries that have pegged their currencies to the U.S. dollar is that the People’s Republic is large enough to

affect macro adjustment in the American economy. Its exchange-rate management has the capacity to interfere with the effectiveness of U.S. macro stabilization policies and to compromise the flexibility of the dollar against other currencies.

1. An Open Economy with Floating Rates

The basic frame of reference for the analysis that follows is the textbook model of the open economy, modified to provide a three-country perspective.⁴ Specification of the U.S. monetary sector follows conventional lines:

$$H/P = L(y, i), \quad (1)$$

where L is the demand for real cash balances, y is real income and i is the nominal interest rate. P is the price level, which is taken as given in the short run, reflecting the well-known “sticky-price” assumption of many macro models. In the standard model, base money is specified as $H = D + R$, where D is domestic credit and R represents foreign exchange reserves held by the *domestic* central bank. In the case of China, however, it is the foreign central bank that holds reserves of the U.S. currency. Hence, the relevant expression is $H = D - R^C + TB^C$, where R^C represents dollar accumulation by the Chinese central bank through intervention in the foreign exchange market and TB^C represents purchases by the Chinese central bank of U.S. Treasury securities from the public.

Equilibrium in the goods-producing sector is specified along standard lines, except that the U.S. trade balance with each country appears separately in the equation.

$$I(i) + T^*(y^*, y, E^*) + T(y^C, y, E) - S(y) = -G, \quad (2)$$

where investment, I , is a negative function of the rate of interest, where U.S. trade with Europe, T^* , and with China, T , is positively related to each country’s real GDP (y^* and y^C , respectively), negatively to U.S. real GDP (y) and positively to the two nominal exchange rates (E^* and E), expressed as the dollar price of the respective foreign currencies. U.S. private real saving rises with real GDP, and G represents the real government budget deficit.

There are, finally, two basic balance-of-payments equations:

$$T^*(y^*, y, E^*) + K^*(i, i^*) = 0 \quad (3)$$

and

$$T(y^C, y, E) + K(i, i^C) = 0, \quad (4)$$

where K^* and K represent capital inflows into the U.S. from Europe and China, respectively. Inasmuch as the current account is a flow variable, we count on capital flows rather than the stock-adjustment components of the financial account to provide ongoing funding for current account imbalances. Cross-country interest differentials should cause agents to borrow where interest rates are low and to lend where they are high. We assume that such financial

intermediation between Euroland and the U.S. exhibits “high capital mobility,” while financial flows between the U.S. and China are subject to low mobility, in part because they are more vigorously controlled and regulated by the Chinese authorities.

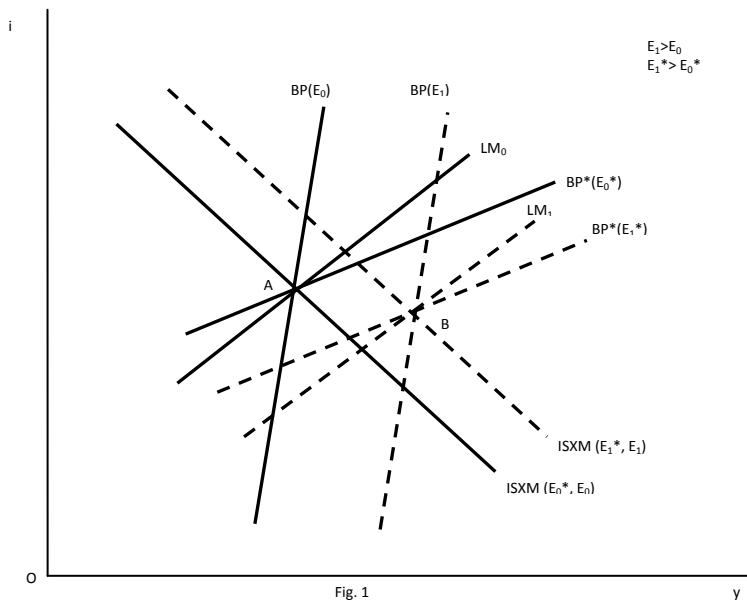
As written, equation (4) assumes that all capital flows between the U.S. and China are autonomous. This assumption is appropriate when the yuan is fully flexible, which is the scenario of this section. Subsequently, equation (4) will be amended to accommodate the fixed-rate scenarios.

We begin by assuming that both exchange rates are fully flexible. This is the regime that Washington policy makers have been working to achieve by pressing China to allow the yuan’s value to be determined by market forces. As noted above, capital mobility is high with Europe and low with China.

1.1 Monetary Policy

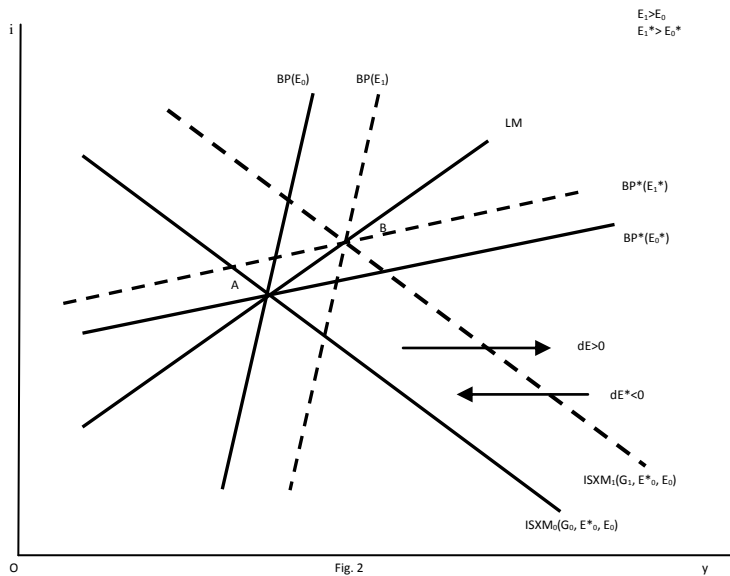
A monetary expansion in the United States produces well-known results. The expansion raises U.S. income and thereby causes both trade balances to deteriorate. It lowers the rate of interest, bringing about capital outflows, which impact negatively on U.S. financial accounts with both countries. As a result, the dollar depreciates against both currencies. If we assume for the present that the marginal import propensities in equations (3) and (4) are roughly similar, then the current account deteriorations are roughly similar as well.⁵ In view of Europe’s higher capital mobility, however, the decline in the U.S. interest rate affects the financial account with that region more severely than that with China. Hence, the dollar’s depreciation against the euro is relatively larger. In the main, however, this result is consistent with well-known findings that depreciation enhances the effectiveness of monetary policy in achieving a reduction in the U.S. output gap.

The essential features of the adjustment are depicted in Figure 1. Note that the shift in goods-market equilibrium, represented by the ISXM curve, is the result of changes in both exchange rates and that there are separate curves for balance of payments equilibrium between the U.S. and its two trading partners. The steeper curve (BP) reflects the assumption of low capital mobility vis-à-vis China, while the flatter curve (BP*) accommodates the high degree of capital mobility between the U.S. and Euroland. The monetary expansion shifts out the LM curve, while the depreciation of the dollar against the two currencies shifts the ISXM curve out and the two BP curves down. In the new equilibrium, U.S. output is higher and the interest rate lower than initially. The resulting improvement in output and employment is stronger than in the closed economy. This is the outcome that would pertain if the U.S. succeeded in persuading China to allow its exchange rate to become completely market-determined.⁶



1.2 Fiscal Policy

In the closed economy, a U.S. fiscal expansion shifts out the goods-market equilibrium curve along the stationary LM curve in Figure 2, raising output and the interest rate. In the open economy, however, the rise in output causes deterioration in both current accounts. The rise in the interest rate, on the other hand, improves the financial account with Europe by more than enough to offset the deterioration of the current account, therefore causing the dollar to appreciate against the euro. This, in turn, causes the goods-market equilibrium curve to shift inward, as indicated by the lower arrow, and the BP^* curve to shift up to $BP^*(E_1^*)$. The result is to reduce the effectiveness of the fiscal expansion in achieving a desired reduction in the output gap.



With respect to China, on the other hand, the interest-rate increase is not large enough to improve the financial account by as much as the rise in U.S. output has caused the bilateral current account to deteriorate. The dollar is forced to depreciate against the yuan, pushing the goods-market curve out, as indicated by the upper arrow, and the BP curve to $BP(E_1)$. These adjustments, therefore, work in directions opposite to those associated with the dollar's appreciation against the euro. The net effect on the ISXM curve depends on the magnitudes of the relevant interest-rate and exchange-rate elasticities between the U.S. and Europe and China, respectively. If the forces indicated by the two arrows are equal, then the ISXM curve will not move from the position it reached with the initial fiscal expansion. That is the case depicted in Figure 2. The likelihood of little or no movement in ISXM rises as the values of the U.S. marginal propensities to spend on imports from the two trading partners and the exchange-rate elasticities of the two bilateral trade balances, respectively, converge toward each other.

When the adjustments are perfectly offsetting, the effectiveness of the fiscal expansion does not change relative to the closed-economy outcome. On the other hand, if the European results dominate, then the effectiveness of fiscal expansion will be weaker. It will be stronger, if the Chinese side of the adjustment process dominates.

2. An Open Economy with Two Exchange-Rate Regimes

In this section we assume that China unilaterally pegs the yuan to the U.S. dollar. When the central bank intervenes in the foreign-exchange market and acquires dollars with yuan, it is assumed to convert those dollars into U.S. Treasury securities by purchasing them directly from the U.S. Federal Reserve.⁷ It is important to keep in mind that intervention is carried out by the Chinese authorities rather than the Americans. As they do so, the level of China's reserves will be changing, but in equilibrium there is no ongoing intervention in this scenario. In equilibrium, autonomous current account imbalances are exactly offset by autonomous financial flows. In this instance, R^C and hence H are clearly endogenous.

2.1 Monetary Policy

As before, a monetary expansion tends to put upward pressure on U.S. GDP and downward pressure on U.S. interest rates, causing deterioration in both current accounts and in both financial accounts. The Chinese authorities intervene in the foreign-exchange market by supplying yuan in exchange for dollars and use those dollars to purchase U.S. Treasury securities from the Fed. As a result, U.S. money supply shrinks until the initial rise in money supply due to the Fed's expansionary policy has been eliminated (as indicated by the westward arrow in Figure 3) and interest rates and GDP have returned to their original levels. The monetary policy is completely ineffective in the pursuit of higher levels of output and employment.

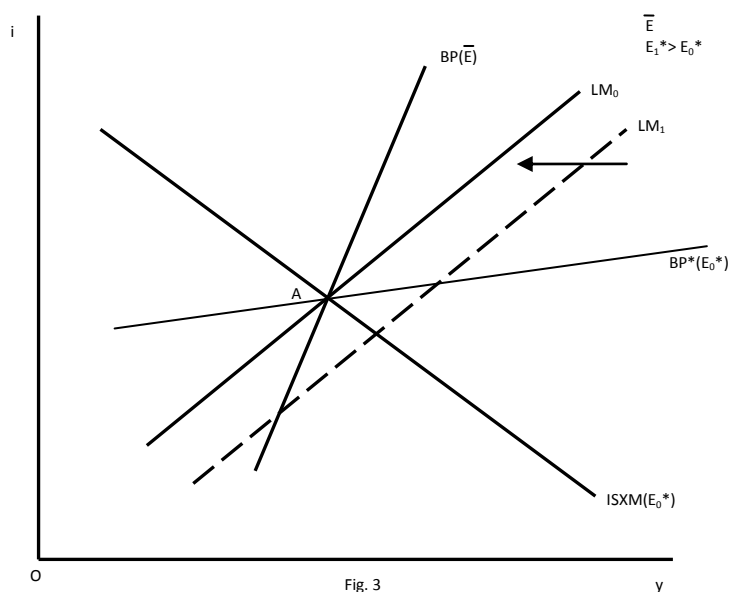


Fig. 3

It is worth noting in view of the flexibility of the dollar-euro rate, that the immediate effect of the policy is to push the rate up as it did in Figure 1. However, that higher rate and its effects on domestic income and employment is not sustainable, given the current account deficit with China, whose exchange-market intervention continues until the money supply has returned to its initial level.

While the end result is to an extent typical of fixed-rate regimes, the novelty here is that it occurs in the context of a free float between the dollar and the euro. The dollar depreciation against the euro, which would take place under floating rates, is prevented by the exigencies of a mixed-rate regime. The Chinese policy of pegging against the dollar has the effect of immobilizing the dollar against the euro. China's unilateral decision to attach its currency to the dollar prevents the U.S. from enjoying the benefits of monetary expansion under floating rates. In this situation, intervention by the Chinese central bank effectively makes the U.S. a non-floater.

2.2 Fiscal Policy

As before, a fiscal expansion shifts ISXM out and raises both GDP and the rate of interest. With high capital mobility between the U.S. and Europe, the resulting improvement of the financial account dominates the deterioration of the current account. The dollar appreciates against the euro, which shifts the ISXM and BP* curves in Figure 4 to the left, thereby reducing the potency of the fiscal expansion in the pursuit of high domestic output and employment. Meanwhile, the U.S. balance of payments with China deteriorates, because bilateral current account worsening exceeds bilateral financial account improvement. The Chinese authorities intervene to prevent the yuan from appreciating and then recycle the dollars acquired back to the U.S. by purchasing U.S. Treasury

securities directly from the Fed. U.S. money supply shrinks, causing the LM curve to shift left in Figure 4. This reduction of liquidity has the effect of further limiting the expansion of output and employment.

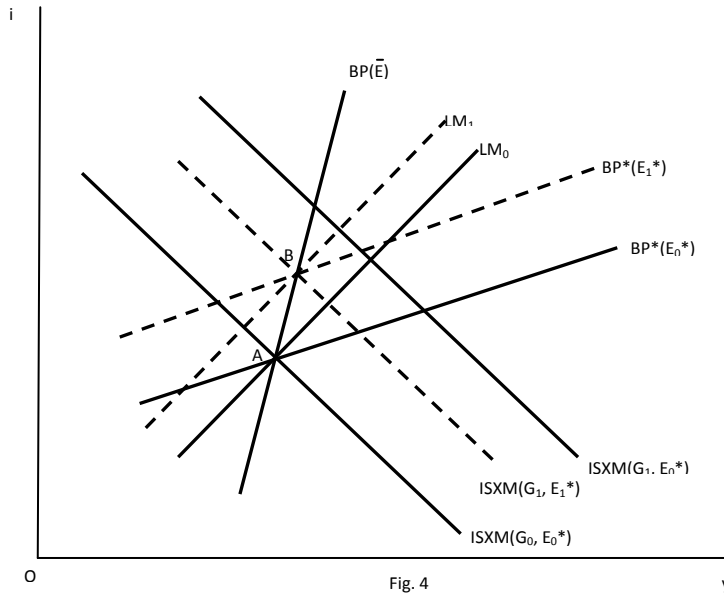


Fig. 4

3. The Foreign Central Bank Asserts Control over the U.S. Money Supply

In this section, we assume that the Chinese authorities recycle intervention dollars directly into the U.S. financial system by purchasing Treasury securities from the public. In other words, the Chinese conduct “open-market operations” in the U.S. which have the effect of sterilizing the contractionary impact of their foreign-exchange market interventions on U.S. money supply.⁸

3.1 Monetary Policy

We now rewrite equation (4) as follows:

$$T(y^c, y) + K^C(i, i^c) + R^C = 0, \tag{4a}$$

where R^C represents the ongoing official capital inflow from China. It means that any excess demand or supply in the bilateral autonomous balance of payments is automatically accommodated by the Chinese authorities. In other words, the autonomous imbalance is made “permanent” by this recycling policy.

A U.S. monetary expansion shifts the LM curve out in Figure 5 and puts upward pressure on output and downward pressure on interest rates, worsening both current and capital accounts vis-à-vis Europe. The dollar depreciates against the euro, which enhances the effect of the monetary policy on output and employment. (The BP* curve shifts down to the right and the ISXM curve shifts out.)

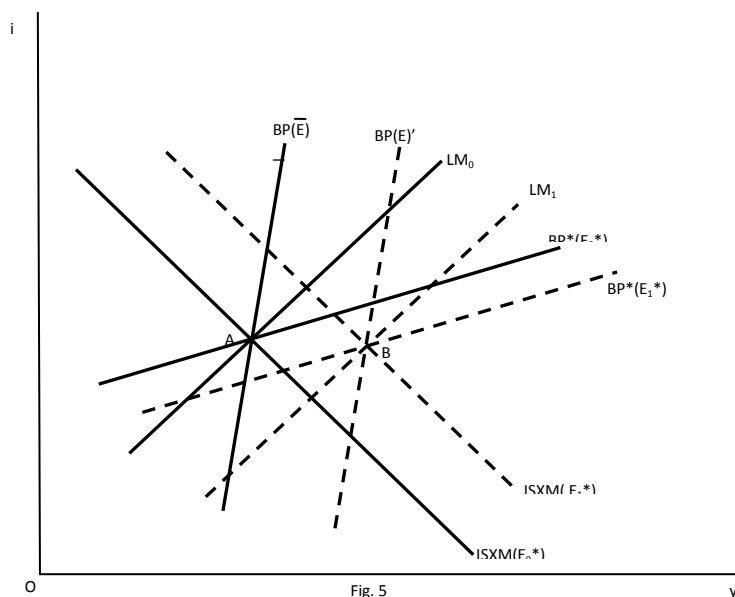


Fig. 5

The U.S. current account with China also moves into deficit and the bilateral autonomous financial account deteriorates as well. But this overall deterioration in the bilateral autonomous balance of payments is accommodated by dollar accumulation on the part of the Chinese central bank. The BP curve moves down to the right. The gap between the initial and new BP curves reflects the extent of the deficit in the autonomous balance of payments between the U.S. and China that must be financed by the ongoing inflow of official capital from China. At point B, a “permanent” payments deficit with China is financed by official Chinese accumulation of dollar-denominated securities.

3.2 Fiscal Policy

A fiscal expansion in the U.S. shifts the ISXM curve to $ISXM(G_1^*, E_0^*)$ in Figure 6, tending to raise output and interest rates. The dollar appreciates against the euro, given the assumed high capital mobility between the U.S. and Europe. The appreciation to E_1 shifts the BP^* curve up and to the left and the ISXM curve moves back inward. These adjustments reflect a weakening of the effectiveness of the fiscal expansion.

With respect to China, the bilateral current account deteriorates and the financial account improves. The net effect is a deficit in the autonomous balance of payments with China. The central bank of China prevents the incipient appreciation of the yuan by intervening in the foreign exchange market. It then recycles the dollars acquired in the process back into circulation in the U.S. by purchasing U.S. Treasury securities from the public. The imbalance in bilateral payments is made permanent by this move and China continues to accumulate claims against the United States. Once again, the automatic adjustment

mechanism has been shut down and the ongoing payments deficit is financed by Chinese reserve accumulation.

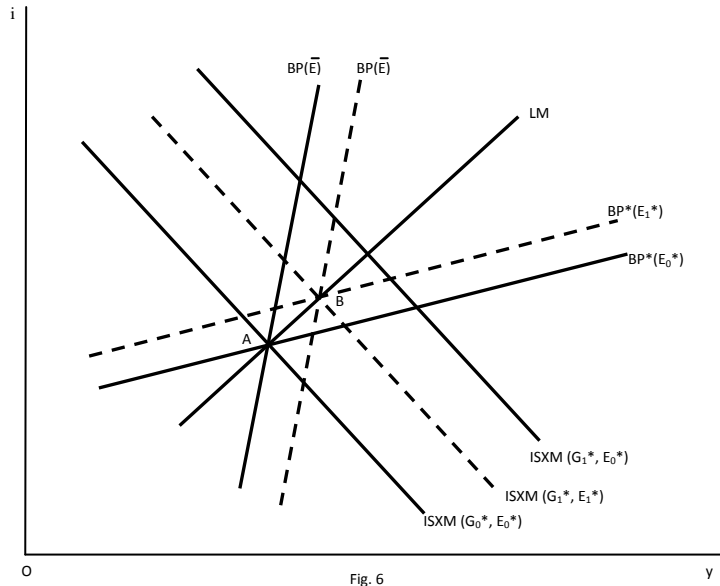


Fig. 6

4. Conclusion

In this mixed-regime model, the United States is neither a clear floater nor a full fixer, a condition which has ramifications for the effectiveness of monetary and fiscal policies in the context of cyclical stabilization. This paper has used a modified open-economy macro model to examine the implications. In an initial section, policy effectiveness is examined in the context of full flexibility of both exchange rates. The results are broadly consistent with the well-known benchmark model. However, high capital mobility between the U.S. and Europe, combined with low mobility between the U.S. and China, causes the two exchange rates to move in opposite directions in reaction to a fiscal expansion, with offsetting effects on policy effectiveness.

The paper next explores the case of a pegged yuan in the context of two scenarios. In the first, China recycles dollars absorbed in the process of exchange-market intervention by purchasing U.S. Treasury securities directly from the Fed, while in the second scenario the securities are purchased from the public. This allows China's pegging and recycling operations to "interfere" with the macro adjustment process within the United States. For example, even though the dollar is nominally free to fluctuate against the euro, the fact that China fixes the dollar-yuan rate "freezes" the dollar-euro rate. In another example, China's purchases of U.S. Treasury securities from the public essentially shut down the automatic adjustment mechanism associated with fixed rates.

5. Notes

1. Sven W. Arndt is Charles M. Stone Professor of Money, Credit and Trade at Claremont McKenna College. Comments from Tony Cavoli, and from participants at the meetings of the 2010 Asia Pacific Economics Association in Hong Kong and of the 2011 International Trade and Finance Association in Denver are gratefully acknowledged. Thanks to Saumya Lohia and Hao Tang for valuable research assistance and to the Financial Economics Institute at Claremont McKenna College for generous research support. Sven W. Arndt, Claremont McKenna College, Claremont, California 91711, sarndt@cmc.edu

2. According to the IMF (2008), the U.S. operates an “independently floating” exchange-rate regime. The evidence shows that this is so both *de jure* and *de facto*. China’s regime is classified as a “fixed peg,” meaning no bands. For more on the ongoing debate over exchange-rate arrangements, see Levy-Yeyati and Sturzenegger (2005), Reinhart and Rogoff (2004) and Shambaugh (2004).

3. In the Bretton-Woods system, rates were fixed in a coordinated, consensual manner, with each country committed to the defense of the agreed-upon rates. In the present case, China fixes to the dollar unilaterally. While China is not the first country to have done so, it is the first country large enough to generate serious repercussions for the U.S.

4. We use this model as the benchmark model because it is well-known. It is the model found in most undergraduate and graduate textbooks and it is the paradigm widely used by contemporary policy makers. That does not always make it the best analytical tool. Alternative model choices would include the New Open Economy Macro Models as expounded by Obstfeld (2001), Obstfeld and Rogoff (1995), Lane (2001) and Corsetti (2007) and the portfolio-balance model (Frankel, 1993; Devereux and Sutherland, 2007).

5. Production networking and processing trade between China and the U.S. may reduce the response of the trade balance to changes in certain variables, including the exchange rate and domestic GDP (Arndt (2010)).

6. It is important to note that many countries in Asia fix their currencies to the dollar; others price their exports in dollars. Many are participants in international production networks that either feed end products to the United States or engage the U.S. in reciprocal components trade. These linkages have implications for exchange-rate and macro adjustment. (See, for example, Arndt and Huemer, 2007.)

Suppose, for example, that China allows the yuan to float against the dollar, but that Singapore fixes its currency against the dollar. Then a yuan appreciation against the U.S. dollar is also a yuan appreciation against the Singapore dollar. The U.S. dollar price of end products from China rises, but the yuan price of components from Singapore falls and with it the cost of end-product exports to the United States. If Chinese value-added contained in Chinese exports is small, then dollar depreciation against the yuan has repercussions only for a small part of the price of end-products from China. The effect of exchange-rate changes on the trade balance is reduced and with it the shift of BP due to a given exchange-rate shock.

7. We assume for simplicity that China pegs solely to the U.S. dollar and that it is a peg without bands. In reality, China is believed to operate a basket peg, with

the dollar the dominant currency. China also has allowed the actual rate of the yuan to fluctuate. These departures from our simple peg will affect the magnitudes of various outcomes, but not the essential story. For further discussion of China's exchange-rate policy, see Frankel and Wei (2007).

8. In this section, we assume that sterilization is complete. A more realistic case would lie somewhere between this and the preceding scenario. See Obstfeld (1982) and Sarno and Taylor (2001), for example, for further discussion of the effectiveness of sterilization.

9. The fact that many of the components imported by China from third countries are incorporated into China's final-product exports implies that the "bilateral" current account deficit between the U.S. and the People's Republic is in reality a U.S. deficit with a multiplicity of countries. Indeed, only a relatively small part of the value of the trade imbalance between the U.S. and China is directly attributable to China as opposed to the countries that supply China with components and intermediate products. The importance of "processing" trade in China's overall trade is expertly examined in Xing (2011).

6. References

- Arndt, S.W., (2010), "Intra-industry Trade and the Open Economy", *Korea and the World Economy*, December, 11(2), 1-18.
- Arndt, S.W. and Huemer, A., (2007), "Trade, Production Networks and the Exchange Rate", *Journal of Economic Asymmetries*, June, 4(1), 11-39.
- Corsetti, G., (2007), "New Open Economy Macroeconomics", *CEPR Discussion Papers*, November.
- Devereux, M.B. and Sutherland, A., (2007), "Monetary Policy and Portfolio Choice in an Open Economy Macro Model", *Journal of the European Economic Association*, April-May, 5(2-3), 491-499.
- Frankel, J.A., (1993), "Monetary and Portfolio-Balance Models of the Determination of Exchange Rates", in J.A. Frankel, *On Exchange Rates*, Cambridge, MA: MIT Press, 95-115.
- Frankel, J.A. and Wei, S.-J., (2007), "Assessing China's Exchange Rate Regime", Cambridge, MA: National Bureau of Economic Research, Working Paper No. 13100.
- International Monetary Fund, (2008), "De Facto Classification of Exchange Rate Regimes and Monetary Policy Framework", April.
- Lane, P., (2001), "The New Open Economy Macroeconomics: A Survey", *Journal of International Economics*, August, 54(2), 235-266.
- Levy-Yeyati, E. and Sturzenegger, F., (2005), "Classifying Exchange Rate Regimes: Deeds vs. Words", *European Economic Review*, August, 49(6), 1603-1635.
- Obstfeld, M., (1982), "Can We Sterilize? Theory and Evidence", *American Economic Review*, May, 72 (2), 45-50.
- Obstfeld, M., (2001), "International Macroeconomics: Beyond the Mundell-Fleming Model", *IMF Staff Papers*, Special Issue: IMF Annual Research Conference.
- Obstfeld, M. and Rogoff, K., (1995), "Exchange Rate Dynamics Redux," *Journal of Political Economy*, June, 103(3), 624-660.

- Reinhart, C.M. and Rogoff, K., (2004), "A Modern History of Exchange Rate Arrangements: A Reinterpretation", *Quarterly Journal of Economics*, February, 119(1), 1-48.
- Sarno, L. and Taylor, M.P., (2001), "Official Intervention in the Foreign Exchange Market: Is It Effective and, If So, How Does It Work?" *Journal of Economic Literature*, September, 39(3), 839-868.
- Shambaugh, J.C., (2004), "The Effect of Fixed Exchange Rates on Monetary Policy." *Quarterly Journal of Economics*, February, 119(1), 301-352.
- Xing, Y., (2011), "Processing Trade, Exchange Rates and the People's Republic of China's Bilateral Trade Balances," Asian Development Bank Institute, Working Paper No. 270.

Regional Long-term and Short-term Unemployment and Education in Transition: The Case of Poland

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Abstract. This paper examines regional disparities in long-term (LTU) and short-term (STU) unemployment in Poland paying particular attention to the role of education. It analyses how: 1) LTU and STU vary across regions; and 2) differences in LTU and STU are affected by the type and level of education of the unemployed, as well as by other economic and structural variables. Regional variations in STU and LTU are much greater than for overall unemployment. Using regression analysis, we find that human capital as measured by type and level of education, as well as several other variables, is significantly related to regional unemployment rates. Coefficients and significance levels often differ depending on whether we are looking at LTU, STU or total U.

JEL Classification: J61, J64, J68, P23, P25, P36, R11, R12

Keywords: Transition, Poland, Short-term unemployment, Long term unemployment, Regional unemployment, Education, Vocational education, Human capital, Central and Eastern Europe

1. Introduction

Long-term unemployment has been a persistent problem in Central Europe even during periods of rapid economic growth. At the same time, unemployment rates have varied significantly across regions within countries, and this variation has persisted over time. The related problems of regional and long-term unemployment continue to be important policy issues. As Huber (2007) points out,

“...regional mismatch of workers and work opportunities may be a cause of high and persistent unemployment and ... substantial funds are devoted to subsidizing poorer regions with the aim of reducing regional disparities. Thus understanding the workings of regional labor markets in transition may be an important contribution to combating national unemployment and may help to increase the efficiency of regional as well as labor market policy (p. 263).”

Researchers have analyzed the determinants of regional unemployment in an attempt to explain this variance across regions. However, regional unemployment patterns have not been disaggregated in order to understand how explanatory variables may affect long-term unemployment (LTU) and short-term unemployment (STU) differently at the regional level.² Although researchers have identified a number of variables that affect unemployment across regions, a particularly important factor is differences in human capital. (See for example, Jurajda and Terrell, 2009.) In this paper, we examine the role of education, by both type and level, in determining STU and LTU across regions in Poland. Other explanatory variables that reflect industrial structure, wages, housing, infrastructure, age and gender are also considered.

Poland was selected as the country for this study for several reasons. First, like many transition economies, it has experienced persistently high unemployment in certain regions of the country. Second, it is a large country with a relatively large population. Third, the country is divided into 16 regions (voivodships) for which detailed economic data are available.³ The approach of studying one country in detail is useful because (1) one can drill down into deeper subcategories by industry, location, and population characteristics than one typically does with multi-country studies, and (2) the regulatory and institutional environment in which economic activity is conducted (for example, income maintenance policy) is typically country-specific and often difficult to control for in multi-country studies.

Using cross-sectional data (by voivodship) in Poland from 2002 to 2009, we examine how LTU and STU vary across regions and over time as well as how regional LTU and STU respond to differences in the education of the unemployed and other economic and structural variables. Each of these variables may impact regional LTU and STU differently, and may even have opposite and offsetting effects on these two components of unemployment. Thus, studying aggregate unemployment alone may mask some important relationships. Our method is twofold. First, we document that LTU and STU vary more at the regional level than does the total unemployment rate (U), suggesting the need to analyze them separately. Second, using a fixed effects model with time dummy variables, we regress LTU, STU, and U on a set of explanatory variables. There is a separate equation for each dependent variable: LTU, STU and U. The explanatory variables include the education of unemployed workers by level and whether the education is general or vocational. A number of other variables, described in more detail later, that may affect unemployment are also included. We find that regression coefficients in the LTU equation are often different with respect to size, significance and sometimes even sign from those in the STU equation and from those in the total U equation and these results are robust to different specifications. Thus, we believe that this approach provides a better understanding of the underlying determinants of regional LTU unemployment and particularly the role of education.

The paper is organized as follows. Section 2 summarizes the relevant literature. Section 3 presents data describing the level and variation in total, long-term, and short-term unemployment across regions and time. Section 4 explains the econometric methodology and explanatory variables used to examine regional unemployment in both its aggregated and disaggregated forms.

Section 5 reports the results of our empirical analysis. Section 6 concludes and discusses some policy implications of these findings.

2. Review of Literature

Long-term unemployment in transition countries has been analyzed by many researchers.⁴ Studies at the national level frequently emphasize the long-term economic and social costs of high and persistent unemployment. (See, for example, Campos and Coricelli, 2002, Herzog, 2003, and Stiglitz, 2002.) Using national data, many researchers have shown that LTU in particular has been a large and persistent problem in Central Europe and in some cases in Western Europe as well. A 2006 World Bank Working Paper by Rutkowski states, "It is noteworthy, that in every EU transition economy the incidence of long-term unemployment is higher than the already high EU average (p. 24)." During the first decade of this century, the incidence of LTU (as a percent of total unemployment) reached 52 percent in Poland, 48 percent in Hungary, 55 percent in the Czech Republic, and 73 percent in Slovakia, compared to 31 percent in the G7 and 29 percent in the US. With the spread of the "great recession" from 2008 to 2009, the spectre of even more unemployment was a concern. Poland did quite well through this period with LTU rates falling. Although the incidence of LTU fell in Poland, this was partly due to the flow of new workers into unemployment (Mondschean and Oppenheimer (2010) p.32). Tvrdon (2011) identifies vulnerable groups including people older than 55, women and youth and describes the link between long-term unemployment, social exclusion and poverty. Revenga (2002) also documents this relationship and argues that unemployment policies have historically been focused on addressing short-term unemployment, and may be inadequate for addressing many of the issues that arise when unemployment duration is high.

There are several potential explanations for why high long-term unemployment rates at the national level may persist even in the presence of economic growth. These include the impact of technological change, international trade, obsolescence of skills, regional immobility, and government policies such as non-employment benefits, taxes and regulations. In Central Europe, the situation is even more complex because labor markets face the additional challenges of disruptions caused by the economic transition from communism to capitalism and, for some countries, the transition into the European Union and/or the Euro. Education and skill development have also played an important role. For example, Lamo, Messina and Wasmer (2006) provide evidence that labor market reallocation in Poland has been hampered by a relatively large amount of earlier investment in specific skills under Communism (in particular vocational education at that time) as opposed to investment in general skills. Winiecki (2008) emphasizes the continuing effect of Communism on what he calls transition structural unemployment. He describes the low-skill bias under the communist system which raised demand for blue-collar and less skilled workers. Combined with narrow wage differentials, there were few incentives to increase education. This left a large number of workers unprepared for the structural changes in demand in a market economy. Transition, globalization and technological change have been skill-based, raising demand for skilled workers (Jurajda and Terrell, 2009). Kupets

(2006) finds that an individual's education is a key factor in explaining unemployment duration in the Ukraine while Borsic and Kavkler (2009) find the same general relationship in Slovenia. However, Borsic and Kavkler find an exception in that unemployed persons with a master's degree are at some disadvantage relative to people with a bachelor's degree or a professional college degree (p. 153). Other key factors cited in one or both studies are age, marital status, income while unemployed, city size and gender. In a study of unemployment and earnings in Latvia, Hazans (2005) finds that, "education matters most" and describes the magnitude of this effect as impressive (p. 22).

Rutkowski (2007) argues that the misallocation of capital investment during central planning, some of which continued after the fall of Communism, may have exacerbated structural unemployment in these countries. He also finds that a large percentage of employment in agriculture is contributing to an underutilization of labor. In an analysis of Slovenia, Senjur (2009) describes two periods of transition, the transition crisis and transition rehabilitation. Senjur also sees the transition as requiring major changes in labor markets due to characteristics of the earlier system. Gabrisch and Buscher (2006) examine the relationship between output and unemployment in several countries. They find that, "the unemployment rate has been responding to changes in output since the late 1990s, which provides evidence that the process of transition has been completed (p. 274)." However, they find that Poland and Slovakia are exceptions. In the case of Poland they believe the cause is the productivity increases in the relatively large agricultural sector, which has released more labor into the market (p. 270). Wolnicki (2006) describes "jobless growth" in Poland; Onaran (2008) examines "jobless growth" in the manufacturing industry in Central and Eastern Europe. He reports that even when output is growing, labor demand in some cases has responded very little, and sometimes not at all. Furthermore, employment did not respond to wages in more than half of the cases that he studied. Mondschean and Oppenheimer (2006) also discuss how increasing labor productivity slowed the growth of labor demand in Central Europe.

In a cross-country study, Fialova and Schneider (2009) examine the relationship between current labor market institutions and unemployment in 19 EU countries, including the Czech Republic, Hungary, Poland and Slovakia. They find that national unemployment and LTU rates decrease with active labor market policies and increase with labor taxes. Boeri and Terrell (2002) also consider the importance of institutions. They look at the roles of unions, tax-based incomes policies, minimum wages, employment protection legislation, and programs for the unemployed (nonemployment benefits). They conclude that it was the last category that most affected the flow of labor from old to new sectors. Feldmann (2005) uses surveys of business executives in a number of transition countries to assess the importance of these types of institutions. He finds that high minimum wages, strict regulations on working time, hiring and firing, strong unions and confrontational industrial relations all raise unemployment, especially for low skilled workers, young workers, women and the long-term unemployed. Kajzer (2007) reviews labor market regulations and other labor market policies and their relation to unemployment in Slovenia. In a volume devoted to structural unemployment in Europe (Werding, 2006), Nickell

discusses models of long-run equilibrium unemployment rates and pays particular attention to how institutions explain much of the variation in unemployment rates over approximately two decades.

In addition to the above studies of LTU at the national level, the literature devoted to regional unemployment in Central Europe shows that regional disparities are large and persistent. For example, in a study of unemployment in Poland and the Czech and Slovak Republics, Tyrowicz and Wojcik (2010) document that, "regional differentials seem to be highly persistent, which strongly undermines the effectiveness of the cohesion policies implemented over the last decade (p. 6)." Going back further, Rutkowski and Przybyła (2002) report that regions with high unemployment in 1993 were also likely to have had high unemployment in 2001. Ferragina and Pastore (2006) continue to find "dramatic and persistent spatial differences (p.34)." They describe two general types of explanations for this persistence: rapid and varied structural changes (demand factors); and market rigidities (supply factors) which limit the mobility of labor. In a later paper (2008), the same authors conclude that the optimal speed of transition (OST) literature suggests that gradual restructuring can lead to lower unemployment. Newell and Pastore (2006) also find a positive relation between industrial restructuring and regional unemployment in Poland. They also consider the age distribution of the unemployed and find that, "middle-aged workers in high unemployment regions have almost no greater job security than young workers.... Thus, in high-unemployment regions, the risk of unemployment does not diminish with age, as is normally the case (p. 16)." Newell (2006) also emphasizes the importance of workers' education and skills as a determinant of regional unemployment in Poland. As mentioned above, Jurajda and Terrell (2009) emphasize human capital; they find that regional differences in human capital are very important. Not only is unemployment higher for less skilled workers, but they report that low skilled workers are less likely to migrate while high-skilled workers tend to migrate to locations where unemployment is already low. Thus, migration does not serve as a mechanism to equate unemployment rates across regions. Luo (2007) looks at age and education in regions of Croatia and concludes that much of the regional disparity is associated with differences in human capital endowment.

Bornhorst and Commander (2006) study regional unemployment in six transition countries and report that regions with low unemployment have higher net migration rates; however, the relationship tends to be weak, suggesting limited labor mobility (p. 284). Fidrmuc (2004) also concludes that labor mobility has played a very limited role in reducing interregional differences in unemployment and earnings in Central Europe. In his survey, Huber (2007) confirms that regional disparities in transition countries were stable over time and that migration tends to be low. He also finds that regions that are closer to the EU and regions that include the capital city generally did better than other regions within a country. This is consistent with studies of Latvia (Hazans, 2005) and Ukraine (Kupets, 2006) which demonstrated that capital cities or large cities showed greater employment opportunities. Barjak (2001) found similar results for regions with large cities in East Germany and Poland. Capital cities and large cities are likely to have better qualified labor and participate more in technical progress; they benefit from an agglomeration effect which allows firms

to profit from specialization and external economies as well as lower recruitment costs. These findings further support the observation by Jurajda and Terrell (2009) that, “A new literature on EU and US research has oriented researchers away from thinking that mobility of labor and capital might equilibrate unemployment and wages across regions. The new economic geography literature stresses the possibility that spatial concentration of production factors may lead to self-enforcing spatial divergence (p. 244).”

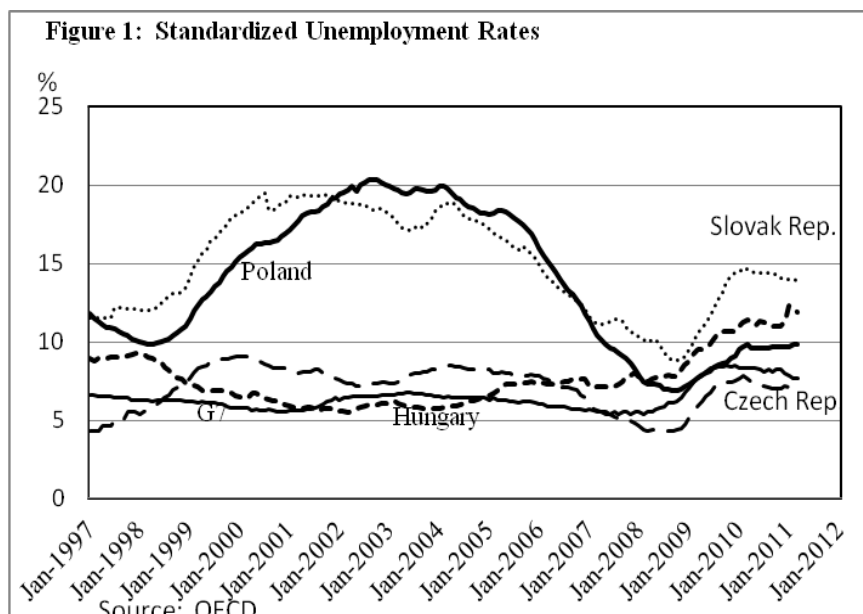
A number of authors have identified the scarcity of housing as a cause of labor immobility. (See, for example, Deichmann and Henderson, 2000) and Ghatak, Mulhern and Watson, 2008.) Other authors have considered how wage rigidities may limit labor mobility. However, Huber (2007) finds that wages tend to be more flexible in transition countries than in most European markets. Bornhorst and Commander (2006) also report some wage flexibility, with lower wage growth associated with greater increases in unemployment, although this relationship is significant only in the Czech Republic and Hungary and not, for example, in Poland (p.282). The literature that explores the relationship between regional unemployment and wages goes back a long way but generally does not distinguish LTU from STU, Blanchflower and Oswald (1994) identified the wage curve, a negative relationship between regional wage levels and regional unemployment rates as did Card (1995). Since then other authors have examined this relationship in other countries including those in Central and Eastern Europe. Important examples are Bellmann and Blien (2001), Blanchflower (2001), Blanchflower and Oswald (1994, 1995, 2005), Iara and Traistaru (2004), Galuscak and Munich (2005), and Yamaguchi (2008).⁵

To summarize, many authors have analyzed persistent disparities in regional unemployment without examining the differences between short- and long-term unemployment. Those who have examined unemployment by duration have done so at the national level. Unlike these other studies, this paper explicitly examines the pattern and determinants of regional LTU and STU. We are particularly interested in studying how the level and type of education of the unemployed affects LTU and STU, controlling for other variables that can affect unemployment. We contend that the underlying determinants of long-term and short-term unemployment may be quite different at the regional level, and use regression analysis to test this hypothesis. If we are correct, then we believe that policies to address unemployment would be more effective if they took into account not only duration and regional factors, but also the different determinants of LTU and STU.

3. Regional Variation in Long-Term and Short-Term Unemployment Rates

Time series data for Poland’s national unemployment rate compared with other countries are displayed in Figure 1. In the early 1990s, the transition to a market-oriented economy had resulted in high unemployment with the downsizing and/or closing of many unproductive enterprises. During the middle of the decade, economic growth picked up, causing unemployment to decline to a rate of around 10 percent, but also generated high and persistent inflation. Beginning in 1998, the National Bank of Poland began to fight inflation more aggressively, and that, combined with the Russian economic crisis of 1998 that severely affected Polish exports to the East and a global economic slowdown in

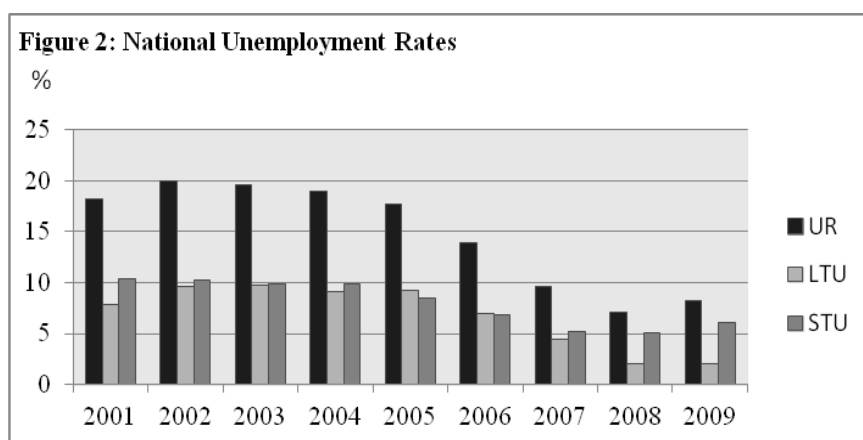
2001, led to unemployment rates exceeding 20 percent of the workforce. Unemployment remained in the 18-20 percent range through 2004. Subsequently, Poland experienced rapid economic growth and a drop in the jobless rate to 7.1 percent in 2008. As Figure 1 indicates, however, unemployment remained substantially higher than in the G7 countries or even in the Czech Republic through most of the past 15 years.



Since the global recession began, however, unemployment has trended upward in all these countries. In 2004, Hungary had the lowest unemployment rate (approximately 6 percent) among the CE4 countries and even lower than the G7. Subsequently, unemployment started to rise even though it was continuing to fall in the other countries. The financial crisis hit Hungary hard because many households and firms had taken out loans denominated in US dollars or Euros, and the depreciation of the forint increased the burden of these debts on the Hungarian economy. Hence, the unemployment rate rose to 12 percent by early 2011. The Slovak economy, which had grown rapidly fuelled by exports to Western Europe, suffered from a rapid decline in trade that resulted in the unemployment rate increasing from 9 percent in late 2008 to 14 percent by early 2011. Poland's unemployment rate also rose during the recession, from around 7 percent in 2008 to just under 10 percent by early 2011. Of the four countries shown in Figure 1, the Czech Republic had consistently lower unemployment rates than the others, and the impact of the recession was mildest in the sense that the unemployment rate rose by approximately 2.5 percentage points, although this increase was still larger than for the G7 countries on average.

Annual data from the 2002-2009 period (which is the focus of this study) for total, LTU and STU in Poland are shown in Figure 2. From 2002 to 2007, the unemployment rate began to decline, but long-term unemployment continued

to represent approximately half of the jobless in Poland. As the recession led to layoffs, however, more short-term unemployed were created and the proportion of LTU fell significantly in 2008 and 2009.



Source: Polish Statistical Office: *Statistical Yearbooks of the Regions – Poland*, published 2002-2010 and authors' calculations.

Tables 1A, 1B and 1C report unemployment rates by voivodship over the same period. These data show the substantial decline in all three rates across all regions during this period. However, these tables also show that the regional declines in jobless rates varied substantially. While the national unemployment rate fell by 11.8 percentage points from 2002 to 2009, declines in regional unemployment rates ranged from 6.9 to 17.5 percentage points. For long-term unemployment, the national average dropped by 7.6 percentage points from 9.6 percent to 2.1 percent between 2002 and 2009; however, over the same period, the decline ranged from 3.8 percentage points to 11.3 points depending on the region. The variation in performance was even more pronounced for short-term unemployment rates. From 2002 to 2009, the national jobless rate for those out of work for less than one year fell by 4.2 percentage points, while the decline ranged from 9.8 points to an *increase* of 1.8 points.

Table 1A: Total Unemployment Rates by Voivodship (%)

Location	2002	2003	2004	2005	2006	2007	2008	2009	2002-2009
POLAND	19.9	19.6	19.0	17.7	13.8	9.6	7.1	8.2	-11.8
Dolnoslaskie	26.1	26.0	24.9	22.8	17.1	12.6	9.1	10.1	-16.0
Kujawsko-pomorskie	21.5	21.9	22.1	19.8	16.1	11.3	9.1	10.4	-11.1
Lubelskie	16.5	16.0	16.7	14.3	12.8	9.5	8.8	9.7	-6.9
Lubuskie	26.3	24.6	23.2	19.1	13.8	9.7	6.5	9.6	-16.8
Lodzkie	20.3	19.7	18.8	17.4	13.4	9.3	6.7	7.6	-12.7
Malopolskie	16.2	18.0	17.2	15.2	12.5	8.5	6.2	8.0	-8.2
Mazowieckie	17.0	16.3	14.6	14.8	12.2	9.1	6.0	6.0	-11.0
Opolskie	19.7	18.4	17.8	17.0	13.2	9.5	6.6	9.8	-9.9
Podkarpackie	18.2	17.8	16.7	16.6	13.6	9.5	8.2	10.0	-8.2
Podlaskie	16.9	17.9	15.6	14.3	11.4	9.0	6.4	7.1	-9.7
Pomorskie	21.5	20.5	20.2	18.9	13.5	9.5	5.5	6.4	-15.1
Slaskie	20.1	20.3	19.3	19.0	14.1	8.1	6.6	6.7	-13.4
Swietokrzyskie	18.9	19.1	20.6	19.0	15.6	12.0	8.8	10.9	-8.0
Warmińsko-mazurskie	26.0	24.0	22.3	20.4	16.0	10.5	7.5	8.5	-17.5
Wielkopolskie	18.2	17.1	18.2	17.2	12.7	8.3	6.1	7.5	-10.7
Zachodniopomorskie	26.1	25.6	23.8	22.7	17.1	11.4	9.6	10.3	-15.7
Standard Deviation	3.67	3.30	3.10	2.68	1.78	1.34	1.36	1.61	
Mean	20.60	20.20	19.50	18.04	14.07	9.85	7.34	8.65	
Coefficient of Variation	0.18	0.16	0.16	0.15	0.13	0.14	0.19	0.19	
Highest/Lowest	1.63	1.63	1.71	1.60	1.51	1.57	1.76	1.81	

Source: Polish Statistical Office: *Statistical Yearbooks of the Regions – Poland*, 2002-2010 and authors' calculations

Table 1B: Long-term Unemployment Rates by Voivodship (%)

Location	2002	2003	2004	2005	2006	2007	2008	2009	2002-09
POLAND	9.6	9.8	9.1	9.3	7.0	4.4	2.1	2.1	-7.6
Dolnoslaskie	12.1	12.4	11.0	11.1	8.5	6.0	2.3	2.1	-10.0
Kujawsko-pomorskie	10.0	10.8	10.4	10.6	9.6	5.9	2.9	2.4	-7.6
Lubelskie	6.8	7.2	7.0	6.7	5.6	4.3	2.4	3.0	-3.8
Lubuskie	10.4	8.7	7.2	5.9	3.7	2.7	1.6	2.0	-8.4
Lodzkie	11.9	11.1	10.7	10.2	7.9	4.7	2.5	2.0	-9.8
Malopolskie	8.4	10.2	10.3	9.8	6.8	4.4	2.1	2.6	-5.8
Mazowieckie	8.4	8.9	7.4	7.6	5.6	3.3	1.1	1.2	-7.1
Opolskie	9.1	8.7	7.6	7.6	5.1	3.5	1.5	1.6	-7.5
Podkarpackie	11.4	9.6	8.2	7.8	5.4	3.0	2.1	1.7	-9.7
Podlaskie	8.9	10.4	8.7	7.8	5.5	4.8	2.1	2.4	-6.4
Pomorskie	6.7	7.0	6.6	7.9	5.7	3.3	1.2	0.9	-5.8
Slaskie	11.1	10.3	10.5	10.8	7.3	4.2	1.8	1.7	-9.5
Swietokrzyskie	9.1	10.0	11.0	11.2	9.0	6.7	2.8	3.5	-5.6
Warmińsko-mazurskie	13.7	15.2	12.1	12.2	9.6	5.8	2.5	2.4	-11.3
Wielkopolskie	7.4	6.7	7.0	9.4	7.5	4.1	2.7	2.5	-4.9
Zachodniopomorskie	11.7	11.4	10.0	9.4	8.4	5.9	2.9	3.1	-8.6
Standard Deviation	3.67	3.30	3.10	2.68	1.78	1.34	1.36	1.61	
Mean	20.60	20.20	19.50	18.04	14.07	9.85	7.34	8.65	
Coefficient of Variation	0.18	0.16	0.16	0.15	0.13	0.14	0.19	0.19	

Source: Polish Statistical Office: *Statistical Yearbooks of the Regions – Poland*, 2002-2010 and authors' calculations

To further examine the variability of U, STU, and LTU across regions and time, we measure the variation in all three unemployment rates using the coefficient of variation and the ratio of the highest to lowest rate across regions. Figures 3 and 4 show the results. In each year, both the coefficient of variation and the high-low ratio were lower for total unemployment than for either STU or LTU.

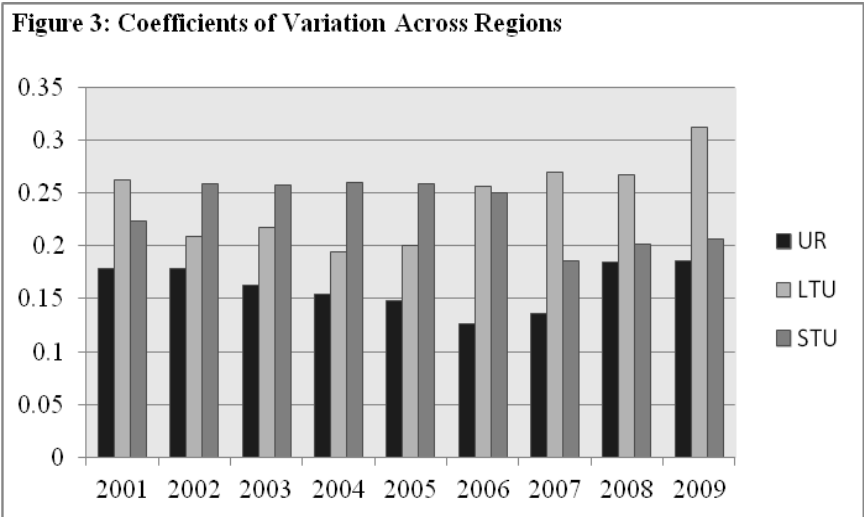
Table 1C: Short-Term Unemployment Rates by Voivodship (%)

Location	2002	2003	2004	2005	2006	2007	2008	2009	2002-09
POLAND	10.3	9.9	9.9	8.5	6.9	5.2	5.1	6.1	-4.2
Dolnoslaskie	14.0	13.6	13.9	11.8	8.6	6.7	6.8	7.9	-6.1
Kujawsko-pomorskie	11.5	11.1	11.7	9.2	6.6	5.4	6.2	8.0	-3.5
Lubelskie	9.7	8.8	9.6	7.6	7.2	5.2	6.4	6.6	-3.1
Lubuskie	16.0	15.9	16.1	13.2	10.1	7.0	4.9	7.6	-8.4
Lodzkie	8.5	8.6	8.1	7.2	5.5	4.6	4.1	5.6	-2.9
Malopolskie	7.8	7.8	6.9	5.4	5.7	4.2	4.0	5.4	-2.4
Mazowieckie	8.7	7.4	7.2	7.1	6.6	5.7	4.9	4.8	-3.9
Opolskie	10.5	9.7	10.3	9.5	8.0	6.0	5.1	8.2	-2.4
Podkarpackie	6.8	8.1	8.5	8.8	8.2	6.6	6.1	8.3	1.5
Podlaskie	8.0	7.5	6.9	6.6	5.9	4.2	4.3	4.7	-3.3
Pomorskie	14.8	13.6	13.6	11.0	7.9	6.2	4.3	5.5	-9.3
Slaskie	9.0	9.9	8.8	8.2	6.8	3.8	4.8	5.1	-3.9
Swietokrzyskie	9.8	9.1	9.7	7.8	6.5	5.3	6.0	7.3	-2.4
Warmińsko-mazurskie	12.2	8.8	10.2	8.2	6.4	4.6	5.0	6.0	-6.2
Wielkopolskie	10.8	10.4	11.1	7.7	5.2	4.1	3.4	5.0	-5.8
Zachodniopomorskie	14.4	14.2	13.8	13.3	8.7	5.6	6.7	7.2	-7.2
Standard Deviation	3.67	3.30	3.10	2.68	1.78	1.34	1.36	1.61	
Mean	20.6	20.2	19.5	18.0	14.0				
Coefficient of Variation	0	0	0	4	7	9.85	7.34	8.65	
Highest/Lowest	0.18	0.16	0.16	0.15	0.13	0.14	0.19	0.19	
	1.63	1.63	1.71	1.60	1.51	1.57	1.76	1.81	

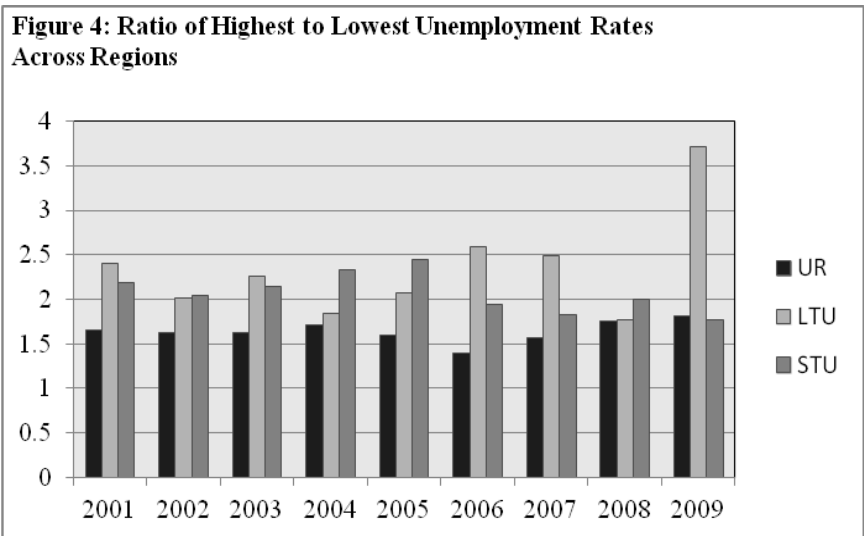
Source: Polish Statistical Office: *Statistical Yearbooks of the Regions – Poland* 2002-2010 and authors' calculations

One can also observe that variations in both STU and LTU in Poland have been persistent over time even when national unemployment is falling. Despite a general decline in total unemployment between 2002 and 2007, the coefficient of variation for LTU actually increased in 2006 and 2007 to a level even higher than in 2001. It is also worth noting that the coefficient of variation for LTU continued to rise in 2009, suggesting further discrepancies across regions in LTU in the wake of the recession. For STU, the coefficient of variation declined markedly in 2007; nevertheless, it was still well above the figure for total unemployment. The variation rose slightly in 2008 and 2009, so over the period we study, the coefficients of variation for both short- and long-term unemployment were highest in 2009. The results for the high-low ratio are

qualitatively similar, though the effect on LTU was much greater using this measure of dispersion than for STU. Thus, it appears that combining the short-term and long-term into the overall rate masks some of the story of regional variation. The next step is to find out whether LTU and STU relate differently to a set of explanatory variables.



Source: Polish Statistical Office: *Statistical Yearbooks of the Regions – Poland*, 2002-2010 and authors' calculations.



Source: Polish Statistical Office: *Statistical Yearbooks of the Regions – Poland*, 2002-2010 and authors' calculations.

4. Determinants of Regional Long-Term and Short-Term Unemployment Rates: Methodology and Explanatory Variables

We posit that regional LTU and STU respond differently to some key economic and structural variables, including the level and type of education of unemployed workers, with coefficients *differing with respect to significance, size and possibly even sign*. To test this hypothesis we use a panel data regression model with and without time fixed effects to estimate the following equations:

$$LTU_{it} = \alpha_L + \gamma_t + \beta_L X_{it} + \varepsilon_{it} \quad (1)$$

$$STU_{it} = \alpha_S + \gamma_t + \beta_S X_{it} + \varepsilon_{it} \quad (2)$$

$$U_{it} = \alpha_T + \gamma_t + \beta_T X_{it} + \varepsilon_{it} \quad (3)$$

LTU_{it} , STU_{it} , and U_{it} are long-term, short-term and total unemployment in voivodship i during year t , respectively; α is a constant term; γ_t is a time dummy variable⁶; X_{it} is a set of explanatory variables; β is a vector of regression coefficients; and ε_{it} is the error term. We compare the sign, size and significance of the coefficients across these equations to better understand the underlying determinants of regional unemployment. In order to compare the relative ability of the vector of explanatory variables to explain the pattern of regional unemployment rates, we use the same variable set for all three dependent variables.

Data for the dependent variables (LTU, STU and U, described above) and independent variables are available for each of the 16 voivodships from 2002 to 2009, resulting in 128 observations for all specifications of the model. While we are particularly concerned with the level and type of education of unemployed workers we include as control variables other factors suggested by the literature. These data are available in two serial publications from the Polish Statistical Office: *The Yearbook of Labor Statistics* and the *Statistical Yearbook of the Regions - Poland*. Table 2 reports summary statistics for the dependent variables (LTU, STU, and U) and independent variables.

The education variables provide data on registered unemployed workers giving both the level of education and whether their education was vocational or general, resulting in the following independent variables: the percent of these workers in each region each year who have a tertiary education (*PctUTertiary*); secondary vocational education (*PctUsecVoc*); basic vocational education (*PctUBasVoc*); and secondary general education (*PctUsecGen*). The omitted variable is the percent with lower secondary, primary and incomplete primary education (*PctUlower*).

Table 2: Summary Statistics Based on 16 Voivodships from 2002 to 2009

Variable	Description	Mean	Std. Dev.	Min.	Max.
LTU	Long-term unemployment rate	6.72%	3.50%	0.95%	15.22%
STU	Short-term unemployment rate	8.06%	2.95%	3.40%	16.07%
U	Total Unemployment rate	14.78%	5.73%	5.47%	26.35%
PctU Tertiary	% registered U with tertiary education	6.17%	2.26%	2.55%	12.80%
PctUSecVoc	% registered U with secondary vocational education	21.80%	2.30%	17.34%	25.87%
PctUSecGen	% registered U with secondary general education	8.27%	1.79%	5.26%	13.05%
PctUBasVoc	% registered U with basic vocational education	32.01%	3.55%	25.00%	40.54%
PctULower	% registered U with lower secondary, primary or incomplete education	31.75%	4.39%	21.31%	39.07%
PctEmp Ag	% employed in agriculture	18.20%	9.58%	4.30%	38.40%
PctEmp Indr	% employed in industry	28.13%	5.09%	17.90%	38.75%
PctEmp Serv	% employed in services	53.66%	6.21%	43.21%	65.50%
AvgMo Wage	Avg. monthly wage (Zl)	2333.98	408.22	1788.08	3915.46
GDPpercapita	GDP per capita (Zl)	24299.84	6790.01	14821	52770
GminaExp Per Cap	Local govt. expend. per capita	1379.54	390.02	586.62	2297.87
DwelComp Pop	Dwellings completed per capita.	3.20	1.36	1.10	7.50
RoadsPerkm2	Public roads per 100km ²	85.72	30.38	50.58	169.61
NetMigrPerCap	Net migration per capita	-0.88	1.50	-4.61	2.99
Capital	Warsaw voivodship dummy	0.06	0.24	0.00	1.00
PctRegU24orless	% registered U 24 or less	23.05%	3.61%	15.37%	32.28%
PctRegU55	% registered U over 55	5.87%	2.84%	1.44%	11.83%
PctUFemale	% registered U Female	48.83%	4.77%	25.00%	62.97%

We also include measures of industrial structure for each region each year: the percent of employment in industry (*PctEmpIndr*) and the percent in the service sector (*PctEmpServ*). The omitted variable is the percent employed in agriculture (*PctEmpAg*). To capture regional variations in wages, we include the

average monthly wage (*Avgmowage*). As an alternative variable to check for robustness, we also try GDP per capita (*GDPpercapita*) by voivodship.

Although national economic policies and institutions such as minimum wages and non-employment benefits are of course held constant, there may be differences in public expenditures across regions. To capture these differences we include: the voivodship's public investment per capita (*InvPubPerCap*) and the average expenditure by Gminas (governmental units that are contained within voivodships) again per capita (*GminaExpPerCap*). A measure of roads per square kilometre (*RoadsPerkm2*) is included to capture the extent of physical infrastructure.

To measure mobility we include net migration (in-migration minus out-migration counting movement both within Poland and international migration) measured per capita (*NetMigrationPerCap*). To capture the possible housing constraint on mobility we include the number of dwellings completed each year relative to the population (*DwelCompPop*). To test whether there is an advantage to being in or near the capital, as found for other countries, a dummy variable is included valued at one for the voivodship that includes Warsaw and zero for all other regions (*Capital*).

Since some authors find that the age of unemployed workers is important, the percent of unemployed who are age 24 or less (*PctU24orless*) and the percent who are 55 or older (*PctU55*) are included. Finally, some specifications include the percent of the unemployed who are female (*PctUFemale*) and some specifications include time dummies for each year to capture national time trends.

Because we use time series data, we test for the presence of first order serial correlation using the method proposed in Wooldridge (2002, pp. 282-283). We found the presence of serial correlation, so for each specification of the model we ran iterated generalized least squares with an AR (1) error term correction for all the regression results we report in order to correct for serial correlation.

5. Empirical Results

Table 3 reports the results of regression equations that use these variables to explain the different types of unemployment by region. Regressions were run separately for the three dependent variables: LTU, STU and U (total unemployment). Each equation has 128 observations: 16 regions times 8 years (2002-2009). This table shows the results of five specifications of the model.⁷ Specification (1) is the basic model. Specification (2) adds GDP per capita to control for regional demand. However, since this variable is highly correlated with the average monthly wage (with a simple correlation of 0.93), the average monthly wage is dropped from this specification. Specifications (3) and (4) are the same, but drop the percent of the unemployed who are female. Specification (5) is the most economical version of the model, further dropping both the average monthly wage and GDP per capita. These additional specifications serve to support the robustness of the basic model. All specifications include time dummies to further control for macroeconomic and country-wide changes in the Polish economy.

Both the level and type of education are significant. The omitted variable is the percent of unemployed people with the lowest level of education (lower secondary, primary and incomplete education). Raising education among the unemployed with either secondary general, basic vocational or secondary vocational significantly lowers unemployment. Basic vocational education reduces LTU at the 1 percent significance level in all specifications. Moreover, these changes are economically significant. The coefficient on PctUBasVoc is approximately - 0.5. Therefore, a 1 percentage point increase in the percent of unemployed with basic vocational education is associated with a 0.5 point drop in LTU. Further, a one standard deviation (3.6) increase in this variable is associated with a lower LTU of approximately 1.8 percentage points. However, the story for basic vocational education is quite different for STU; the coefficient on STU is not significant at all or only marginally significant at the 10 percent level.

In contrast, the impact of secondary general education seems to be significant in lowering STU only. Secondary vocational education, however, significantly lowers both LTU and STU. Again these effects are economically large. A one standard deviation increase in PctUsecVoc is associated with approximately a 0.76 percentage point decrease in LTU and 0.83 in STU. Although there had been concerns about vocational education in the past, it appears that vocational education does benefit unemployed workers, and in the case of secondary vocational with respect to both short-term and long-term unemployment. Even basic vocational education seems to help with respect to long-term unemployment. Policies geared towards current vocational education, perhaps targeted to the regional demand for particular types of skilled or semi-skilled labor, may be useful in reducing a region's LTU. Surprisingly, the percent of the unemployed with a tertiary education is positively related to U and STU. It may be that these educated workers have not been insulated in the recent business cycle. The impact on LTU however, is negative although not significant.

Table 3: Regression Results

Variable	(1A)	(1B)	(1C)	(2A)	(2B)	(2C)
	LTU	STU	U	LTU	STU	U
PctUTertiary	-3844 (-1.45)	1.0203*** (3.76)	5757** (2.02)	-3795 (-1.49)	1.0804*** (4.15)	6830*** (2.47)
PctUSecVoc	-3510*** (-2.60)	-3604*** (-2.61)	-7526*** (-5.34)	-3224** (-2.33)	-3592*** (-2.54)	-6987*** (-4.69)
PctUBasVoc	-5273*** (-4.48)	1693 (1.40)	-4077*** (-3.32)	-5198*** (-4.46)	.1782 (1.49)	-3709*** (-2.97)
PctUSec Gen	-3264 (-1.05)	-6520** (-2.05)	-11631*** (-3.44)	-2989 (-0.95)	-6768** (-2.10)	-11005*** (-3.15)
PctEmp Infr	-1004 (-1.53)	-0765 (-1.13)	-2285*** (-3.34)	-1053 (-1.57)	-0680 (-.99)	-2080*** (-2.92)
PctEmp Serv	-0739 (-1.41)	2243*** (4.17)	1368*** (2.53)	-0629 (-1.39)	.2381*** (5.15)	1742*** (3.65)
Avgnwage	.0011 (.57)	.0009 (.44)	.0031 (1.50)	No	No	No
GDPpercapita	No	No	No	0.0001 (.72)	-0.000 (-.10)	.0001 (.83)
Gmina Exp Per Cap	.0027*** (2.83)	.0015 (1.55)	.0039*** (3.93)	0.0026*** (2.90)	.0014 (1.46)	.0040*** (4.23)
DvelCompPop	-0280 (-.17)	-3283** (-1.96)	-4434** (-2.28)	-0234 (-.15)	-3069* (-1.88)	-3693** (-1.98)
RoadsPerkm2	.0422*** (4.57)	-.0232*** (-2.45)	.0232*** (2.45)	0.0415*** (4.47)	-.0232** (-2.45)	.0210** (2.14)
NetMigration Per Cap	.2803* (1.73)	.1639 (.99)	.5990*** (3.26)	.2193 (1.29)	.1565* (.90)	.4175** (2.26)
Capital	-2.0430 (-1.18)	-4.9226*** (-2.77)	-8.1232*** (-4.55)	-1.9473 (-1.38)	-4.1735*** (-2.90)	-6.6709*** (-4.50)
PctU24orless	-1865* (-1.68)	-3197*** (-2.81)	-5427*** (-4.56)	-1773 (-1.62)	-3096*** (-2.77)	-5041*** (-4.24)
PctU55	-7282*** (-3.74)	-5204*** (-2.61)	-13760*** (-6.77)	-7247*** (-3.89)	-4729*** (-2.49)	-12706*** (-6.41)
PctUFemale	-0207 (1.08)	-0031 (.16)	-0394* (1.72)	-0208 (1.08)	-0028 (.14)	-0339 (1.50)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	466139*** (6.06)	128336* (1.63)	654662*** (7.92)	460921*** (5.97)	12.9830* (1.65)	62.9827*** (7.44)
Wald chi2	810.89***	534.64***	2089.88***	810.70***	498.17***	1976.17***
Rho	0.48	0.49	0.36	0.49	0.49	0.40
Adj. R ²	0.864	0.794	0.942	0.863	0.796	0.939

Note: z-statistics in parentheses. *significant at the 10% level, **significant at the 5% level, ***significant at the 1% level.

Table 3: Regression Results (Continued)

Variable	(3A)	(3B)	(3C)	(4A)	(4B)	(4C)
	LTU	STU	U	LTU	STU	U
PctUTertiary	-3444 (-128)	10241*** (3.80)	6480** (2.18)	-3546 (-1.37)	10868*** (4.26)	7222*** (2.48)
PctUSecVoc	-3267** (-236)	-3586*** (-2.63)	-0.7035*** (-4.68)	-3051** (-2.17)	-3535*** (-2.56)	-6666*** (-4.19)
PctUBasVoc	-4856*** (-4.04)	.1744 (1.47)	-3403*** (-2.62)	-4866*** (-4.12)	.1876* (1.63)	-3121** (-2.34)
PctUSecGen	-2581 (-.82)	-.6553** (-2.07)	-.9924*** (-2.84)	-2467 (-.78)	-.6849** (-2.15)	-9102*** (-2.54)
PctEmpIndr	-.0887 (-1.31)	-.0792 (-1.19)	-.1893*** (-2.58)	-.0984 (-1.43)	-.0750 (-1.13)	-.1604** (-2.07)
PctEmpServ	-.0648 (-1.19)	.2255*** (4.24)	.1477*** (2.53)	-.0598 (-1.29)	.2430*** (5.43)	.1734*** (3.30)
Avgnwage	.0008 (.42)	.0009 (.46)	.0021 (.93)	No	No	No
GDPpercapita	No	No	No	.0001 (.65)	-.0000 (-.01)	.0000 (.39)
Gmina Exp Per Cap	.0025*** (2.48)	.0015 (1.54)	.0041*** (3.87)	.0024*** (2.64)	.0013 (1.43)	.0038*** (3.66)
DwelCompPop	-.0367 (-.23)	-.3411** (-2.03)	-.3622** (-1.93)	-.0312 (-.20)	-.3427** (-2.07)	-.3057* (-1.71)
RoadsPerkm2	.0388*** (4.06)	-.0236*** (-2.53)	.0183* (1.79)	.0389*** (4.08)	-.0241*** (-2.63)	.0162 (1.50)
NetMigration Per Cap	.2507 (1.51)	.1680 (1.02)	.4641*** (2.56)	.2075 (1.21)	.1582 (.93)	.3646* (1.87)
Capital	-1.8081 (1.01)	-4.971*** (-2.83)	-7.1888*** (-3.73)	-1.9016 (-1.31)	-4.327*** (-3.11)	-5.9480*** (-3.64)
PctU24orless	-.1889* (-1.71)	-.3236*** (-2.94)	-.5449*** (-4.49)	-.1890* (-1.75)	-.3114*** (-2.92)	-.5035*** (-4.12)
PctU55	-.6868*** (-3.43)	-.5235*** (-2.65)	-1.2716*** (-5.85)	-.7028*** (-3.69)	-.4803*** (-2.59)	-1.1696*** (-5.43)
PctUFemale	No	No	No	No	No	No
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	43.244*** (5.55)	12.6221 (1.62)	59.3283*** (6.91)	43.530*** (5.59)	12.5111 (1.62)	56.699*** (6.44)
Wald chi2	769.61***	505.97***	1811.88***	778.49***	525.23***	1694.23***
Rho	0.53	0.48	0.47	0.52	0.45	0.52
Adj. R ²	0.857	0.798	0.934	0.859	0.870	0.930

Note: z-statistics in parentheses. *significant at the 10% level, **significant at the 5% level, ***significant at the 1% level

Table 3: Regression Results (Continued)

	(5A)	(5B)	(5C)
Variable	LTU	STU	U
PctUTertiary	-.3060 (-1.26)	1.0892*** (4.55)	.7574*** (2.72)
PctUSecVoc	-.3305** (-2.43)	-.3535*** (-2.65)	-.6771*** (-4.33)
PctUBasVoc	-.4919*** (-4.20)	.1885* (1.65)	-.3065** (-2.28)
PctUSecGen	-.3094 (-.99)	-.6875** (-2.21)	-.9140*** (-2.39)
PctEmpIndr	-.0900 (-1.39)	-.0754 (-1.19)	-.1458** (-1.95)
PctEmpServ	-.0578 (-1.27)	.2438*** (5.58)	.1770*** (3.38)
Avgmowage	No	No	No
GDPpercapita	No	No	No
Gmina Exp Per Cap	.0024*** (2.64)	.0018 (1.44)	.0038*** (3.61)
Dwd Comp Pop	-.0017 (-.01)	-.3470** (-2.14)	-.2883* (-1.65)
RoadsPerkm2	.0404*** (4.30)	-.0242*** (-2.66)	.0161 (1.48)
NetMigration Per Cap	.2553 (1.58)	.1597 (1.01)	.3806** (2.06)
Capital	-1.2793 (1.30)	-4.323*** (-4.52)	-5.429*** (-4.77)
PctU24orless	-.1934* (-1.80)	-.3109*** (-2.93)	-.4956*** (-4.03)
PctU55	-.6705*** (-3.83)	-.4795*** (-2.81)	-1.128*** (-5.59)
PctUFemale	No	No	No
Time Dummies	Yes	Yes	Yes
Constant	44.992*** (5.82)	12.4761* (1.62)	56.365*** (6.40)
Wald chi2	787.98***	528.91***	1667.08***
Rho	0.50	0.44	0.53
Adj. R ²	0.860	0.805	0.929

Note: z-statistics in parentheses. *significant at the 10% level, **significant at the 5% level, ***significant at the 1% level

The effect of the industrial structure of each region can be seen by looking at the coefficients on the percent of workers employed in industry and in services. The omitted variable is the percent employed in agriculture. A greater percent of employment in industry significantly lowers unemployment at the 5 percent or 1 percent level. However, when unemployment is divided between short-term and long-term, the effects are still negative but no longer significant. In contrast, the greater the employment in the service sector, the higher is STU and total U in all specifications. However, this positive relation does not hold for LTU and therefore does not seem to be a major explanation for LTU, even though short-term and total rates are affected. Disaggregating total unemployment by duration gives a clearer picture of how industrial structure relates to unemployment.

There is no clear relationship between unemployment and either the average monthly wage (specifications 1 and 3) or GDP per capita (specifications 2 and 4). We find that this holds true for STU and LTU as well. This is consistent with other authors who have also reported little or no relation between employment and wages in some cases (for example, Onaran, 2008). Since wages and per capita income are so highly correlated, this would hold true for per capita income as well.

As noted above, several authors have considered the role of institutional variables such as nonemployment benefits and government policies. Although most of these variables are determined at the national level, and therefore held constant, we capture some variation across regions by looking at Gmina expenditures per capita. (Gminas are local government units within the voivodships.) Not surprisingly, Gmina expenditures per capita are positively and significantly related to LTU. It appears that local governments spend more on services when LTU is high. This positive relation occurs for total U as well, but not for STU. Therefore, the higher burden on Gminas' expenditures is a phenomenon of LTU only.⁸ This finding is consistent with the points made by Huber (2007), Funck and Pizzati (2002), Revenga (2002), and others concerning the large social costs and transfers that result from LTU.

Turning now to variables that reflect the infrastructure of the region, we look first at the number of dwellings completed relative to the population in each region each year. Several authors cited earlier considered housing scarcity as a possible factor preventing labor mobility across regions. In our regressions, the coefficient on dwellings completed relative to the population is always negative for both STU and U, and usually significant at the 5 percent level, although sometimes only at the 10 percent level. This negative relation suggests that regions with low short-term and total unemployment do experience housing growth, so perhaps housing construction has begun to respond in areas with tight labor markets. In contrast, this relation does not hold for LTU. Therefore, the growth in dwellings seems to be related primarily to low STU rates only.

Another important infrastructure variable is transportation which also shows divergent results by duration. The transportation infrastructure variable measures roads per square kilometer. Interestingly, more roads are associated with more LTU but less STU in all specifications. As reported earlier, several authors have found that unemployment is lower in large cities. These results are consistent with those findings but distinguish STU from LTU. The density of

roads here may be serving as a proxy for larger cities. If so, we find that in the presence of large cities, where roads will be very dense, it is only STU that is lower. The story for LTU seems to be quite different, although this finding may be a peculiarity of how LTU is measured. A look at the map of Poland shows that the regions with fewer roads are indeed more rural, tending to be either highly agricultural or forested land that are popular vacation destinations. LTU may be relatively lower in these regions, because a lot of unemployment in these locations is likely to be seasonal. Since LTU is measured as unemployment for over one year, this type of unemployment will show up as STU and not LTU. Migration of Polish citizens to the rest of the EU and to the US has received considerable publicity as there has been continuous net out-migration over the period of this study. At the same time, as noted above, there has been concern that neither internal nor international migration is serving to equalize unemployment rates across regions. We find a positive and usually significant relation between net migration (measured as in-migration minus out-migration and including both international and domestic migration) and unemployment. This means that where unemployment is high, migration is also high (or less negative), suggesting that unemployed workers are not leaving areas with high unemployment. This is consistent with this concern and consistent with the hypothesis that the most employable workers are also the most mobile.

Our results partially support the presence of the agglomeration effect for capital cities described by Huber (2007), Barjak (2001), Jurajda and Terrell (2009) and others. Both total U and STU are lower in the region that includes the capital city of Warsaw, and these results are highly significant, at the 1 percent level in all specifications. This effect is large; holding other variables constant, STU is 4 to 4 percentage points lower in the region that contains Warsaw. However, the results for LTU tell a very different story. The coefficients on the capital variable are negative, but not significant in any specification, not even at the 10 percent level. It appears that the agglomeration effect may be a story about STU and that LTU does not respond in the same way, or at least to a much smaller degree.

Looking now at the age distribution of the registered unemployed, we examine the coefficients for the percent who are 24 or younger and the percent who are 55 and over compared to the omitted group between 25 and 54 years of age. Both unemployment and STU are negatively related to the proportion of unemployed in the younger cohort and this is always highly significant at the 1 percent level. For LTU, on the other hand, the relationship is still negative but not significant or only at the 10 percent level. Although one expects that unemployment and especially LTU are most detrimental for the young, these findings may simply reflect a lower proportion of young workers in high unemployment areas. This will show up at the regional level if young unemployed workers are more mobile out of these regions. These results are also broadly consistent with the finding cited above (Newell and Pastore, 2006), that middle-aged workers might not have more job security than the young. In fact, these results suggest that middle-aged workers may fare worse with respect to regional unemployment rates, perhaps due to less mobility. All three measures of unemployment are negatively related to the percent of the unemployed who are in the older cohort at the 1 percent significance levels. Although this may

suggest that older unemployed workers are less vulnerable, it more likely reflects that workers in this cohort unable to find jobs may have retired from the labor force. Specifications 1 and 2 include a variable for the percent of the registered unemployed who are female. Researchers often include women among the groups in Central Europe who are particularly vulnerable to high unemployment and low employment (for example, Feldmann, 2005). Our results do not find a strong relationship between unemployment and the percentage of the registered unemployed who are female.

Taken as a whole, these results provide strong evidence that separating the unemployment rate into short- and long-term unemployment and separately regressing these variables give us a better understanding of the labor market situation in Poland. In many cases the correlates with LTU and STU differ considerably and these differences are robust across specifications.

6. Conclusion

In this paper, we report results relating long- and short-term unemployment to a set of explanatory variables for the voivodships of Poland from 2002 to 2009. As far as we know, this is the first study that analyzes long- and short-term unemployment at the regional level in this way. Moreover, the vast majority of regional studies use data from the 1990s. Our main objectives were to determine the effects of education, by level and type, as well other economic and structural variables, on STU and LTU, and show that examining regional unemployment by duration can provide a better understanding of a country's labor market than by focusing solely on overall unemployment rates. We did this by first demonstrating that the regional dispersion of unemployment rates was greater for STU and LTU than for U, and secondly by regressing each of these unemployment rates on a set of explanatory variables. The results show that there are substantial differences between the coefficients on several variables depending on which measure of unemployment is the dependent variable. In some cases, relationships emerged when looking at LTU and STU that did not appear when regressing aggregate unemployment rates on the same set of explanatory variables.

We found that there is a different relationship between LTU and STU with respect to education. For example, we find that secondary vocational education lowers both LTU and STU. In contrast, basic vocational education significantly reduces LTU, but not STU. Vocational education does appear to ameliorate LTU, and at the secondary level both STU and LTU, suggesting that further investment in this form of education may be important. While secondary general education appears to lower STU, it seems to be less effective with respect to the long-term unemployed. We find a differential impact by duration for other variables as well, such as the percent employed in the service sector, local government expenditures, new housing, transportation infrastructure, the percentage of the unemployed who are young, and the agglomeration effect for the capital city. With respect to the latter variable, we do find that unemployment is significantly lower in the region that includes Warsaw. However this appears to be a phenomenon with respect to STU only; this effect does not show up for LTU when holding other variables constant.

These results strongly suggest that looking only at total unemployment rates can mask significant and important relationships between independent variables and the different types of unemployment. Analyses like this one can be helpful in identifying more precisely the structural and economic variables that differentially affect regional short-term and long-term unemployment. This is an important task since strategies for reducing long-term unemployment may be quite different from strategies to address short-term unemployment. These results may also suggest a direction for further research. Unemployment is a complex phenomenon. We have seen here that the determinants of regional unemployment vary by duration. It might also be fruitful to examine whether regional unemployment broken down by other characteristics (for example, by gender) would also show different coefficients on the independent variables.

7. Notes

1. Thomas Mondschean and Margaret Oppenheimer are Professors of Economics, DePaul University, 1 East Jackson Blvd., Chicago, IL 60604. Comments are welcomed and can be sent to either tmondsch@depaul.edu, or moppenhe@depaul.edu. The authors wish to thank the Economics Department and the College of Commerce at DePaul University for research support. Nick Dinunzio and Elitza Kostova provided excellent research assistance. We would also like to thank anonymous referees and the editor of this journal for helpful comments and suggestions.
2. The LTU rate is the percent of the labor force (employed and unemployed) who have been unemployed for one year or longer. The STU rate is the percent of the labor force unemployed for less than one year. The unemployment rate for the whole labor force is therefore equal to the LTU rate plus the STU rate.
3. In the late 1990s, the Polish government consolidated voivodships, reducing the number from 49 to 16. Since most of the existing literature examined the behaviour of regional labor markets in Poland during the 1990s, these studies use the older definition of voivodship as the unit of analysis. It also changed the definition of agricultural employment starting with 2002 data. Since agriculture is an important sector in many regions in Poland, the data before 2002 are not strictly comparable to those in 2002 and later. While some data before 2002 were used for comparison purposes above, the regression analysis is restricted to the six years, 2002-2007.
4. For an overview of the transition in Central and Eastern Europe see Kornai (2006) and for an assessment of the key political and economic changes during transition in Poland, see Hunter and Ryan (2011).
5. Although Galuscak and Munich (2005) did include regional data on STU and LTU in the Czech Republic to determine the slope of the wage curve, the focus of the paper was not on the differences in STU and LTU and their determinants.
6. To avoid perfect multicollinearity, we must exclude one of the time dummies. We chose to exclude 2002, so coefficient estimates on the remaining time dummy variables should be interpreted as relative to 2002.
7. The estimated R-squared is computed as $W/(W+N)$ where W is the Wald statistic and N is the number of observations. For more information, see Magee (1990).

8. With respect to the wage, GDP per capita, and Gmina expenditures, we recognize that unemployment may be endogenous with respect to these variables. Although, this makes the interpretation of their coefficients difficult, it is important to include them as control variables. We do, however, remove the first two of these variables in the last specification.

8. References

- Barjak, F., (2001), "Regional Disparities in Transition Economies: a Typology for East Germany and Poland," *Post-Communist Economies*, 13(3), 289-311.
- Bellmann, L., and Blien, U., (2001), "Wage Curve Analyses of Establishment Data from Western Germany," *Industrial and Labor Relations Review*, 54(July), 851-863.
- Blanchflower, D.G., (2001), "Unemployment, Well-Being and Wage Curves in Eastern and Central Europe," *Journal of the Japanese and International Economies*, 15(4), 364-402.
- Blanchflower, D.G. and Oswald, A.J., (1994), *The Wage Curve*, Cambridge, MA: MIT Press.
- Blanchflower, D.G. and Oswald, A.J., (1995), "An Introduction to the Wage Curve," *Journal of Economic Perspectives*, 9(Summer), 153-167.
- Blanchflower, D.G. and Oswald, A.J., (2005), "The Wage Curve Reloaded," *National Bureau of Economic Research Working Papers*, 11338, 1-44.
- Boeri, T. and Terrell, K., (2002), "Institutional Determinants of Labor Reallocation in Transition," *Journal of Economic Perspectives*, 16(1), 51-76.
- Bornhorst, F. and Commander, S., (2006), "Regional Unemployment and its Persistence in Transition Countries," *Economics of Transition*, 14(2), 269-288.
- Borsic, D. and Kavkler, A., (2009), "Modeling Unemployment Duration in Slovenia Using Cox Regression Models," *Transition Studies Review*, 16, 145-156.
- Campos, N. F. and Coricelli, A., (2002), "Growth in Transition: What We Know, What We Don't, and What We Should," *Journal of Economic Literature*, 40(3 September), 793-836.
- Card, D., (1995), "The Wage Curve: A Review." *Journal of Economic Literature*, XXXIII (June), 785-799.
- Deichmann, U. and Henderson, J.V., (2000), "Urban and Regional Dynamics in Poland," *Policy Research Working Paper 2457*, *The World Bank Development Research Group*, (September), 1-40.
- Feldmann, H., (2005), "Labor Market Institutions and Labor Market Performance in Transition Countries," *Post-Communist Economies*, 17 (1), 47-82.
- Ferragina, A.M. and Pastore, F., (2006), "Regional Unemployment in the OST Literature," in Caroleo, F.E. and Destefanis, S., (eds.), *The European Labor Market: Regional Dimensions*, Heidelberg and New York: Physica-Verlag, Springer, 33-87.
- Ferragina, A.M. and Pastore, F., (2008), "Mind the GAP: Unemployment in the New EU Regions," *Journal of Economic Surveys*, 22(1 February), 73-113.

- Fialova, K. and Schneider, O., (2009), "Labor Market Institutions and Their Effect on Labor Market Performance in the New EU Member Countries," *Eastern European Economics*, 47(1 May-June), 57-83.
- Fidrmuc, J., (2004), "Migration and Regional Adjustment to Asymmetric Shocks in Transition Economies," *Journal of Comparative Economics*, 32, 230-247.
- Funck, B. and Pizzati, L., (eds.), (2002), *Labor, Employment, and Social Policies in the EU Enlargement Process*, Washington, D.C.: The World Bank.
- Gabrisch, H. and Buscher, H., (2006), "The Relationship between Unemployment and Output in Post-communist Countries," *Post-Communist Economics*, 18(3), 261-276.
- Galuscak, K. and Munich, D., (2005), "Regional Wage Adjustments and Unemployment: Estimating the Time-Varying Wage Curve," *Czech Journal of Economics and Finance*, 55, 68-81.
- Ghatak, S. and Mulhern, A. and Watson, J., (2008), "Inter-Regional Migration in Transition Economies: The Case of Poland," *Review of Development Economics*, 12(1), 209-222.
- Hazans, M., (2005), "Unemployment and the Earnings Structure in Latvia," *World Bank Policy Research Working Paper 3504*, 1-90.
- Herzog, H.W. Jr., "Transition and Unemployment in Central Europe: How Redundant Workers Fare in Regional Labor Markets," *Papers in Regional Science*, 82, 75-79.
- Huber, P., (2007), "Regional Labor Market Developments in Transition: A Survey of the Empirical Literature," *The European Journal of Comparative Economics*, 4(2), 263-298.
- Hunter, R.J. Jr. and Ryan, L.V., (2011), "Reflections in Twenty Years of Political and Economic Change in Poland," *Global Economy Journal*, 11(1), 1-16.
- Iara, A. and Traistaru, I., (2004), "How Flexible Are Wages in EU Accession Countries?" *Labor Economics* 11(4 August), 431-450.
- Jurajda, S. and Terrell, K., (2007), "Regional Unemployment and Human Capital in Transition Economies," *Economics of Transition* 17(2), 241-274.
- Kajzer, A., (2007), "Development of the Slovenian Labor Market in 1996-2006 and the Main Challenges of Labor Market Policy," *Post-Communist Economics*, 19(4), 471-482.
- Kornai, J., (2006), "The Great Transformation of Central Eastern Europe: Success and Disappointment," *Economics of Transition*, 14(2), 207-244.
- Kupets, O., (2006), "Determinants of Unemployment Duration in Ukraine," *Journal of Comparative Economics*, 34, 229-247.
- Lamo, A., Messina, J. and Wasmer, E., (2006), "Are Specific Skills an Obstacle to Labor Market Adjustment? Theory and an Application to EU Enlargement," *European Central Bank Working Paper Series No. 585*, 1-57.
- Luo, X., (2007), "Regional Disparities in Labor Market Performance in Croatia: The Role of Individual and Regional Structural Characteristics," *World Bank Policy Research Working Paper 4148* (March).
- Magee, L., (1990), "R2 Measures Based on Wald and Likelihood Ratio Joint Significance Tests," *The American Statistician*, 44(3), 250-253.

- Mondschean, T.S. and Oppenheimer, M., (2006), "Labor Market Adjustment and Convergence in Central Europe: A Look at the Czech Republic, Hungary, Poland, and Hungary," *Journal of International Business and Economics*, 6(1), 152-170.
- Mondschean, T.S. and Oppenheimer, M., (2010), "Output, Employment and Unemployment in Central Europe during the Economic Crisis: A Look at Four Transition Countries," *European Journal of Management*, 10(3), 24-35.
- Newell, A. (2006), "Skill Mismatch and Regional Unemployment in Poland," in Caroleo, F.E. and Destefanis, S., (eds.), *The European Labor Market: Regional Dimensions*, Heidelberg and New York: Physica-Verlag, 187-202.
- Newell, A. and Pastore, F., (2006), "Regional Unemployment and Industrial Restructuring in Poland," *Eastern European Economics*, 44, (3 May-June), 5-28.
- Nickell, S. (2006), "A Picture of European Unemployment: Success and Failure," in Werding, M., (ed.), *Structural Unemployment in Western Europe*, Cambridge, MA: MIT Press, 9-51.
- Onaran, O. (2008), "Jobless Growth in the Central and East European Countries: A Country-Specific Panel Data Analysis of the Manufacturing Industry," *Eastern European Economics*, 46(4 July-August), 90-115
- Revenga, A., (2002), "Unemployment, Poverty, and Social Exclusion in Central and Eastern Europe," in Funck, B. and Pizzati, L., (eds.), *Labor, Employment, and Social Policies in the EU Enlargement Process*, Washington, D.C.: The World Bank.
- Rutkowski, J., (2006), "Labor Market Developments during Economic Transition," *World Bank Policy Research Working Paper 3894*, 2-44.
- Rutkowski, J., (2007), "From the Shortage of Jobs to the Shortage of Skilled Workers: Labor Markets in the EU New Member States," *Institute for the Study of Labor Working Paper #3202*, Bonn, Germany (December).
- Rutkowski, J. and Przybyla, M., (2002), "Poland: Regional Dimensions of Unemployment," in Funck, B. and Pizzati, L., (eds), *Labor, Employment, and Social Policies in the EU Enlargement Process: Changing Perspectives and Policy Options*, Washington, D.C.: The World Bank, 157-175.
- Senjur, M., (2009), "The Transition Experience in Retrospect: the Labor Market Transformation was Vital," *Post-Communist Economies*, 21(2), 175-189.
- Stiglitz, J.E., (2002), "Employment, Social Justice and Societal Well-being," *International Labor Review*, 141(1-2), 9-29.
- Tvrđon, M., (2011), "Unemployment as the Macroeconomic Problem: the Case of the Visegrad Group Countries," *International Journal of Systems Applications, Engineering and Development*, 5(2), 187-197.
- Werding, M., (ed.), (2006), *Structural Unemployment in Western Europe*, Cambridge, MA: MIT Press.
- Winiecki, J. (2008), "Employment and Unemployment in Transition: the Legacy of the Communist Past," *Post-Communist Economies*, 20(3), 377-390.
- Wolnicki, M., Kwiatkowski, E. and Piasecki, R., (2006), "Jobless Growth: a New Challenge for the Transition Economy of Poland," *International Journal of Social Economics*, 33(3), 192-206.
- Wooldridge, J.M., (2002), *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: MIT Press.

Yamaguchi, S., (2008), "Wage Flexibility in Turbulent Times: A Practitioner's Guide, with an Application to Poland," *Eastern European Economics*, 46(2 March-April), 88-114

Globalization and Development: India Since 1991

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Abstract: Among the predictions made vis-à-vis Globalization were the decline of the nation state and the rise to dominance of multinational corporations. Globalization was also promoted as a route to faster growth and declining poverty. These predictions are evaluated here based on the experience of India since 1991 when a concerted effort was made to integrate its economy with the rest of the world. The best evidence shows that while growth has accelerated the trend, decline in poverty has not. It appears that global integration cannot be a substitute for a national developmental strategy which continues to retain a salience.

JEL Classification: F15, O19, O53

Keywords: Globalization, Economics reforms, India, Growth, Development

1. Introduction

It was the decade of the 1990s that was the heyday of Globalization theory. Perhaps “theory” is too grand a term for what were mainly in the nature of claims made regarding the consequences of a renewed movement in the global economy being witnessed at that moment. The immediate provocation for these pronouncements was the collapse in 1989 of the Berlin Wall and the subsequent implosion of the Former Soviet Union in 1991. These events had pre-figured to some a borderless world organized around the newly freed markets. Some like Francis Fukuyama (1989) had taken the collapse of East European communism so far as to declare the end of history, implying that we had finally arrived at a point when there would no longer be conflict as liberal democracy was henceforth the only credible option. At the end of two decades since then we can see that this is far from having been achieved. There was a certain Eurocentricity to Fukuyama’s assertion, for the end of a somewhat parochial contest over 2 rival economic systems, namely, capitalism and communism. The decisive defeat of communism on the Continent need hardly have implied the end of conflict in the rest of the world where differences over ethnicity, religion and alternative modes of living were rife. However, it appears that the Globalization theorists of that time were quite confident that they were not taking so narrow a view of the world as Fukuyama when they made their pronouncements, and it is of interest to see how their claims have held out. Further, the consequences themselves had been visualized as both political and economic. As these forces are not always separable, I shall consider the economic and political consequences of Globalization together.

2. Nation States, Corporations and Civil society

From the vantage point of political theory, in the early nineties the foremost consequence of Globalization was seen to be the demise of the nation state. This may be understood better when we reflect upon the fact that almost all of the political theory that we work with – for effect I might emphasize that this comprises conservative, liberal and radical versions – is European in origin and the nation state narrowly defined as a sovereign territory constructed around language, culture and often even religion is central to it. Now to some Globalization would imply a hollowing out of the nation state. However in the minds of those who foresaw this weakening it was a contemporaneous historical development that had been factored-in as central. This was the rise of the giant multinational. Often with sales turnover greater than the national economic budgets of some mid-sized developing country these companies, it was presaged, would wield considerable power over the nation state. The precise situation sketched was the following: national states competing for inward investment, it was argued would scale down social protection requirements made on firms, weaken labor rights and generally make things simpler for capital, already spoilt for choice when it came to location. The result, it was thought, would be a “race to the bottom” whereby nation states would be forced to progressively lower the bar for multinationals that are potential investors in their territories. This was particularly the fear and anxiety of the anti-Globalization activists from Seattle to Genoa. An investigation of the extent of vindication of this twinned development, namely, the rise of corporations and the extinction of the nation state comprises one part of this article. However, before returning to this issue I wish to flag some others.

A second set of predictions regarding the process of Globalization had revolved around the metaphor of leveling. With economic differences between national territories assumed to be the initial condition, following the integration implied by Globalization, it was forecast that economic forces would move to take advantage of this difference, resulting in a certain leveling of incomes. In the cultural sphere a homogenization was predicted, though no particular mechanism was outlined except to emphasize the role of technology, especially communications, in generating this outcome. I shall spend some time on the economic leveling that had been predicted. From the point of view of neoclassical economics, the integration of markets would equalize the rate of return to factors of production as they flow to regions with higher rates of return. This has encouraged the view that all regions would become equally developed. However, we know from the sub-discipline of regional economics that this will almost never come to be. Capital and labor, it has been observed shun areas with less prosperity and inadequate infrastructure. For instance, it is unlikely that either will move immediately to Kim Jong Il’s North Korea or Mugabe’s Zimbabwe even after the inevitable demise of their regimes. Thus there is something in the very logic of market integration that hitherto poor regions become relatively poorer afterwards, partly also because of the exit of labor and capital from these very regions. The original formulation of this idea as “cumulative causation” is due to Gunnar Myrdal (1957) and was devised to explain the economic distance between the countries of north-western and south-eastern Europe.

Cultural homogenization is not taking place, as predicted or feared. If it were that such homogenization is occurring, ethnic differences are unlikely to remain a political issue. However, there is no evidence that such conflict is dying out. Though Sri Lanka has been quietened by military force, the Uighurs of China, Kurds of Turkey and the tribes of India all remain restless. Interestingly, there are ways in which modern communications technology keeps alive these differences. The Tamils of Kuala Lumpur, the Punjabis of Southall and the North Africans in France all congregate around their own music, food and films. The sociologist Manuel Castells (Castells, 2004) has interpreted this behavior as the attempt to create a 'communal haven' in a world of increasing uncertainty due to Globalization.

So what can we say about the relative status of the nation state and the multi-national corporation twenty years after this had been pronounced upon? Some egregious examples stand out. Neither the collapse of the Former Soviet Union nor the gathering Globalization has weakened the Chinese nation state. The USA, though by default the victor in the Cold War, is yet unable to impose any political settlement on the Chinese government. In the economic sphere, China has had to compromise very little with multi-national corporations. There is a straightforward explanation of this. Though China is the world's largest recipient of foreign direct investment, FDI itself is a small part of total investment in its economy. (This apart from the fact that a large part of it is believed to be made by so-called "overseas" Chinese.) To an extent the last can be said of India itself, despite much larger capital inflows since 1991 and the progressive integration of the Indian economy with the rest of the world since then. The way to understand China's independence despite being open to capital flows is to recognize the condition for relative autonomy in the international order. For the integrated economy it has to be the sufficiency of hard currency reserves. China in particular, East Asia in general and India to a lesser extent are today sitting on quite substantial dollar reserves. This very fact reflects their ability to compete in the global market. China's is a particularly forceful case in that it now props up the US trade deficit by purchasing US Treasury Bills. Though India's economic rise is perhaps less spectacular it is not unimpressive. Note that its reserves which had amounted to less than 5 billion dollars in July 1991, when the liberalizing reforms were launched, are close to 300 billion dollars today.²

Altogether, in this phase of Globalization, the resurgent growth in China and India along with their burgeoning foreign exchange reserves suggests that the global economic balance (and thus political power) is shifting towards the East. Two decades of Globalization show no signs of the American ascendancy that was imagined at the outset. In fact, the United States is by now a somewhat diminished power. It may be high on military prowess but is low on political capital, is stuck in a quagmire of its own making in Iraq and its economic model itself has been rendered questionable after the global financial crisis of 2008.

Interestingly, 'the-end-of-the-nation-state' thesis has in its time had adherents positioned at both ends of the political spectrum. On the one hand, corporate gurus, prominent among them Kenichi Ohmae (1995), have proclaimed a "borderless world", thereby ushering in the idea that national restrictions on global corporations are pointless. On the other hand, political

activists have lamented the decline of the nation state as heralding the end of social democracy. Actually, these pronouncements seem to be cases of expressing aloud the protagonists' keenest aspirations and deepest anxieties, respectively. Neither of these claims are credible. By now we can see that both these ways of approaching the question of the likely demise of the nation state have been wrongly imagined. Not only has the nation state from Switzerland to Botswana not diminished. In the case of China and India it has actually strengthened vis-à-vis the rest of the world.³ The experience of the latter economies is not incidental. This strengthening has taken place precisely because these two large nations have engaged with the global market and taken advantage of the opportunities, though they have done so in different ways. China has largely re-invented itself as a global manufacturing hub for low-end products while India has become a world-class vendor of software and IT-enabled services. I have argued elsewhere (Balakrishnan, 2006) that India's rise as a software exporter has been aided by government intervention. Nor could the role of government in the rise of China's economy have been less important. Very likely it was on a far higher scale. We are unable to pronounce on this matter with greater confidence as the precise relationship between economic policy and outcomes remains somewhat opaque to the outside observer. What the recent history of China and India shows is that successful nations leverage opportunities provided by the global market and that by designing policy accordingly their states enable national companies to succeed on the world stage. The recent history of the world points to two things. First, picturing countries as boats, even when the rising tide of Globalization may lift all boats it may not lift them equally. Secondly, in the present phase of Globalization at least, corporations and nation states do not always work at cross purposes. Precisely as to position their economies in a competitive global market, nation-states must nurture their own companies if the latter are to survive international competition. Bill Clinton and Nicholas Sarkozy have all travelled to India at some point or the other to further the prospects of American banks and French aircraft manufacturers, respectively. At the same time, to maintain their global competitiveness, western corporations need to engage with governments whose legislative and judicial powers remain intact even as Globalization may have gathered pace. We may recall the much publicized meetings of Ms. Rebecca Mark, the CEO of Enron, with Indian politicians when her company were negotiating with the Indian government. One of the controversies that refuses to die in the Indian state of Kerala is that of the Canadian multinational SNC-Lavalin offering to build a cancer hospital in return for special consideration in the award of a contract to supply of electric turbines to the government.

But it is certainly the case that in the world economy after the collapse of Soviet communism, corporations have become more powerful along with the managers of finance capital. That nation states are alert to their demands is demonstrated in some of the policy shifts in India itself and the new access that corporate leaders have to the centers of power in the country. In the United States, even after the global financial crisis, Wall Street has managed to retain its influence on the Obama Administration in the form of economic advisers. There has been strong opposition there to the continuation of the fiscal stimulus from the corporate sector which prizes low inflation over lower unemployment.

Nevertheless, the hubris of management gurus and the anxiety of political activities that the multi-national corporation will rule the world may not come to pass so soon after all. I point to three events that occurred in recent years which suggest this. The first of these is Google's final acquiescence in the Chinese government's demand for 'web filtering', or censorship in plain language. Recall that Google had first threatened to leave China but then stayed on to comply with the government's directive. This becomes intelligible when it is recognized that China is the world's largest internet market. Later in 2009, Google bowed once again to the might of the nation state this time agreeing to the Chinese government's demand that Arunachal Pradesh be shown as part of China. In an act of monumental duplicity, separate maps, with the territory in one or the other of the two countries, were devised for each of audiences from India and China! I next turn to examples of corporate subordination, and that too not always to the state alone, from India and Europe. They reflect the role of a different influence, and one that may be expected to become more powerful with time. While the taming of Google by the Chinese authorities reflects the unquestioned power of the nation state the particular cases of Shell and Vedanta reflect something altogether different. In the second half of the 90s Shell, one of the world's largest and oldest corporations, had had to revise its plan to sink a disused offshore oil platform at Brent Spar in the North Sea following a public campaign by Greenpeace.⁴ The case of the giant multinational metals corporation Vedanta was one of its being denied environmental clearance by the Government of India in 2010. Both these were instances when corporations had to take a bow to the power of environmental groups which had skillfully orchestrated the media. In the case of Vedanta, there was also the consideration that the Niyamgiri Hills, which would have been destroyed in the pursuit of bauxite, were considered sacred by the Adivasis of Orissa. This made it an issue of relevance to national political parties, even beyond that of the feature that Orissa has a large tribal population. Nevertheless, these two examples point to the rise of civil society groups as a third player on the world stage. This tends to get ignored in a discourse on Globalization that sees nation states and corporations as the sole protagonists of any importance. Neither states nor corporations can any longer override civil society concerns. Democracy, at times fanned for its own reasons by the visual media, allows for the outcome that even single-issue groups retain an importance exceeding their numbers. The drama involving Julian Assange that has been playing out on TV screens across the world in late 2010 suggests that a global civil society that challenges the nation state is no longer an impossibility at some future date. Altogether, it is the metaphor of a kaleidoscope that best describes the shifting balance of power between nation states, corporations and civil society in the early twenty first century and there is no indication of a settlement soon.

3. What is Different about the Current Globalization?

Quite early on in the current phase of Globalization it was argued that not only was it not particularly new but also that it is dwarfed by the global economy of the 3 or 4 decades leading up to 1914. The claim is that trade and capital flows in relation to national economies were much larger, making it a more global era. It is certainly true that FDI was a larger part of capital flows of the time but it has

been shown that trade has grown much faster than GDP globally since the Second World War and that capital flows are also much larger by now. Today the annual turnover in the global capital markets is much larger than the GNP of the major West European countries. However, these flows mainly finance speculation in the equity markets and the foreign exchanges. Foreign direct investment, which had dominated the capital flows of the pre-1914 global economy is only a fraction of these flows today.⁵ This raises the question of the social value of capital flows that do not contribute to capital formation. A more fundamental differentiation exists between these two periods, and this has been anticipated by the discussion here. It is that the global economy of the 20th century was ordered by the hegemonic power of the time. Thus imperial Britain more or less governed the trade and payments arrangements of the day in the pre-1914 world, while the arrangements for the post-Second World War world were governed by the United States, partly because the Soviet Union, in a severe act of misjudgment of the value of engaging with the world, had opted out. By the early 21st century there is no comparable hegemon. The erstwhile ones, such as Britain, have faced the fury of global capital markets. While the US continues to be seen as a safe haven for capital, its government cannot direct global capital flows in anything like the manner in which imperial Britain had done. Arguably, British capital of the nineteenth century was also more nationalist than the US multinationals of today. Thus the proper way to comprehend what has happened is not that the nation state itself has disappeared or even weakened. It is more that there has taken place a global shift in the balance of power with China, India and the erstwhile colonies of Japan emerging as powerful rivals to the economies of the west. While Britain and France are far wealthier than they were at the height of the colonial era they are relatively less rich in relation to East Asia, China and India by now. This is of far-reaching significance.

4. India Integrated

I now turn to the extent of Globalization that has occurred in India since 1991 and the impact that it may have had. There is unambiguous evidence of an increased share of trade in India's economy. Both exports and imports have increased as a share of GDP. India is now more integrated with the rest of the world. It is therefore appropriate to ask whether the predicted effects have materialized. But what are these predictions?

At their most generic, claims of the beneficial impact of Globalization boil down to that it raises the rate of growth and reduces poverty (Fischer, 2003). Interestingly no mechanism is specified. Be that as it may, we might yet ask for the evidence on the matter. When it comes to India we do find that the period since 1991 is one of faster growth and that all the estimates of poverty, for there are more than one, point to its reduction. This must be seen in perspective though. First, as regards to growth, the Indian economy has been experiencing faster growth for at least a decade prior to 1991. It is also significant, as we are considering the impact of Globalization, that this quickening of the economy *circa* 1980 had occurred prior to its greater integration with the rest of the world. As for the higher growth rate since 1991 we find that a statistically significant acceleration is observed only when the five years of faster growth from 2003-04 on are included in the sample (Balakrishnan, 2011). Significantly also, this

growth acceleration was disproportionately accounted for by the services sector (Balakrishnan and Parameswaran, 2007). Services as a sector are not particularly dependent upon trade as a source of demand as they are largely non-tradable, the conspicuous example of information-technology-enabled services (ITES) notwithstanding. Interestingly, services was not the sector targeted by the liberalizing reforms of 1991 which had largely targeted manufacturing. But there is no puzzle here. In fact, the output of services having first accelerated in the seventies have been growing rapidly ever since *circa* 1980, implying the presence of a 'circular and cumulative causation' in the growth process. Quite simply growth begets growth. If this is so, at least some part of the growth dynamic being witnessed after 1991 is a continuation, though with greater force, of the one already in existence. This does not imply that liberalization of the policy regime did not make any difference whatsoever. There are fast-growing sub-sectors within services such as 'communication' for which the policy-regime was substantially liberalized after 1991. In this sector the impact of liberalization is there to be seen. But overall the services sector is not export reliant and whether its faster growth since 1991 is due to a greater global integration is moot.

We next move to the question of the trend with respect to poverty. I have already stated that all the independently made estimates of poverty point to its decline. However, according to our most authoritative source (Deaton and Dreze, 2002) there is no evidence of a faster rate of decline as predicted by the Globalization enthusiasts. In India, the decline in poverty in the 1980s was at least as fast. But it would be hasty to conclude from this that Globalization in India has not contributed to poverty decline as not everything has "remained the same" since 1991. In particular, agriculture, as a sector of some importance to poverty reduction has grown more slowly. Even today the largest numbers of Indian workers are in the agricultural sector. From the rapid growth of this sector in the 1980s, a time when the rate of decline of poverty in the country first accelerated, we may assume that agricultural performance continues to be crucial for poverty reduction in India so long as the majority of Indians continue to earn their incomes in that sector. A specific aspect of agricultural performance in the post-1991 era, one with direct relevance to the feasibility of poverty reduction, is the relative stability of the price of food. Indian economists have long been emphasizing the importance of the price of food for poverty reduction (Ahluwalia, 1978). Since then the direct and indirect influence of food prices on poverty have been well worked out in the literature. We also know that the 80s, a time of accelerated reduction of poverty, was a time of a declining relative price of food. So when assessing the likely impact of Globalization on poverty reduction in India since 1991, we must factor in the slowing of agricultural growth and the rigidity of the relative price of food in this period. The history of this phase of recent Indian economic history shows us that, as of yet, trade and capital flows, assumed to materialize as the economy gets integrated with the rest of the world, can have only limited power to raise incomes and welfare by comparison with agricultural performance, here interpreted widely enough to include the price of food.⁶

Both economic theory and expectation as expressed by the Government of India, had pointed to one particular route whereby Globalization is likely to have had a major beneficial impact. This is via capital inflows. Capital inflows in

the form of foreign direct investment add to domestic investment and are expected to bring in state-of-the-art technology and managerial skills. Via productivity growth, the latter are expected to contribute to faster growth of output. And being attracted by a poor country's store of cheap labor, multinational corporations are expected to set up export units there. The latter generates employment and earns foreign exchange. Above all, technology flows that close the "ideas gap" (Grossman and Helpman, 1991) between the developed and the developing economies were seen as the pivot from which flows the beneficial impact of Globalization. These arguments were both found in the theory and made much of by the architects of the early stage of the economic reforms in India. In the popular discourse in India, however, there were contrary voices. While not particularly careful in making their argument these had mostly taken a dim view of the likely impact of increased capital inflows, even suggesting that India was embarking upon a second round of colonization, this time by choice exercised by its political leadership. To put it mildly, this view was pessimistic of India's prospects for maintaining her economic independence following global integration.

So, what has actually happened with respect to capital inflows since 1991? I shall rely on the work of Tanushree Majumdar (2005). On the basis of an econometric study the author reports that capital inflows have not contributed to either industrial production or economic growth. She accounts for this as follows: "Either the amount of capital inflows to the country has not been enough or what does flow in is not utilized to its full potential." A particularly interesting result in the literature cited by Majumdar is that FDI is not a significant factor in explaining variations in export performance among firms either.⁷ This implies that foreign capital is in India for its market rather than being attracted here to produce for export.⁸ Overall, Majumdar's results are strong and suggest that both the enthusiasts and detractors of Globalization may have made too much of its impact on India's economy whether beneficial or damaging, as the case may be.

The impact of Globalization on growth and poverty via trade and capital flows exhausts neither the set of outcomes of interest for economists nor the feasible mechanisms whereby Globalization affects an economy. In fact 2 other possible outcomes had been evoked in the debate in the early 90s when the Dunkel Draft that had preceded the launching of the WTO became available in the public domain. These were the impact on the natural environment of the poor economies of Asia and Africa of capital constrained by rich-country regulation seeking pollution havens elsewhere and the impact of the TRIPS Agreement on drug prices, respectively. I do not consider these two important issues here as I move on to the final section of this article.

5. Globalization and Development

From the work of Amartya Sen (1999) we have a more imaginative definition of development. Sen has redefined the concept as the "expansion of freedoms" including among them political freedoms. Clearly, he had had in mind the freedom to do or 'positive freedom' to use the original phrase coined by the philosopher Isaiah Berlin (1958). Positive freedom alone bestows autonomy on the individual. This insight enables us to see clearly what Globalization can

contribute to the project of development as the expansion of freedoms. Globalization as the integration, via trade and capital flows, of hitherto segmented markets is really only an expansion of negative freedoms in that a prevailing restraint has been removed. We would yet be far from achieving an expansion of the positive freedom envisaged in Sen's conceptualization of development. Indeed, the current clamor in India over the lack of inclusiveness of growth may be seen, at least in part, as stemming from such an understanding of development. It is by now clear that to achieve an expansion of positive freedom for the people of India we would need a policy focused on areas of the economy and society quite far removed from the external sector, which only accounts for India's interface with the rest of the world and which alone is quickened in the course of Globalization.

The largest numbers of India's workers today are in a slow-growing sector, namely, agriculture. Some of them would have to move out into the non-agricultural sectors of the economy for gainful employment. This is also necessary to halt the fragmentation of the family farm, a development with long-term debilitating consequences for the Indian economy. Successful completion of this is contingent upon two factors. First, these potential workers need to have the education and training needed for non-agricultural jobs, even when these are located in the rural sector. Secondly, the jobs they may acquire can only be in response to a demand for what they produce. In the first instance, this would have to come from higher agricultural growth. As agricultural production in India cannot any longer expand via extensive cropping, an increase in productivity is central. In the fast-changing economic and increasingly-adverse ecological environment this is contingent upon an educationally better-prepared farmer than we have in India today. We have evidence from the early spread of the Green Revolution in India that bringing about a yield increase is tied to education via the farmer's capacity to innovate, or even to merely assimilate rapid advances in technology. As the greater part of schooling in rural India is provided by the government, in the first instance at least, the necessary educational effort would have to come from the public sector itself. The term *effort* is consciously adopted to indicate that something more than just funds are likely to be required. We are only too aware of the gross wastage of moneys in India's public system. In the educational sector in particular one form this takes is the absenteeism of teachers from schools.⁹ There is the problem beyond absenteeism, however, when we recognize that we cannot be sure that teachers produce the necessary effort even when they are present in school. Governing the school system then appears to be *sine qua non* for improvement in education so necessary to provide greater livelihood opportunities to so many Indians trapped in low-quality jobs that are leading them, and therefore the economy, nowhere. Thus we find that in the plan for equipping workers with the necessary skills governance emerges as the binding constraint. Steady acceleration of the growth rate has led to the accretion of revenues to India's central and state governments. We find that funding for education is certainly not a constraint any longer also as the government shows no sign of being held back by consideration of the budget deficit. It appears in particular that funding for education is not a constraint any longer. As an illustration, we may consider the following. Since the early part of this century the government has made available substantial

funds for primary schooling via its grandly titled program Sarva Shiksha Abhyaan. Yet assessment of learning outcomes, on which data is scarce, by one of the few agencies that undertake such an exercise indicates disappointingly poor outcomes for rural India (ASER, 2005).

We have reason to believe that the case of primary education is part of a larger condition in India according to which poor governance rather than the paucity of funds is responsible for poor outcomes in state-sponsored schemes. Governance it seems is not just poor, it is just missing. To strengthen the plausibility of my argument, I now turn to examples from outside education. The first is from agriculture. Since 1991 the spending on irrigation in India has increased greatly but the expansion of irrigated area has actually slowed (Balakrishnan, Golait, Kumar, 2008). The second example comes from the area of child nutrition. A research team from the Institute of Development Studies at Sussex has shown that the nutritional status of children in India has remained precarious despite a very large increase in public spending. They have explicitly cited governance as the missing link in this scenario (Haddad and Zeitlyn, 2009). The poser whether India is an “economic powerhouse or nutritional weakling?” (Haddad, 2009) is a useful way to understand what may be expected of Globalization when it comes to development.

Globalization as a process continues apace. The issue of how a country can cope with the opportunities that it throws up and the rigors that it imposes have been a topic of discussion among social scientists. There is some agreement among economists that countries that manage Globalization well are those that can successfully mediate conflict, soften the inevitable blows and spread the possible gains. For a country to achieve these capabilities would require a heavy dose of institution-building. Paradoxically, local knowledge matters greatly in crafting appropriate institutions for a country integrating with the world economy. An economist who has studied the progress of Globalization and national attempts to deal with it has assessed the requirement precisely when he says: “Blueprints, best practices, international codes and standards, and harmonization can do the trick for some of the narrowly ‘technical issues’. But large-scale institutional developments by and large require a process of discovery about local needs and capabilities.” (Rodrik, 2006, 31). This appears to have been missed in the official approach to managing Globalization in India since 1991.

6. Notes

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2. This contravenes the prediction made by some of India’s leading economists that the trade liberalization would inevitably lead to balance of payments stress.
3. Curiously, this may have been co-terminus with emerging internal challenges to the nation state, at least in India judging by the resurgence of Maoist guerilla warfare in its heartland and the anti-state agitation in 2010 in Kashmir.
4. In 1995, Greenpeace activists occupied the Brent Spar oil storage facility in the North Sea. Their purpose was to stop plans to scuttle the 14,500 tonne

installation. The action was a part of an ongoing campaign to stop ocean dumping, and pitted Greenpeace against the combined forces of the UK government and the world's then-largest oil company Shell. Greenpeace was successful. See BBC News (1998).

5. FDI as a share of national income of both the countries is also lower today, lending credence to the claim that the pre-1914 era was more globalised.

6. While on the topic of the centrality of agricultural growth, it may be noted that the period of very high growth in India during 2003-04 was one of exceptionally high agricultural growth. (See 'Economic Survey 2009-10', New Delhi: Government of India, 2010.) We do not have the evidence at present to ascertain what this may have done to poverty.

7. This is not so surprising when we consider the IT sector where the domestic firms – WIPRO, TCS and Infosys - have generally dominated exports from the country.

8. It is important, at the same time, to appreciate the role of exports in economic development. While exports may be welcomed as they help bridge the external payments gap for a foreign-exchange strapped economy its impact on poverty cannot simply be assumed. One is reminded of the observation by Arthur Lewis (1954) on his native West Indies that while the multinational sugar industry, producing almost entirely for export, was hugely profitable the workers in that sector went about barefoot. Recall that in Lewis's justly celebrated model workers economy-wide were paid the average product in subsistence agriculture, which was very low. So unless agricultural productivity raised the wage in terms of food workers would remain poor. The ability of this insight to help us understand what globalization can do for an economy with poverty is truly remarkable.

9. The writer Arundhati Roy's young tribal interlocutor Chandu put this rather well when he explained to her the incentive structure for teachers: "Why should they come in to the jungle when they can earn a salary sitting at home?" (Roy, 2010). Of course, the problem of teacher absenteeism in government schools is not confined to the jungles of Central India.

7. References

- Ahluwalia, M.S., (1978), "Rural Poverty and Agricultural Performance in India", *Journal of Development Studies*, 14 (3), 298–323.
- ASER, (2005), *Annual Status of Education Report*, Mumbai: Pratham.
- Balakrishnan, P., (2006), "Benign Neglect or Strategic Intent: The Contested Lineage of the Indian Software Industry", *Economic and Political Weekly*, 41 (36): 2438-44.
- Balakrishnan, P., (2011), *Economic Growth in India: History and Prospect*, New Delhi: Oxford University Press.
- Balakrishnan, P., Golait, R., and Kumar, P., (2008), *Agricultural Growth since 1991*, Mumbai: Reserve Bank of India.
- Berlin, I., (1958), "Two Concepts of Liberty", in Isaiah Berlin (1969), *Four Essays on Liberty*, Oxford: Oxford University Press.
- BBC News (1998), "Brent Spar's Long Saga",

- <http://news.bbc.co.uk/2/hi/science/nature/218527.stm>; accessed 31 January 2011.
- Castells, M., (2004), *The Information Age: Economy, Society and Culture, Volume II: The Power of Identity*, second edition, Oxford: Blackwell.
- Deaton, A. and Dreze, J., (2002), "Poverty and Inequality in India: A Re-examination", *Economic and Political Weekly*, 37 (36), 3729-3748.
- Fischer, S., (2003), "The Challenge of Globalization", Richard Ely Lecture, *The American Economic Review*, 93 (2), 1-30.
- Fukuyama, F., (1989), "The End of History?", *The National Interest*, 16, Summer, 3-18.
- Grossman, G.M. and Helpman, E., (1991), *Innovation and Growth in the Global Economy*, Cambridge, MA: MIT Press.
- Haddad, L. and Zeitlyn, S., (2009), "Lifting the Curse: Overcoming Persistent Undernutrition in India", *IDS Bulletin*, 40 (4), 1-120.
- Haddad, L., (2009), "Economic Powerhouse or Nutritional Weakling?", *The Hindu*, Kochi, India, 15 September.
- Lewis, A., (1954), "Economic Development with Unlimited Supplies of Labour", *The Manchester School of Economic and Social Studies*, 22 (2), 139-91.
- Majumdar, T., (2005), "Capital Flows into India: Implication for Economic Growth", *Economic and Political Weekly*, 50 (21), 2183-2189.
- Myrdal, G., (1957), *Economic Theory and Underdeveloped Regions*, London: Duckworth.
- Ohmae, K., (1995), *The End of the Nation State: The Rise of Regional Economies*, New York: Simon and Schuster.
- Rodrik, D., (2006), "Institutions for High Quality Growth: What They Are and How to Acquire Them", in K.C. Roy and J. Sideras (eds.) *Institutions, Globalization and Empowerment*, Cheltenham: Edward Elgar, 19-55.
- Roy, A., (2009), "Walking with the Comrades", *Outlook Magazine*, March 29.
- Sen, A., (1999), *Development as Freedom*, New York: Alfred Knopf.

Country Growth Patterns: How Do Industrial and Emerging Market Nations Differ?

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Abstract. Some well-known two-sector models of industrial countries exhibit a crowding out effect between the main sectors of the economy. This is true of the Small Open Economy, traded-non-traded good model without nominal wage rigidity, and for the model of the Dutch Disease. In contrast, important models of semi-industrialized countries, or even emerging markets, such as the Bose Model, portray a complementary relation between the various sectors. This paper discusses a possible synthesis between these differing model specifications, and tests the applicability of these models for a large sample of industrial countries, emerging markets and developing economies by analyzing the inter-linkages in their sector growth patterns.

JEL Classification: O 11, O 57, F 41

Keywords: Open economy models, Dutch disease, Emerging markets, Sectoral growth patterns

1. Introduction

Important two sector models applied to industrial economies often do not seem to be useful in explaining developments in semi-industrialized or even emerging market economies. The analysis with these models often turns out a crowding out, rather than a complementary relation between the various sectors of the economy, which does not usually hold in the case of industrializing countries. The growth process in these nations seems to be better explained by some models specifically designed for them. However, there seems to be possibilities of making a synthesis of these different two sector models, theoretically, or even in an empirical sense, so that the approaches have wider application, to more than a limited group of countries.

Prompted by such a belief, some of the two sector models used widely in applied economic analysis of developing as well as industrial nations are compared in the next section of the paper. Section 3 is devoted to the methodology and an empirical application of these models to explain differences in industrial growth patterns in a large sample of countries that includes developing nations, emerging market economies, and richer industrial nations. Section 4 discusses the empirical results and the final section is the conclusion.

2. Two Sector Models of Industrial and Industrializing Economies

One of the most widely used models of developed industrial economies is the so-called *Small Open Economy (SOE) Model*. It portrays an economy producing traded and non-traded goods, with differing price formation mechanisms in the closed and the open sectors. For the traded goods, there is no possibility of a mark-up pricing at home, or of the price moving in tandem with domestic demand. The price is quite simply set in the world market, which the domestic economy, appropriately considered a *small* open economy, has no influence worth remarking upon. In contrast, goods produced in the non-traded sector are priced in response to domestic conditions of supply and demand only.

In such a two-sector SOE model, the relation between sector outputs will hinge upon the wage formation patterns. With nominal wage rigidity, it would be possible for output in both sectors to increase, in response to favorable domestic and international demand developments. However, as, for instance, shown in Calmfors (1979); rising domestic wages, either via a Philips Curve mechanism due to demand pressure (from government demand for non-traded goods) or due to real wage rigidity, will bring about an asymmetric development in the economy. With rising demand for non-traded goods leading to a hike in their prices, such wage formation mechanisms will result in increased output of non-traded goods, perhaps mostly in the service sector, and a reduction in output of traded goods, often manufactures. Lindbeck (1979) also notes that overshooting of the room for wage increases in the Scandinavian Model of Inflation in which sector productivity increases play a major role – can lead to unemployment and reduced sector outputs.

The model of de-industrialization or the Dutch Disease (see Corden and Neary, 1982) has been applied to explain the crowding out of manufacturing in Holland and Britain following the manna from heaven of oil and gas discovery and exploitation. Rising incomes and wage costs in the wake of transfers from abroad made domestic manufacturing, tied to world prices again, less profitable. In the case of the U.K, exchange rate appreciation also played a role. This model of de-industrialization thus applies to a scenario where the services sector booms while the manufacturing sector contracts.

The two-sector model in Bose (1989, 1993), in contrast, paints a scene where favorable developments in real incomes and output in the agricultural sector is needed to increase demand for, and output in the industrial sector. There is no wage push or pull mechanism operating, but rise in the price of the non-industrial (i.e., agricultural sector in this model) sector output will mean less real income for wage earners, and hence less demand for industrial goods such as textiles, which are labor-intensive in production. It can be observed that increased agricultural productivity will also lead to higher agricultural output; lower food prices and higher real wage incomes, and hence enhanced output of industrial goods. Thus, basically, agricultural output growth and industrial growth should show a positive correlation.

The main elements of the Bose Model, which has been quite influential in discussions and economic policy formulation in India and other industrializing nations, can be briefly summarized in equations (1) to (4). The model incorporates profit earning industrialists, industrial workers and farmers. The share of the wage earner in industrial output 'y' is assumed to be constant at 'u'.

The income of farmers equals the value of marketed agricultural output demanded by industrial workers.

$$y^d = A + m_p(1-u)y + m_f px + m_w(p)uy \quad (1)$$

$$px^d = [1 - m_w(p)]uy \quad (2)$$

$$y = y^d \quad (3)$$

$$x = x^d \quad (4)$$

Equation (1) represents the industrial good, emanating from all three groups of participants in the economy. The first term A is just the sum of constants in the consumption equations of the various groups. m_p and m_f are the marginal propensities to consume of profit earners and farmers respectively. The second term, therefore, will capture the change in demand for industrial products as the profit income $(1-u)y$ changes, 'u' being the capitalist share. Similarly the third term is the demand arising from farmer income (px) , obtained by sale of the marketable agricultural surplus 'x', which is held exogenous in the model.

The third term in (1) is the demand due to worker income (uy) , but the marginal propensity to consume from this income, m_w , is modeled to be dependent on the price of agricultural product (food), 'p'. The marginal propensity to consume industrial products falls as the price of food rises, since the *demand for food is price inelastic*. For simplicity, we rewrite $m_w(p)$ in what follows as $(\alpha - kp)$, with $k > 0$, so that the marginal propensity of workers to consume the industrial good is seen to fall as the price of food, p, rises.

Equilibrium in the system is represented by equilibrium in the industrial and agricultural product markets, (3) and (4), respectively, equating demand and supply. Substituting these equilibrium conditions into (1) and (2), we can solve for 'y' and 'p'. In fact, we can substitute (2) also into (1) to solve for 'y' [also using $m_w(p) = \alpha - kp$, with $k > 0$] as

$$y = \frac{A}{1 - \varphi} \quad (5)$$

where

$$\varphi = [(1-u)m_p + um_f(1-\alpha) + u\alpha + puk(m_f - 1)] \quad (6)$$

It can be observed from (5) and (6) that as long as m_f is less than 1, 'y' and 'p' have an inverse relationship. A rise in the price of the marketed agricultural surplus may increase industrial demand from farmers, but the fall in demand from workers whose real incomes have fallen will bring about a reduction in total demand for industrial goods. Thus, with industrial output being demand-determined, an increase in agricultural production (and marketed surplus), which reduces food prices, will also boost industrial production. The model has,

therefore, features, which can bring about a complementary relationship between agricultural and industrial output growth.

The Bose Model has, of course, seen further development and applications, but we do not elaborate further on these here. We can just briefly note that the model generates interesting results concerning income distribution issues also. Disaggregating industrial production into luxury goods and wage goods output, with the profit earners consuming only the former, it can be shown – with reasonable assumptions about relative marginal propensities to consume – that luxury goods production may increase even when total industrial output contracts. Also, recognizing the existence of marginal farmers who do not sell any agricultural surplus, it can be shown that their real incomes will fall when agricultural prices and agricultural incomes as a whole rise. This effect will also translate into less demand for wage goods, and can exacerbate the contraction of the aggregate industrial sector. Since such goods like textiles are usually more labor-intensive in production than luxury good like automobiles, there are also important implications in the model results for the level of employment.

The Lewis (1954) and Harris-Todaro (1970) models of less developed countries also indicate a complementary pattern of growth between the rural (agricultural) sector and the urban (manufacturing) sector, provided there are no serious wage shocks or unfavorable productivity developments. It may be noted that the terms of trade plays an important role in all the models discussed here, and that can be a common strand which binds them together. In the SOE model applications, it is usually increased government demand for non-traded services, often with the intention of propping up employment levels, which turns the terms of trade in favor of the non-industrial sector. In Bose' (1989, 1993) model too, harvest failures or changes in government procurement policy involving support prices can affect the terms of trade between industry and agriculture. In both cases, turning the terms of trade against industry leads to a reduction in industrial output. Thus, despite considerable differences between the models used for industrial nations and developing economies, similar results can be forthcoming under certain conditions or assumptions.

However, in this age of the dominance of the IT sector, a linkage may be expected from this sector to all of the other sectors. So, at least for the current decade, the IT sector growth and inter-linkages have to find a place in such analysis.

2.1 The IT Sector: A Force for Homogeneity?

The models described above predict differences in growth patterns between industrial and developing nations. However, the emergence of the IT sector as an innovative sector in its own right - and in fostering productivity growth in the other sectors - may have changed the scenario described above, and created more homogeneity in output growth patterns across countries. Studies such as Calmfors et al., (2006), Batavia et al., (2007) try to quantify the contribution of the IT sector to aggregate growth or to gauge its importance in the process of productivity and income catch-up between poor and rich nations. In this study, we relate the developments in the manufacturing and the other services sectors to the growth in output and productivity in the IT sector, both in the industrial nation group and in the emerging market group.

2.2 *Financial – Real Economy Links*

The models discussed above are real models, without a financial sector. We add on a financial sector in the empirical analysis. But, instead of, for instance, splitting services into financial and non-financial services, we introduce the stock market. The hypothesis is that in countries experiencing strong aggregate growth, such as in ASEAN during the best tiger economy days, there will be a strong positive link between stock market expansion and total output growth.

3. Methodology and Empirical Application

The sample of countries for the study, numbering 51 in all, consisted of one group which includes the original European Union bloc together with some of the older new entrants such as Hungary and Poland (which have, presumably, the same type of growth pattern as the western industrial nations), and a number of other industrial nations. The other group included in the sample consists of a number of developing countries and emerging market nations. Table 1 below lists the entire sample.

Data on sectoral outputs for all these countries (source: World development Indicators of The World Bank, OECD database, ASEAN Secretariat, International Financial Statistics, IMF) was be collected for the 2000s, for the period 2005 to 2008, the average values being used in cross-country estimations. Prior to embarking on the actual empirical work, the premise is that the countries belonging to different categories will show a different pattern of interdependence between sectoral output growth rates. It is also conjectured that aggregate growth rates will be higher for countries with a close correlation between sectoral growth rates. In other words, countries experiencing balanced growth will also tend to have higher aggregate growth in the total economy. Finally, the influence of the IT sector may also result in the growth patterns becoming more uniform across countries.

3.1 *Models to be Estimated:*

The following cross-country regressions are run for the two country groupings, first without the IT sector.

$$g_m = \alpha_0 + \alpha_1 g_s + \alpha_2 g_a + \epsilon \quad (1)$$

where g_a is the growth rate of the agricultural sector, g_s is the growth rate of the services sector, and g_m is the growth rate of the manufacturing sector. This equation relates the growth in manufacturing to that in the services and the agricultural sector. With a balanced growth pattern, as postulated for developing and emerging market nations, the coefficients should be positive and significant in the equation, and insignificant for industrial nations which are postulated to have an unbalanced growth pattern with one sector crowding out the other.

Table 1: Country Sample for the Study

Industrial Nations	Emerging Markets and Developing Nations
Australia	Argentina
Austria	Bangladesh
Belgium	Bulgaria
Denmark	Chile
Cyprus	Colombia
Finland	Costa Rica
France	Egypt
Germany	Estonia
Greece	India
Hungary	Indonesia
Italy	Kenya
Japan	Latvia
The Netherlands	Lithuania
Norway	Malaysia
Poland	Mexico
Portugal	Mauritius
Spain	Pakistan
Sweden	The Philippines
UK	Romania
USA	Singapore
Ireland	Slovenia
Luxembourg	South Africa
Switzerland	Sri Lanka
	Thailand
	Turkey
	Vietnam
	Ukraine
	Zambia

3.2 Next the IT sector is brought into the picture:

$$g_m = \alpha_0 + \alpha_1 g_s + \alpha_2 g_a + \alpha_3 IT_{gs} + \alpha_4 \epsilon \quad (2)$$

$$g_m = \alpha_0 + \alpha_1 g_s + \alpha_2 g_a + \alpha_3 IT_{ss} + \alpha_4 \epsilon \quad (3)$$

Here IT_{gs} is the share of IT goods exports in total goods exports, and IT_{ss} is the share of IT services exports in total service exports. For some countries like Singapore, IT goods exports figure prominently in the national exports scenario, while for countries like India, IT service exports are important. These exports also indicate links to the rest of the economy in terms of productivity contributions, and may explain sectoral growth patterns. While it would have

been desirable to include IT sector growth rates as an explanatory variable, this data was not available for all the countries in the sample.

3.3 Finally, the financial sector is also introduced:

Using stock market turnover ratio to GDP as a proxy:

$$g_m = \alpha_0 + \alpha_1 g_s + \alpha_2 g_a + \alpha_3 IT_{gs} + \alpha_4 STY + \alpha_5 \epsilon \quad (4)$$

In (4), STY represents the ratio of stock market turnover value to GDP. These equations are run separately for the groups of industrial nations and developing and emerging market nations.

4. Empirical Results

Tables 2 and 3 provide the results of the estimation.

Table 2: Regression Results: Emerging Markets and Developing Nations

(Dependent Variable: gm (manufacturing growth %))

Equation No.	g_s (services growth %)	g_a (agriculture growth)	IT_{gs} (Share of IT goods, exports)	IT_{ss} (Share of IT services, exports)	STY (stock traded/GDP)	Constant	R^2
1	0.6229*					2.102	0.212
2		0.089				5.743	0.02
3	0.5935*		-0.029			2.57	0.213
4	0.6338*	0.1117				1.755	0.25
5	0.6193*			-0.035		2.039	0.226
6	0.6220*				-0.004	2.192	0.213

* The significance level of the t statistics for the coefficients is represented by one star for 10%, and two and three stars for five and one percent respectively.

Table 3: Results for Industrial Nations

(Dependent Variable: gm (manufacturing growth %))

Equation No.	g_s (services growth %)	g_a (agriculture growth)	IT_{gs} (Share of IT goods, exports)	IT_{ss} (Share of IT service, exports)	STY (stock traded/GDP)	Constant	R^2
1	0.141					2.752	0.032
2		0.0085				3.743	0.006
3	0.1359		-0.0047			2.57	0.013
4	0.0242	0.1234				2.075	0.003
5	0.0189			0.0893		2.29	0.02
6	0.138				-0.004	2.192	0.024

First of all, we can note from Table 3 that the growth rate of manufacturing is quite unrelated, i.e., the differences in the cross-country sample of industrial nations cannot be explained by, any of the independent variables. In particular, manufacturing growth and growth in the services and the agricultural sectors do not move together. This is what we postulated when starting the analysis, and this is consistent with the Dutch Disease models etc (though those models give a stronger result that growth in one sector crowds out growth in the other)

Table 2 for the emerging and developing nations provides a stark contrast in results. In all the equations, growth in manufacturing is positively and significantly related to growth in services. This is the case of “balanced growth” that we postulated for these countries at the beginning of the analysis, and is consistent with the predictions of the Bose model.

Rather surprisingly, the IT sector and financial sector variables are not significant. Also, the agricultural growth variable is not significant. But this was seen to be the case for the 1990s also, in an earlier study in this vein by the authors (Batavia, Nandakumar and Wague, 2004). In that study, it was noted that manufacturing and agricultural growth were positively related for developing and emerging market nations for the 1980s, but not for the 1990s. However, the finding there was that services sector and manufacturing growth were positively related for both decades. The present study confirms this result for the current decade also. The appendix provides information on the results of this earlier study, which had a different sample (as Eastern European nations were not independent at that time).

5. Concluding Remarks

This paper has studied the possibility of applying various well-known multi-sector models to explain sector growth patterns in a sample of sixty-four countries, which included important emerging markets, and a large number of developing and developed industrial nations. The non-traded – traded goods model of the small open economy, the model of the Dutch Disease or de-industrialization, the Harris-Todaro urban-rural representation, and the agricultural-industry inter-linking Bose Model were included in the survey and the subsequent empirical application.

The empirical results seem to indicate that the De-industrialization phenomenon may be prevalent among the group of industrial nations included in the study. For the period of the study, 2005 – 2008, manufacturing sector growth is not positively related to the services sector growth – or growth in agriculture. Also, it was noted that there is a very low or negative correlation in the correlation tables between these sectors. Such a result of a negative correlation between manufacturing and service sectors would be what emerges from the Small Open Economy model in the presence of real wage rigidities. In the case of the other group, that of emerging market and developing nations, manufacturing growth is positively and significantly related to growth in the services sector. Thus, the premise of balanced growth in developing countries, and that of unbalanced growth in the industrial nations seems to be confirmed. It

may be added that the IT sector influence on differences in growth patterns does not stand vindicated by this analysis.

One may therefore conclude that all the multi-sector models considered in this study have relevance for explaining sector growth patterns in every group of countries in the last couple of decades. With an appropriate modeling of labor market conditions and inter-sector linkages, the growth patterns may be traced fairly well by the use of these models.

6. Notes

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7. References

- Batavia, B., P. Nandakumar and C. Wague, (2007), "The IT sector, Globalization and Convergence in Income and the Human Development Index", *International Journal of Business Research*, No.2., Vol. VII.
- Batavia, B., P. Nandakumar and C. Wague, (2004), "Macroeconomic Models for Developed and Developing Nations; A Synthesis", *Working Paper, Summer*, Södertörn University of Stockholm.
- Baumol, W.J., R.R. Nelson and E.N. Wolf (eds) (1994), *Convergence in Productivity: Cross National Studies and Historical Evidence*, Oxford University Press.
- Bose, A. (1993), "Price-Income Fluctuations and Agricultural Shocks in a Semi-Industrialized Economy", in Dutta, B., S. Gangopadhyay, D. Mookerjee and D. Ray (eds) *Theoretical Issues In Development Economics*, Delhi, Calcutta and Madras: Oxford University Press, 3-24.
- Bose, A. (1989), "Short Period Equilibrium in a Less Developed Economy", in Rakshit, M.K., (ed) *Studies In The Macroeconomics of Developing Countries*, Delhi: Oxford University Press, 26-40.
- Calmfors, L. (1979), "Real Wages, Inflation and Unemployment in the Open Economy", in Lindbeck, A. (ed) *Inflation and Employment in Open Economies*, North-Holland, 41-70.
- Calmfors, L., G. Corsetti, S. Honkapohja, J. Kay, G. Saint-Paul, H-W. Sinn, J.E. Sturm and X. Vives, (2006), "Economic Growth in the EU", in *Report on The European Economy, European Economic Advisory Group, CESifo*.
- Corden, M.W and Neary, J.P. (1982), "Booming Sector and De-industrialisation in a Small Open Economy", *Economic Journal*, 92, December; 825-848; reprinted in W.M. Corden: *International Trade Theory and Policy: Selected Essays of W. Max Corden*, Alderhot: Edward Elgar 1992.
- Harris, J., and Todaro, M., (1970), "Migration, Unemployment and Development: A Two Sector Analysis", *American Economic Review*, March, 126-42.
- Lewis, A., (1954), "Economic Development with Unlimited Supplies of Labour", *The Manchester School of Economic and Social Studies*, Vol. 22, 139-91.

8. Appendix**Table A1: The Sample from the Earlier Study (Batavia, Nandakumar and Wague, 2004) for 1980s and 1990s Data**

Emerging Markets	Developing Countries	Industrial Nations
Argentina	Bangladesh	Australia
Brasil	Bolivia	Austria
Chile	Botswana	Belgium
India	Burundi	Canada
Indonesia	Cameroon	Denmark
Republic of Korea	Colombia	Finland
Malaysia	Republic of Congo	France
México	Costa Rica	Germany
The Philippines	Dominican Republic	Greece
Thailand	Ecuador	Italy
Turkey	El Salvador	Japan
Venezuela	Gambia	Netherlands
Vietnam	Ghana	New Zealand
	Guinea-Bissau	Norway
	Iran	Portugal
	Jamaica	Spain
	Jordan	Sweden
	Kenya	United Kingdom
	Nicaragua	United States
	Níger	
	Nigeria	
	Pakistan	
	Paraguay	
	Peru	
	Senegal	
	Sierra Leone	
	South Africa	
	Sri Lanka	
	Trinidad and Tobago	
	Tunisia	
	Zimbabwe	

Results:**Table A2: Sector Growth Correlations: Industrial Nations, 1980s**

Sector	Industry	Agriculture	Services
Industry	1	-0.15	0.57
Agriculture	-0.15	1	0.03
Services	0.57	0.03	1

Table A3: Sector Growth Correlations: Entire Sample, 1990s

Sector	Industry	Agriculture	Services
Industry	1	0.28	0.70
Agriculture	0.28	1	0.30
Services	0.70	0.30	1

Table A4: Sector Correlations: Developing Countries, 1990s

Sector	Industry	Agriculture	Services
Industry	1	0.24	0.62
Agriculture	0.24	1	0.28
Services	0.62	0.28	1

Table A5: Sector Growth Correlations: Emerging Markets, 1990s

Sector	Industry	Agriculture	Services
Industry	1	0.46	0.87
Agriculture	0.46	1	0.43
Services	0.87	0.43	1

Table A6: Sector Growth Correlations: Industrial Countries, 1990s

Sector	Industry	Agriculture	Services
Industry	1	0.28	0.12
Agriculture	0.28	1	0.27
Services	0.12	0.27	1

Table A7: Estimation Results for Industrial Growth, 1990s
(Dependent Variable: % change in industrial output)

Country Group	Constant	Agricultural Growth	Service Sector Growth	Adjusted R squared
All	-0.336 (0.65)	0.105 (0.74)	0.927(7.13**)	0.49
Developing Countries	-0.124 (0.314)	0.092 (0.48)	0.728 (3.94*)	0.39
Emerging Markets	-0.78 (0.71)	0.315 (0.64)	1.18 (5.01*)	0.75
Industrial Nations	1.81 (0.554)	0.182 (1.77)	0.08 (0.19)	0.08

Table A8: Regression Estimates for Industrial Growth, 1980s
(Dependent Variable: % growth of industrial output)

Country Group	Constant	Agriculture Growth	Service Sector Growth	Adjusted R Squared
All	-0.60 (1.26)	0.527 (3.937*)	0.739(7.96**)	0.60
Developing Countries	-0.76 (1.03)	0.640 (3.456*)	0.627(4.496*)	0.51
Emerging Markets	-0.215 (0.16)	0.191 (0.39)	0.952 (4.26*)	0.73
Industrial Nations	0.732 (0.978)	-0.116 (0.827)	0.703 (2.86*)	0.35

Causes of the Financial Crisis and Great Recession: The Role of U.S. Monetary Policy

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Abstract. This paper focuses on the role U.S. monetary policy may have played in creating the U.S. housing boom/bust cycle that caused the financial crisis of 2007-2008 and consequently the “Great Recession”. Both capital inflows and looser U.S. mortgage lending terms and standards (to the extent that these are independent of monetary policy) suggest an alternative source of funds to fuel the initial increase in housing demand and also to sustain the boom. We find the argument that U.S. monetary policy solely caused the housing price boom/bust cycle less than completely convincing.

JEL Classification: E5, E32, E65

Keywords: Monetary policy, Great Recession, Financial crisis

1. Introduction

If the literature on the Great Depression is any indicator, sorting out the causes of the “Great Recession” of 2007-2009 in the U.S. and associated financial crisis will occupy economists for decades to come. As with the Great Depression literature the debate over causes can be framed as a debate over whether the Great Recession was due to market failure, government failure or both. The answer to this debate is of critical importance for devising appropriate policy responses to prevent future crises. The outcome of the debate also has implications for how macroeconomic theory needs to be revised in light of the Great Recession and financial crisis.

A common view among economists is that housing price boom, which eventually burst in the summer of 2006, was the cause of the crisis. The cause of the housing boom can be attributed to two events: 1) the low interest rate environment from 2002 to 2006, and 2) financial market developments that made housing credit easier for borrowers to get. These two events can be further broken down into being caused either by market forces (potentially market failures) or by government policy (potentially government failures). For example the 2002 to 2006 low interest rate environment can be attributed to monetary policy failures (Taylor 2007) or to market forces. The potential market forces source of low interest rates include an increased world demand for safe assets and/or the global savings glut which in turn was perhaps due to government policies abroad (Bernanke 2010a, b)). The increased ease of obtaining housing credit can be attributed either to a failure in government policy (i.e. government pro-housing policies associated with Fannie May, Freddie Mac) or

to market failure in the form of a collapse in lending standards. An additional potential source of market failure occurred if part of the boom was due to a bubble in housing prices.

In this paper we focus on the debate over the cause of the housing boom and in particular the role U.S. monetary policy may have played in creating the boom. In future papers we hope address the role of market failure versus government failure as explanations of other aspects of the Great Recession. The most prominent proponent of the argument that monetary policy caused the housing boom is John Taylor (2007, 2010).

What is at stake and why does it matter whether or not monetary policy caused the Great Recession and financial crisis? If bad monetary policy caused the housing price boom and bust cycle then the implication is, similar to that argued by Milton Friedman and Anna Schwartz (1963) in the context of the Great Depression that free markets function well and those crises that do occur are due to monetary policy mistakes. This view of the role of monetary policy during the Great Depression is widely held by economists who have studied the Great Depression. As Ben Bernanke (2002) graciously said at a conference honoring Milton Friedman:

“Let me end my talk by abusing slightly my status as an official representative of the Federal Reserve. I would like to say to Milton and Anna: Regarding the Great Depression. You're right, we did it. We're very sorry. But thanks to you, we won't do it again.”

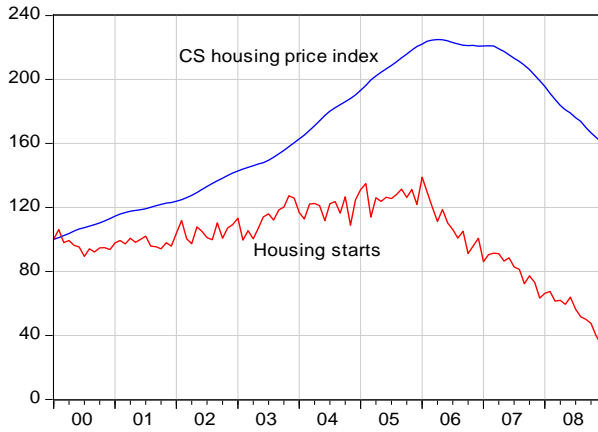
Hence the argument over the role that U.S. monetary policy played in creating the housing boom-bust cycle is a debate over whether or not the Fed “did it again” by following monetary policies which destabilized the economy.

2. The U.S. Housing Boom and Bust

Figure 1 shows the Case-Shiller index of housing prices and housing starts, with both variables set to equal 100 in the year 2000. Housing starts peaked in January 2006, 38% higher than their level six years earlier. Housing prices peaked in May 2006, at 125% of their January 2000 level. To understand the link between housing prices and housing starts consider the simple model of the housing market given in Figure 2. In the short run housing prices are determined by the intersection of the inelastic stock of housing and the demand for housing. The demand for housing depends negatively on the current price of housing, negatively on interest rates as well as depending on other factors such as the availability of housing credit, rents and expected future housing prices. Housing starts depend positively on housing prices, negatively on interest rates (since developers typically borrow to finance construction) and as well as on other factors. Eventually housing starts add to the stock of housing, shifting the stock of housing curve to the right which, everything else equal, reduces housing prices.

This framework makes it clear that some event or events must have increased the demand for housing and hence caused the increase in housing prices and housing starts.

Figure 1: Housing States and the Case-Shiller Housing Price Index (Both relative to 2000: 01=100)



Source: Standard & Poors, Federal Reserve Economic Data, authors calculations

Figure 2: A simple model of the housing market: An increase in the demand for housing increases both housing prices and housing starts

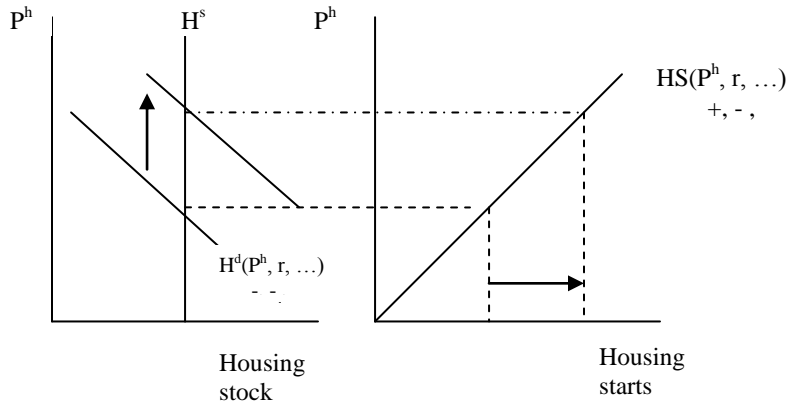


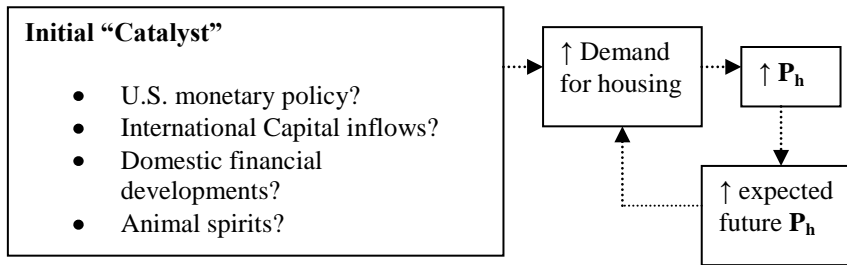
Figure 3: Flow Diagram Model of the U.S. Housing Price Boom/Bubble

Figure 3 provides a flow diagram model of the housing price boom/bubble. The debate over what caused the housing price boom can be thought as a debate over what the initial “catalyst” or trigger was that caused the increase in housing demand. An increase in housing demand shifts the demand for housing curve right resulting in an increase in housing prices (P^h). The higher housing prices result in developers starting to build more houses. By definition a bubble develops if higher housing prices cause increases in expected future housing prices causing the demand for housing to increase some more. This leads to further increases in housing prices and expected housing prices and so on in an upward spiraling housing price bubble. The rising housing prices result in further increases in housing starts, as developers respond to higher housing prices by building more housing. Empirically housing starts moved with the increase in housing prices (see Figure 1). In the model, as housing starts become completed housing, the supply of housing curve (in the left graph) shifts right putting downward pressure on housing prices. Housing prices continue to rise so long as demand for housing grows faster than increases in the housing stock. The bust in housing prices occurs when the supply of completed housing grows faster than the increase in housing demand perhaps because the supply of potential home buyers is exhausted.

Taylor (2007, 2010) argues that the initial catalyst that increased housing demand was the loose monetary policy in 2002-2005 and downplays somewhat the idea that a bubble developed, i.e. the feedback in the flow diagram from higher housing prices to higher expected higher price to increased demand for housing and so on. After attempting to evaluate Taylor’s argument, alternative explanations for the initial catalyst such as international capital inflows, domestic financial developments and animal spirits are discussed.

3. Taylor’s Evidence that U.S. Monetary Policy Created the Housing Boom

John Taylor (2010) argues that government policy was “...the ultimate source of the extraordinary housing boom and the subsequent housing bust and financial distress ...” While Taylor attributes some of the cause to lending by Fannie Mae and Freddie Mac and some to capital inflows into the U.S., he believes that the Fed bears

the primary responsibility for causing the housing boom. Taylor's argument has three components: The first component is that from the mid 1980s up to 2001, the period known as the "Great Moderation", U.S. monetary policy was consistent with the Taylor Rule. Taylor originally reported his rule for monetary policy as a description of Fed policy in the 1990s. Subsequent research shows that it is optimal in some theoretical settings for a central bank to follow a Taylor monetary policy rule (Woodford 2001). Taylor's version of his rule (the success of the approach is indicated perhaps by the number of alternative versions of Taylor's rule) is:

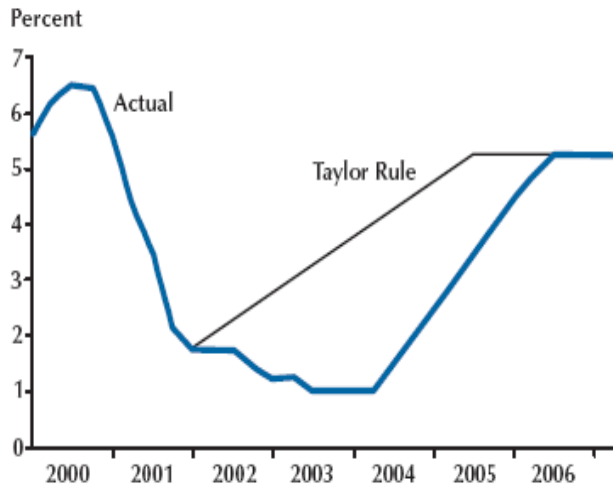
$$(1) \quad FFR_t = 4\% + 1.5 * \pi_t + 0.5 * gap_t,$$

where FFR_t is the Federal funds rate, π_t is CPI inflation, and gap_t is the gap between real GDP and potential GDP (as measured by the CBO). A central bank which follows equation (1) i.e. increasing the policy interest rate by more than increases in inflation and/or increasing the policy rate when the output gap increases should stabilize both inflation around the inflation target and output around the natural rate of output. In fact, consistent with monetary policy that follows the Taylor Rule being optimal, between the mid 1980s up to 2001 both the volatility of inflation and real GDP growth decreased.

The second component of Taylor's argument is that from roughly 2002 through 2005 the Federal funds rate was below the level suggested by Taylor's version of the Taylor rule (for example by up to 300 basis points in 2004, see Figure 4). Taylor refers to this as the "Great Deviation" of monetary policy which in his view caused the housing boom-bust cycle which ended the Great Moderation. In Taylor's view, loose monetary policy from 2002 to 2005 decreased the cost of mortgage credit and/or increased the profitability to lenders of making housing credit more available resulting in a right shift in the demand curve for housing. This resulted in both a housing price boom and an increase in housing starts. The housing bust is then explained by the increase in the Federal funds rate starting in 2004 which reduced the profitability of lending. In other words in Taylor's view a "boom-bust" or "go-stop" monetary policy caused the boom and bust in housing prices and housing starts.

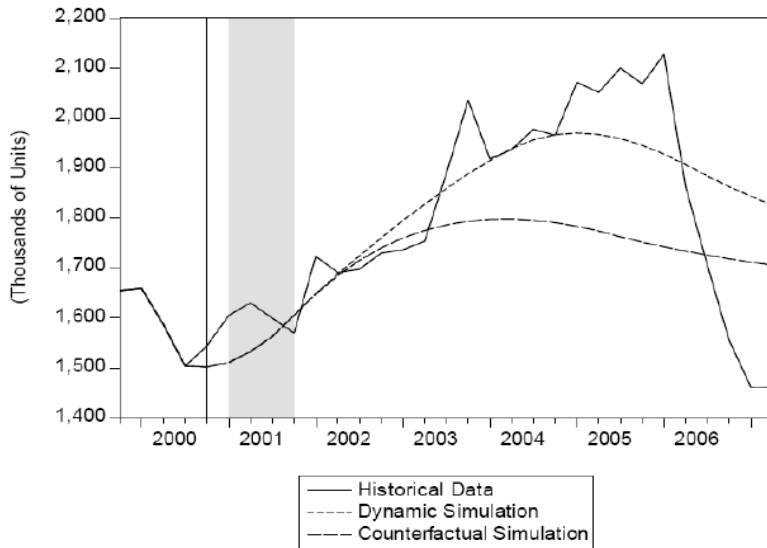
Taylor first makes this argument in Taylor (2007) where he uses equation (1), with changes in the Federal funds rate limited to 25 basis point increments, to derive Figure 4. We can see from Figure 4 that the actual path of the Federal funds rate diverged from Taylor's specification of the Taylor rule from about 2002 to 2005.

Figure 4: Federal Funds Rate: Actual and as calculated by Taylor's Taylor Rule



Source: Taylor (2007)

Figure 5: Taylor's Housing Starts Counterfactual



Source: Taylor (2007)

The third component of Taylor's argument is that the low Federal funds rate from 2002-2005 resulted in a surge in housing starts which Taylor uses as a measure of the housing boom. Taylor (2007) conducts a counterfactual exercise by 1) regressing housing starts on the Federal funds rate from 1959 to 2007 and 2) plugging in the Federal funds rate implied by his version of the Taylor rule to generate a counterfactual path for housing starts given in Figure 5. Taylor attributes the difference between actual housing starts and the counterfactual simulation to the Federal funds rate being too low from 2002-2005. The accumulated difference in housing starts from 2003 to 2005 represents Taylor's estimate of the over investment in housing due to loose monetary policy. Taylor's conclusion is that if the Fed had followed his version of the Taylor rule, the increase in housing starts would have been less dramatic. Hence Taylor argues that the "great divergence" of monetary policy from the Taylor Rule in 2002-2005 caused the housing boom-bust cycle which ended the Great Moderation and caused the Great Recession and financial crisis of 2007-2009.

4. The Response to Taylor

The evidence to counter Taylor's argument has three main components: 1) evidence from alternative specifications of "Taylor Rules", 2) evidence on the relationship between the Federal funds rate and housing prices and 3) non-monetary policy explanations of the housing price boom-bust cycle. We will discuss each of these in turn.

4.1 Alternative "Taylor Monetary Policy Rule" Specifications

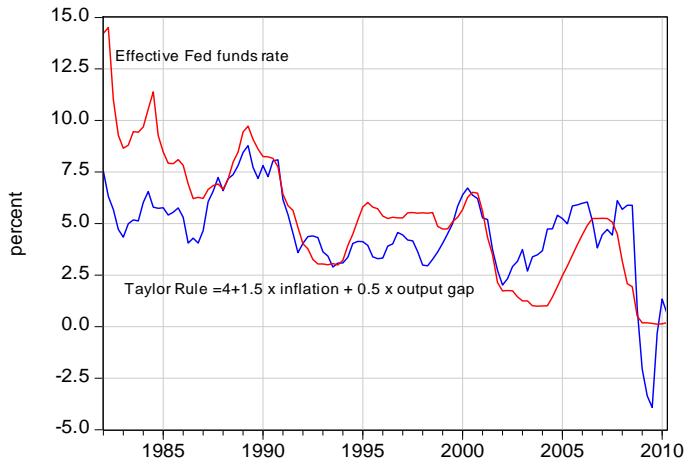
Taylor argues that the Great Moderation was caused at least partly by the Fed following his specification of the Taylor Rule and that the "Great Divergence" from the Taylor Rule resulted in the housing boom. Calculation of Taylor's version of the Taylor Rule (without smoothing the changes in the Federal funds rate to 25 basis point increments) starting in 1982 (Taylor's date for the beginning of the Great Moderation) results in Figure 6. One interpretation of Figure 6 is that even during the Great Moderation period monetary policy occasionally deviated from the rule apparently without adverse consequences. There were "Great Divergences" (deviations of the Federal funds rate from the rule) before the 2002-2005 episode namely from 1982 to 1986 and 1995 to 1998. Unlike the period from 2002 to 2005, these divergences involved the effective Fed funds rate being higher than that implied by the Taylor Rule. Perhaps monetary policy being too tight relative to the Taylor Rule is benign compared with being too loose.

There are also other specifications of a Taylor like monetary policy rule which track actual monetary policy better than Taylor's version and show less of a "great divergence" of monetary policy in the 2002-2005 period. In particular Rudenbush (2009) using data from 1988 to 2008, regresses the Federal funds rate on core inflation and deviations of the unemployment rate from the natural rate of

unemployment $u_t - u_t^n$ (as measured by the CBO) and obtains the following regression equation

$$(2) FFR_t = 2.07\% + 1.28 * \pi_t - 1.95(u_t - u_t^n).$$

Figure 6: Effective Federal Funds Rate and the Taylor Rule 1982-2010



Source: Calculation by the authors, using data from FRED and the CBO's estimate of potential GDP.

Figure 7 graphs actual Federal funds rate and the target rate suggested by equation (2) and shows less of a great divergence of monetary policy in the period 2002 to 2005. As Rudenbusch (2009) states:

“As shown in... [our Figure 7], this simple rule of thumb captures the broad contours of policy over the past two decades. Differences between the recommended target rate from the estimated policy rule...and the Fed's actual target funds rate...are fairly small. Exceptions occurred during the mid-1990s and the mid-2000s, when the funds rate was set somewhat higher or lower than the policy rule recommended.”

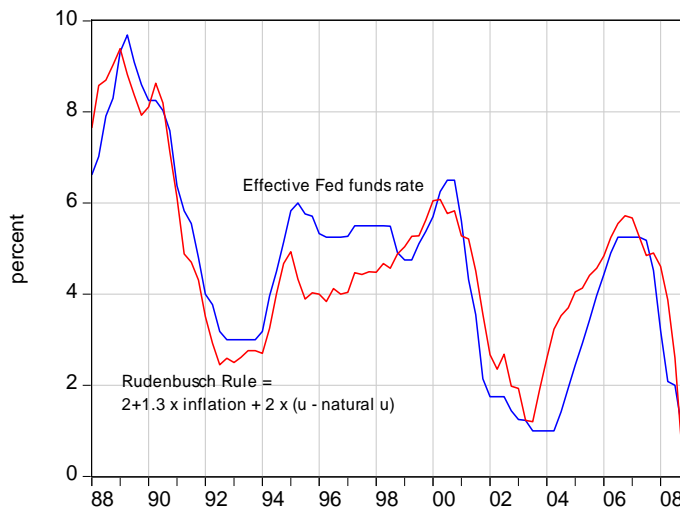
However Rudenbusch's version of the Taylor rule gives a better fit for actual policy in part because the parameter values are based on a regression equation for the period 1988-2008. We re-estimated equation (2) for the period 1988 to 2001 and obtained the following results:

$$(3) \quad FFR_t = 3.05\% + 1.05 * \pi_t - 1.65 * (u_t - u_t^n)$$

(0.25) (0.09) (0.11)

where the standard errors are in parenthesis and the adjusted R squared of the regression is 0.84. We then used equation (3) to derive target rates of inflation from 2002 to 2008. The results of this exercise are reported in Figure 8 and Table 1 and suggest that U.S. monetary policy was loose although not as loose as suggested by Taylor’s version of the Taylor rule. Table 1 shows there was a great divergence of the actual Federal funds rate from the target Federal funds rate based on either Taylor’s version of the Taylor rule (equation (1)) or Rudenbusch’s version if it is based estimates from Fed behavior from 1988 to 2001.

Figure 7: Federal Funds Rate and Target Rate from Rudenbusch’s Version of the Taylor Rule



Source: http://www.frbsf.org/economics/economists/grudebusch/el2009_17data.xls

Figure 8: Federal Funds Rate and Target Rates Based on Alternative Monetary Policy Rules

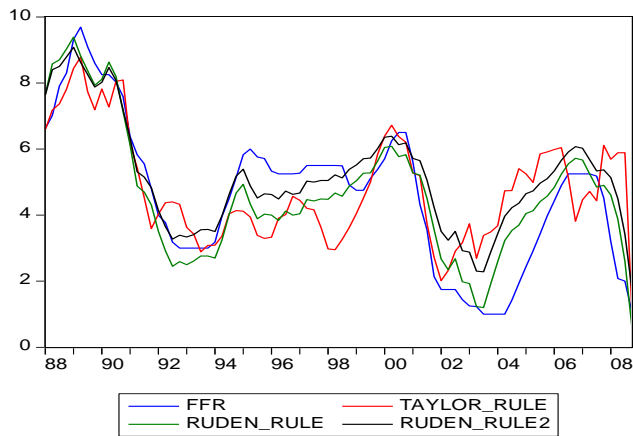
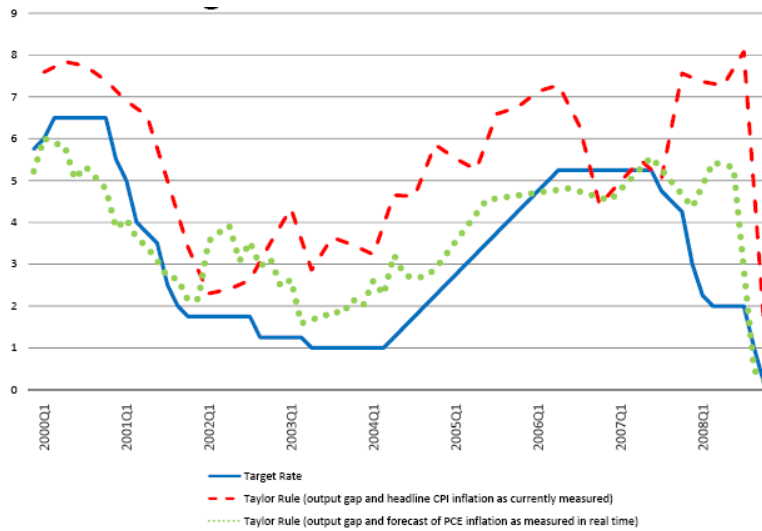


Table 1: Divergence of Federal Funds Rate from Target Rates based on Alternative Monetary Policy Rules (Percentage Points)

Date	Taylor	Rudenbusch – Estimation periods:	
		1988-2008	1988-2001
2002:1	-0.27	-0.92	-1.76
2002:2	-0.57	-0.60	-1.49
2002:3	-1.16	-0.93	-1.76
2002:4	-1.73	-0.54	-1.48
2003:1	-2.49	-0.68	-1.63
2003:2	-1.46	0.00	-1.07
2003:3	-2.39	-0.20	-1.28
2003:4	-2.49	-0.91	-1.87
2004:1	-2.68	-1.59	-2.43
2004:2	-3.74	-2.23	-2.97
2004:3	-3.32	-2.11	-2.81
2004:4	-3.47	-1.76	-2.42
2005:1	-2.81	-1.61	-2.21
2005:2	-2.07	-1.21	-1.81
2005:3	-2.42	-0.98	-1.53
2005:4	-1.94	-0.60	-1.13
Sum	-34.99	-16.87	-29.66

Bernanke (2010a, 2010b) responds rigorously to Taylor’s critique of U.S. monetary policy in the 2002-2005 period, arguing that the Fed’s response to the jobless recovery after the 2001 recession and the fear of deflation were actions consistent with the Fed’s dual mandate of using monetary policy to maintain “maximum employment” and “price stability”, a mandate that does not include popping real estate or other asset price bubbles. Bernanke (2010a) also argues that given the time it takes monetary policy to have an impact on the economy, the FOMC has to set the target Federal funds rate based on expected future inflation rather than the observed rate of inflation at the time of policy meetings. Bernanke shows (see Figure 9) that putting the “Greenbook inflation forecasts” (Federal Reserve Board staff economist inflation forecasts) into Taylor’s version of the Taylor rule gets rid of much of the “great divergence” although the actual Federal funds rate is still lower than the suggested target rate.

Figure 9: Federal Funds Rate, Equation (2) Taylor Rule Target Rate and Equation (2) Taylor Rule Target Rate using the FOMC Greenbook (Rule-Time) Inflation Forecasts



Source: Bernanke (2010a)

4.2 Evidence on the Relationship between the Federal Funds Rate and Housing Prices

As discussed above Taylor argues that the low Federal funds rate from 2002-2005 caused the housing boom-bust cycle, which Taylor measures using housing starts. An alternative measure of the housing boom-bust cycle is housing prices which are perhaps a more direct measure of what is typically meant by the housing boom and

bust. Of course, as discussed above, housing starts and housing prices are related: increased housing demand increases housing prices which encourages more housing starts.

The IMF (2009) looking at a cross section of OECD countries finds almost no relationship between monetary policy interest rates and increases in housing prices. This is due to housing prices rising by large amounts in both countries with low interest rates (such as Ireland) and in countries with high interest rates (e.g. Australia and U.K.). Bean et al. (2010) point out that within the Euro area, with countries facing the same monetary policy, some countries (such as Spain) had a housing price boom while others (Germany) did not. Del Negro and Otrok (2007) make a similar argument for U.S. housing markets: not all regions of the U.S. experienced housing booms. Given that housing booms are associated with low policy rates, high policy rates and no cross section variation in policy rates (in the Euro area and the U.S.) suggests that explanations, other than low monetary policy interest rates, are needed to explain the housing boom. In other words this literature suggests that if monetary policy had followed the Taylor Rule (or at least some version of it) as suggested by Taylor, then housing prices may still have increased.

Glaeser et al (2010) estimate a user cost model of housing prices and find, consistent with our simple housing market model, that while decreases in interest rates cause increases in housing prices, the 200 basis point decrease in U.S. long term interest rates in 2000-2005 can only account for less than half of the increase in U.S. housing prices. Further as shown in the next section of this paper mortgage rates were higher than the historical relationship between the Federal funds rate and the 30 year fixed mortgage rate would suggest. In other words mortgage rates did not fall by as much as one could have historically expected given the fall in the Federal funds rate. That housing prices rose by as much as they did suggest that other factors must have been at play.

4.3 The Federal Funds Rate and the “Bond Market Conundrum”

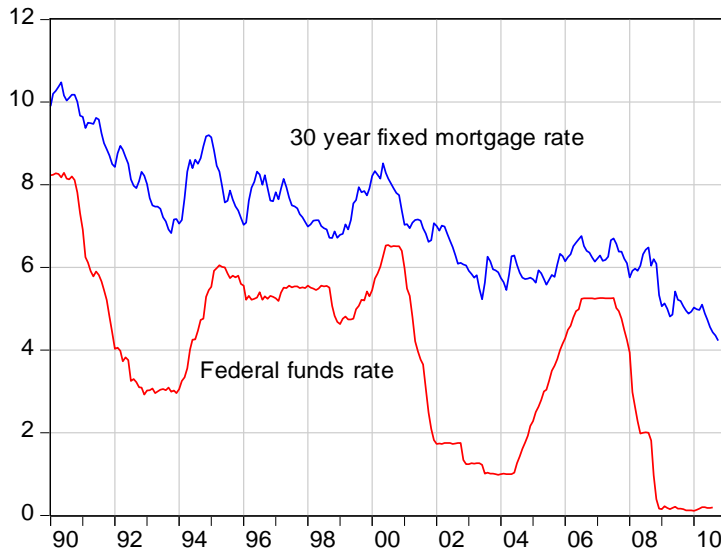
In 2005 testimony to the U.S. Congress Fed chairman Greenspan (2005) pointed out that even though the Fed had increased the Federal funds rate by 150 basis points, long term interest rates had moved little. Since according to the expectations approach to the term structure of interest rates, long term interest rates can be thought of as an average of current and expected future short interest rates, the lack of movement in long term rates was according to Greenspan a “conundrum”. Figure 10 compares the 30 year fixed mortgage rate and the Federal funds rate. These two interest rates are positively correlated with the spread between them measuring the profitability to lenders making mortgage loans. To estimate the relationship between the 30 year mortgage rate and the Federal funds rate we estimated the following regression using data from 1971 to 2000:

$$(4) \Delta(\text{Mortgage rate})_t = -0.00 + 0.38 * \Delta(\text{Mortgage rate})_{t-1} + 0.23 * \Delta(\text{Federal funds rate})_t$$

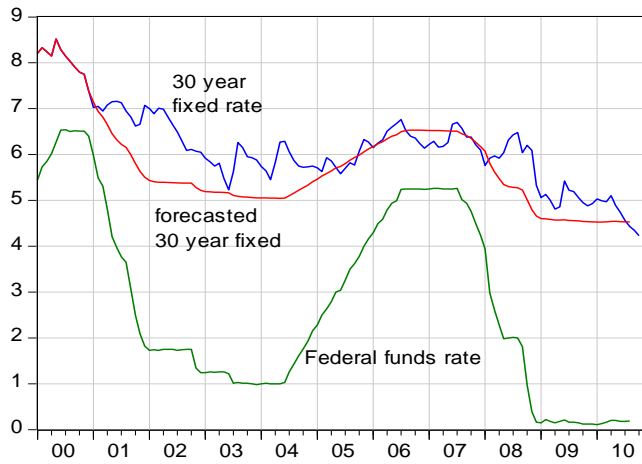
(0.01) (0.04) (0.02)

where the numbers in parenthesis are standard errors and the adjusted R squared of the regression is 0.41. This regression equation suggests that for the sample period 1971 to 2000 a short run 100 basis point increase in the Federal funds rate resulted in a 23 basis point increase in the 30 fixed rate while a 100 basis point permanent change would increase the 30 year fixed rate by $0.23/(1-0.38) = 0.37$ or 37 basis points. We used this regression equation to forecast the 30 year fixed rate from 2001 to 2010 as shown in Figure 11. During the period of monetary policy looseness, the 30 year fixed mortgage rate did not fall nearly as much as the historical relationship would have suggested. This is surprising at least to us given Greenspan's discussion of the bond market conundrum and suggests that the conundrum is actually why mortgage rates did not fall by more than they did given the drop in the Federal funds rate. This finding is also at odds with the discussion of the global savings glut.

Figure 10: The 30 Year Fixed Mortgage Rate and the Federal Funds Rate



Source: FRED

Figure 11: The 30 Year Fixed Mortgage Rate (Actual and Forecasted) and the Federal Funds Rate

5. Non-Monetary Policy Explanations of the Housing Boom

To argue that U.S. monetary policy was not responsible for the housing price boom requires at least one alternative explanation. One possibility is that the housing price boom/bubble developed spontaneously.

Shiller (2005) and Akerlof and Shiller (2009) suggest that asset price bubbles are caused by psychological factors described as “animal spirits”, “irrational exuberance” and/or “herding” behavior. In this case, independent of fundamentals, people’s expectations of future increases in an asset price cause increases in the demand for the asset thereby driving up its price leading to further increases in the expected future price and so on in an upward spiral. This idea is represented in the feedback part of the flow diagram in Figure 3.

Akerlof and Shiller’s (2009) explanations are consistent with Kindleberger’s (2005) classic analysis of financial panics. However Kindleberger also emphasizes that credit availability is a necessary condition for a bubble to develop. This suggests that any alternative explanation for the housing boom and bust, other than the low Federal funds rates from 2002-2005, requires identifying an alternative source of the increased availability of credit. Two alternative sources of housing credit have been proposed. One is the increased availability of credit from international sources due to capital inflows into the U.S. and/or 2) from domestic sources at a given interest rates, i.e. less credit rationing, due to a perceived decrease in default risk (perhaps due to the Great Moderation!) or due to a decline in underwriting standards as a consequence of the switch in the mortgage lending model to initiate and sell.

5.1 *The Global Saving Glut and/or the International Demand for Safe Assets*

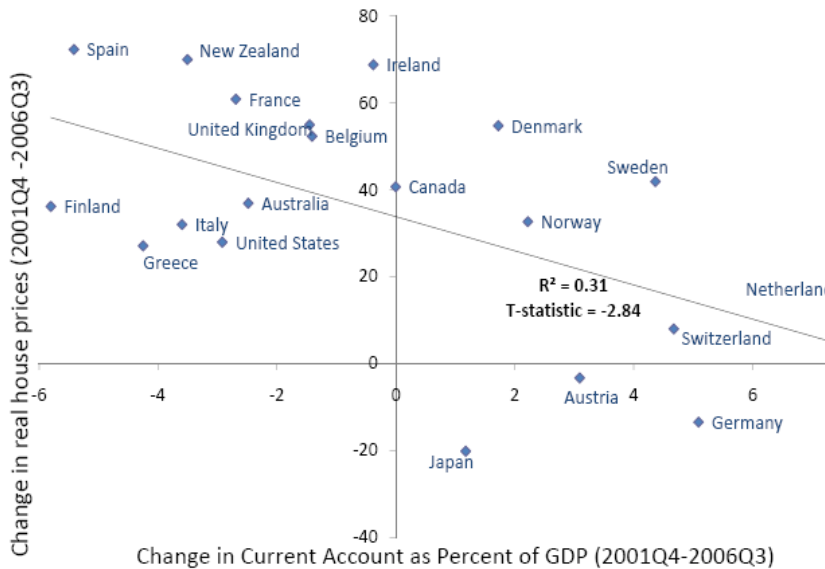
One potential non-monetary policy explanation of the increased demand for U.S. housing is increased capital inflows into the U.S. due to a “world savings glut” or due to the U.S. having a comparative advantage in supplying safe financial assets. Support for this source of funds (provided by the IMF and cited by Bernanke (2010a) see Figure 12) is that those countries with higher current account deficits (bigger capital inflows) had bigger increases in housing prices. This is consistent with previous episodes of financial asset price booms and busts. For example Reinhart and Rogoff (2008) find that greater international capital flows are associated historically with banking crises.

Figure 13 shows a positive correlation between U.S. real private residential investment and U.S. real net capital inflows in the decade of the 2000s. This evidence is consistent with the idea that at least some of the source of funds that financed the U.S. housing boom came from abroad, particularly after the Fed started increasing interest rates in 2004.

5.2 *Increased Availability of Mortgage Credit from Domestic Sources*

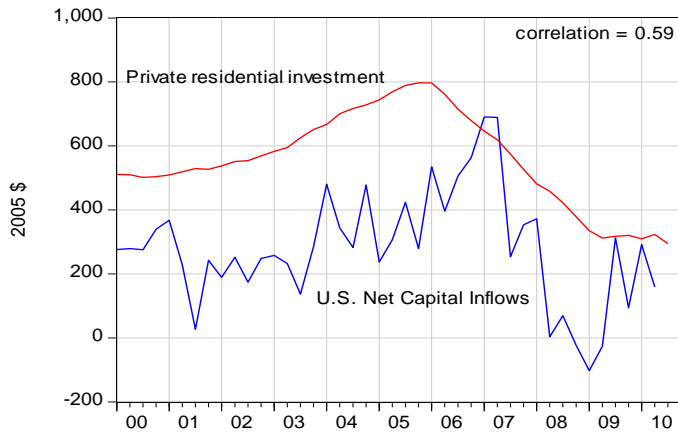
Changes in the mortgage lending market in the early to mid 2000s made housing credit more available and with lower monthly mortgage payments to home buyers with increasingly lower credit ratings.

Figure 12: The Current Account and Housing Prices for OECD Countries



Source: International Monetary Fund, Haver Analytics, and Federal Reserve staff calculations.

Source: Bernanke (2010a)

Figure 13: Capital Inflows to the U.S. and U.S. Residential Investment (Deflated by the GDP Deflator)

Source: FRED

The result was an increased the demand for housing and hence an increase in housing prices. Key changes in the mortgage lending market include adjustable rate mortgages, with options that included interest only payments or payments that did not even cover the interest on the loans (“negative amortization”) and declines in lending standards that allowed low credit rating borrowers to obtain loans (Dekko et al (2009)). The result was a mortgage lending environment that enabled borrowers to make highly leveraged purchases of homes with temporarily low carrying costs. Consequently, a number of people either unknowingly purchased homes they could not reasonably afford if housing prices did not continue to increase or knowingly purchased homes with the idea of defaulting on their mortgage if they were unable to realize a capital gain. Arguably, these changes in mortgage lending changed the housing market into what Minsky (1986) called “ponzi finance”. Bernanke (2010b) argues that these changes in the mortgage lending environment were more than enough to account for the housing price boom independent of monetary policy.

5. Conclusions

Clearly some event triggered the increase in the demand for housing leading to a boom in housing prices which then in our view evolved into a housing price bubble. This paper focuses on Taylor’s claim (2007, 2010) that the trigger event for the housing boom-bust cycle was the Fed’s loose monetary policy from 2002 to 2005. Clearly the Federal funds rate was at a historic low which was not repeated until 2008. While the Federal funds rate was low this paper provides evidence that the 30 year fixed mortgage rate did not fall by as much the historical relationship between

the Federal funds rate and the 30 year fixed rate would suggest. Research also suggests the amount the 30 year fixed rate decreased was not enough to explain all of the increase in housing prices.

The argument that monetary policy caused the U.S. housing price boom would be more compelling if there were no plausible alternative explanations. However both capital inflows and looser U.S. mortgage lending terms and standards (to the extent that these are independent of monetary policy) suggest an alternative source of funds to both fuel the initial increase in housing demand and also to sustain the boom. In addition, loose monetary policy does not seem necessary to cause a housing boom given that across countries housing price booms have occurred with loose, neutral and tight monetary policy. In our view if monetary policy had been loose in 2002-2005 relative to at least some versions of the Taylor Rule, the counterfactual may have been a deflationary spiral along with a smaller housing boom or bust. Alternatively if the Fed was actually wrong about the potential for deflation and had followed tighter monetary policy as suggested by Taylor (2007) the housing price boom, given the alternative sources of mortgage credit expansion is likely to have occurred anyway. In short, we find the argument that U.S. monetary policy caused the housing price boom/bust cycle less than completely convincing.

6. Notes

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7. References

- Akerlof, George and Robert J. Shiller (2009) *Animal Spirits: How Human Psychology Drives the Economy and Why It Matters for Global Capitalism* Princeton: Princeton University Press.
- Baily, Martin N., Robert E. Litan and Matthew S. Johnson (2008), “The Origins of the Financial Crisis”, Brookings Institute Fixing Finance Series, Paper 3, November.
- Bean, Charles, Matthias Paustian, Adrian Penalver and Tim Taylor (2010), “Monetary Policy after the Fall” paper presented at the Federal Reserve Bank of Kansas City Jackson Hole Conference, August 28
<http://www.kansascityfed.org/publicat/sympos/2010/2010-08-23-bean.pdf>
- Bernanke, Benjamin (2002), “On Milton Friedman’s Ninetieth Birthday” remarks by Governor Ben S. Bernanke at the Conference to Honor Milton Friedman, University of Chicago, Chicago, IL November 8
<http://www.federalreserve.gov/boarddocs/speeches/2002/20021108/default.htm>
- Bernanke, Benjamin (2010a), “Monetary Policy and the Housing Bubble” speech to the American Economic Association, Atlanta, Georgia, January 3.

- Bernanke, Benjamin (2010b), "Statement by Ben S. Bernanke Chairman Board of Governors of the Federal Reserve System before the Financial Crisis Inquiry Commission", September 2 <http://www.fcic.gov/hearings/pdfs/2010-0902-Bernanke.pdf>
- Del Negro, Marco and Christopher Otrok (2007), "99 Luftballons: Monetary Policy and the House Price Boom across U.S. States", *Journal of Monetary Economics*, Vol 4, 1962-85.
- Dekko, Jane, Brian Doyle, Michael Kiley, Jinill Kim, Share Sherlund, Jae Sim and Skander Van den Heuvel (2009), "Monetary Policy and the Housing Bubble" Finance and Economics Discussion Series 2009-49 Board of Governors of the Federal Reserve System December <http://www.federalreserve.gov/pubs/feds/2009/200949/200949pap.pdf>
- Friedman, Milton and Anna J. Schwartz (1963), *A Monetary History of the United States*, Princeton: Princeton University Press.
- Glaeser, Edward L. Stuart S. Rosenthal and William C. Strange (2010), "Can Cheap Credit Explain the Housing Boom?" *Harvard University working paper*, July.
- International Monetary Fund (2009), *World Economic Outlook: Sustaining the Recovery*, Chapter 3, Washington: IMF October.
- Kindleberger, Charles (2005), *Manias, Panics and Crashes: A History of Financial Crises* (Wiley, 5th edition).
- Reinhard, Carmen M. and Kenneth S. Rogoff (2008), "This Time is Different: A Panoramic View of Eight Centuries of Financial Crises", *NBER Working Paper 13882* <http://www.nber.org/papers/w13822>
- Rudebusch, Glenn D. (2009) "The Fed's Monetary Policy Response to the Current Crisis", *FRBSF Economic Letter* Number 2009-17, May 22.
- Shiller, Robert J. (2005), *Irrational Exuberance*, 2nd edition, Princeton: Princeton University Press.
- Taylor, John B. (2007), "Housing and Monetary Policy", *Housing, Housing Finance and Monetary Policy*, Federal Reserve Bank of Kansas City Symposium, Jackson Hole, WY, September 1.
- Taylor, John B. (2010), "Getting Back on Track: Macroeconomic Policy Lessons from the Financial Crisis", *Federal Reserve Bank of Saint Louis Review*, May/June, 92(3), 165-76.
- Woodford, Michael (2001), "The Taylor Rule and Optimal Monetary Policy", *American Economic Review*, 91(2), 232-237.

The Role of House Flippers in a Boom and Bust Real Estate Market

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Abstract: The single-family house transactions data of the Chicago Metropolitan Statistical Area during the 1995-2010 period revealed that the peak flipper participation in the housing market occurred between 2004 and 2006 and they realized a higher return than long-term house holders, especially between 2000 and 2006 when the housing market boomed. However, flippers had higher risk than long-term holders. The estimation results of the multilevel mixed regression model showed that when more flippers entered the housing market, they created a positive upward movement in home price. The multivariate adaptive regression splines (MARS) model revealed a nonlinear relationship between housing prices and the fixed and variable effects of flipper participation in the housing market. Multiple knots indicated that flippers impacted the market differently as the frequency and magnitude of flipper participation in the housing market changed.

JEL Classification: R11, R21, R30, C31, C41

Keywords: House flippers, Real estates, Asymmetric information, Boom and bust, House price, MARS

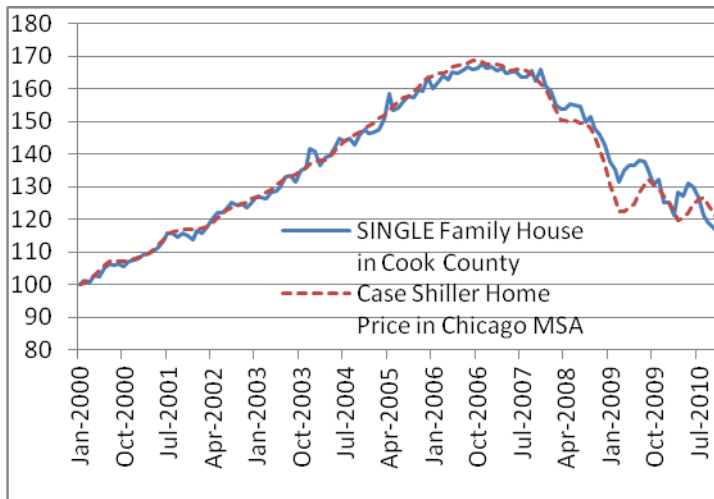
1. Introduction

After a boom in the real estate market between 2000 and 2006, U.S. housing prices experienced a steep decline for 5 consecutive years. The most recent boom and bust cycle in the real estate market has been a major concern for the stability of financial markets and overall economy. Numerous studies have tried to explain the causes of this cycle -- particularly the housing bubble burst beginning in 2007. One hypothesis suggests excessive credit availability in the financial market, resulting in historically low interest rates, caused the housing bubble to burst². The low interest rates triggered excessive demand for assets, especially in the real estate market. Assuming this hypothesis was valid, there should have been an unusually large volume of real estate transactions during the boom period, particularly by the house flippers who were able to finance their frequent house purchases with low mortgage payments during the holding period. In addition, flippers would have been able to take advantage of the capital-gains tax-exemption afforded by the Taxpayer Relief Act of 1997³, which encouraged their speculative behavior. However, the inability to accurately determine the ulterior motives of home buyers and sellers leaves us to

define a house flipper simply as a home buyer that purchased a house and then sold it back within 2 years⁴. In this study, we examine the roles of these flippers in the recent boom and bust housing market.

The high demand for houses, due to capital-gains tax-exemption provision and low financing costs driven by historically low mortgage rates in the early 2000s, created a perfect environment for house flippers. From 2000 to 2005, the U.S. housing market experienced an average increase of 12 percent per year according to the Case-Shiller home price index. The Chicago Metropolitan Statistical Area (MSA), for example, which includes eight counties surrounding the City of Chicago, experienced about an 8.6 % increase per year from 2000 to 2005. Similarly, the housing prices in Cook County, which has 66% of the Chicago MSA's total population, also increased about 8.7 % per year for the same period. Since then, like other cities in the U.S., Cook County and the Chicago MSA experienced very steep home price decreases as shown in Figure 1.

Figure 1: Case-Shiller Home Price Index in Chicago MSA Calculated via the Repeat Sale Method



The bust in the housing market originates from the subprime loan crisis in 2007-- a crisis which turned into a worldwide financial catastrophe. The subprime crisis is often blamed on those individuals who purchased homes despite their inability to sustain monthly mortgage payments. However, the real culprit in the crisis may be house flippers who aided artificially inflating home prices, which eventually hurt subprime borrowers; that is, subprime borrowers were, conceivably, lured into purchasing an unaffordable home because they paid an inflated price. Therefore, we

examine the role played by house flippers who engaged in speculative purchases of homes during the recent boom and bust cycle in the real estate market.

Many studies attempted to find the sources of the instability in the housing market using various econometric techniques. Crawford and Frantaton (2003) employ a Markov switching model to explain the threshold behavior, while Miles (2008) shows that the housing market is subject to boom and bust cycles via the Generalized Autoregressive (GAR) model that utilizes quadratic, cubic, and multinomial functions of the lagged dependent variable. Miles finds the GAR model works well given a history of housing bubbles and crashes.

Coleman IV, LaCour-Little and Vandell (2008), while having studied home price fluctuation during the 1998-2006 period, conclude that subprime activity has a marginal influence on the price run-up. They attribute the reason for home price increase to the combined effects of changing institutional, political, and regulatory environments observed after late 2003. Similarly, Clark and Coggin (2011) examine the existence of a U.S. house price bubble applying unit root, cointegration, and error corrections models. They find that the U.S. home price movement is unrelated to many commonly suggested variables in the literature.

Bayer, Geissler, and Roberts (2011), however, specifically examine the role of flippers in the housing market. They identify the role of flippers as middlemen who provide liquidity to the market, investors who improve a community via gentrification, and speculators who create huge run-ups in home prices and thus, an increase in price volatility. As speculators, the flippers tend to enter the housing market very promptly as prices rise. They earn more than an average return by selling back in the declining market after a short-term holding of the houses. Thus, Bayer, Geissler and Roberts conclude that the entry of speculative house flippers is strongly associated with volatile housing price movements. Unlike previous studies, however, this paper specifically examines and measures the magnitude of the house flippers' impacts during the recent boom and bust in housing prices by applying two different econometrics tools, each based on detailed house transactions data from the Chicago MSA.

We organize this paper as follows: In Section 2, we identify and describe four different types of house flippers based on their transactions behavior shown via the single-family house transactions data from the Chicago MSA between 1995 and 2010. Section 3 presents the theoretical structure of two econometrics models - the Multilevel Mixed Regression Model and the Multivariate Adaptive Regression Splines. Their estimated results are described in Section 4. Finally, in Section 5, we present the summary and conclusions of the study.

2. Data, Flipper Types, and Descriptive Statistics

This study uses the data on single-family housing transactions among individual home owners⁵ from the Cook County Recorder of Deeds for the Chicago MSA observed between 1995 and 2010. Initially, we identified all houses in which a purchase-and-sale transaction was made during the study period⁶. In the Chicago

MSA, there were 247,880 such transactions. Among these transactions, we further identified 45,016 transactions to have belonged to house flippers whose definitions are discussed next.

2.1. Types of House Flippers

Based on the data set, we broadly identified individuals as house flippers when they bought houses and sold them back within 2 years from the date of purchase. The reason why the two-year limit is chosen is based on the two-year minimum residence requirement for the capital-gains tax-exemption as specified in the Taxpayer Relief Act of 1997. Also, we identified individuals who bought and sold houses more than once, possibly due to their profit motive instead of residence motive, within any 2-year period. Because anyone who buys houses with such a frequency and a short-term holding period can be considered to have a speculative motive in the housing market, we identified them as house flippers and grouped them into the four types as follows:

Type 1 flipper: A person who sold a house once within two years from its purchase date.

Type 2 flipper: A person who owned multiple houses and sold at least two of them within two years from their respective purchase dates.

Type 3 flipper: A subset of Type 2 flippers whose house sales are identified and matched up with those of Type 1 flippers.

Type 4 flipper: A person who is identified as either Type 1 or Type 2 flippers.

In Type 1 flippers, we include any house transaction whose holding period is less than or equal to 2 years. This may include many sellers who did not intend to flip houses for an immediate profit, such as those who needed to sell their homes due to unexpected job changes or any other personal reasons. However, because their transactions formed a part of the aggregate house prices prevailing during the study period, we consider them flippers and examine their role in the housing market. Type 2 flippers are those who owned more than one house and actively participated in trading houses. For example, an owner of three houses who sold at least two of them in different two-year periods belongs in this group⁷. This group can be considered the core group of flippers in the broader sense of definition. Type 3 flippers are a subset of Type 2 flippers whose transacted houses are identified in Type 1 flippers. This group is, therefore, the identified true flippers who owned multiple houses and actively sold them within a two-year period. Their success or failure in profiting from housing trade can yield the clearest picture of how much impact they have had on the housing bubble. Therefore, this group can be considered the core group of flippers in the narrowest sense of definition. Type 4 flippers are those who belong in either the Type 1 or Type 2 flipper groups, except those who are in Type 3 flipper group. That is, Type 4 flippers belong in the broadest definition of flippers who had any sale of houses within a two-year period.

2.2. Summary of Data

As shown in Table 1, there were a total of 247,880 transaction pairs⁸ of single-family houses in the Chicago MSA between 1995 and 2010. Among these, 202,864 transactions – 81.8% of the total – were identified as participating in non-flipper activity, where homeowners sold their houses after a holding period greater than 2 years. The remaining 45,016 transactions – 18.2% of the total – were identified as house flippers. Of these 45,016 flipper transactions, we further classified 65.8% of them to be attributed to Type 1 flippers; 34.2%, to Type 2 flippers; 5.1%, to Type 3 flippers; and 94.9%, to Type 4 flippers.

Table 1: Number of Transactions by Flipper Type

Type of Flippers	Number of Transaction Pairs	Fraction of Flipper Type per Total Transactions	Fraction of Flipper Type per Total Flipper Transactions
Type 1	29,617	11.9%	65.8%
Type 2	15,399	6.2%	34.2%
Type 3	2,291	0.9%	5.1%
Type 4	42,725	17.2%	94.9%
Total Flipper Transactions	45,016	18.2%	100%
Total Transactions	247,880	100%	NA

The presence and activity of house flippers strongly reflect the underlying economic conditions. For example, when large returns are possible in the real estate market, relative to other alternative investments such as savings accounts, stocks, bonds, and financial derivatives, house flippers will be very active in the real estate market. Alternatively, when expected returns from the real estate market are low, the flipper activity, as measured as a share of the total transaction pairs, declines. In fact, Table 2 clearly illustrates these patterns for the four types of flippers. First, we note that there was a growing participation trend by them from 2000 to 2006. Type 1 flippers' share of transactions increased from 15.1% in 2000 to its peak of 19.6% in 2006. Similarly, type 2 flippers increased from 5.23% to 8.13% during the same period. Second, we note that in all four types of flippers, respective shares of the housing transactions exceeded all categories of averages during the period between 2001 and 2007 when interest rates were low in the U.S. Therefore, it can be reasonably concluded that there was a rapid increase in flipper activity during the 2000-2006 period, possibly peaking between 2004 and 2006.

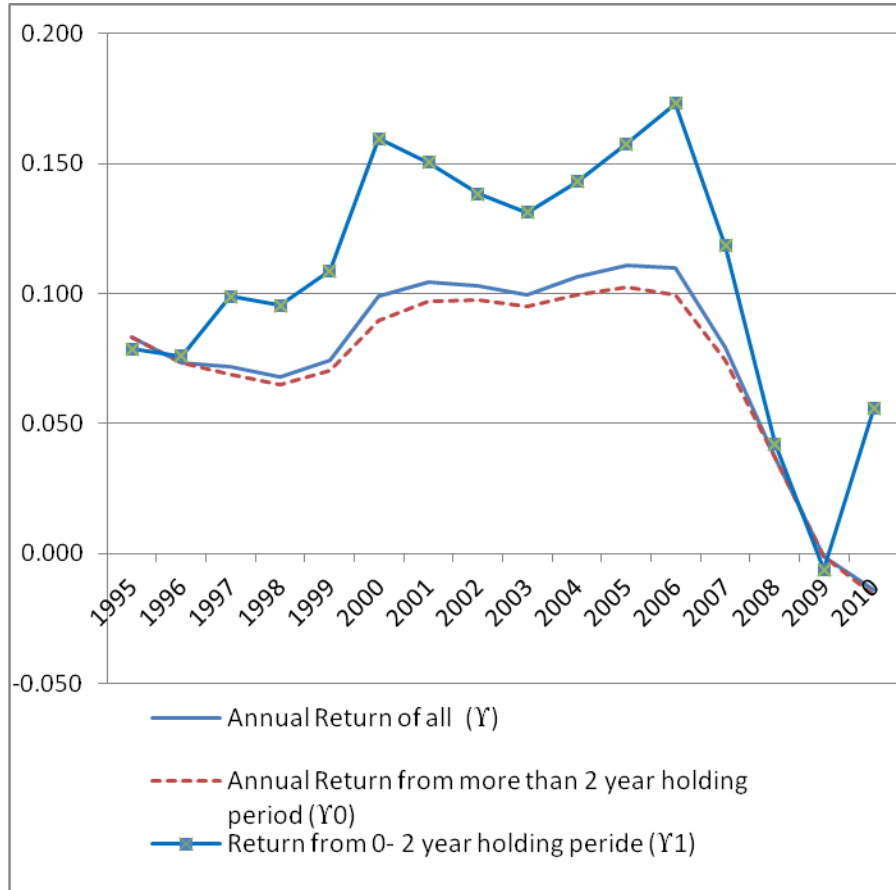
Table 2: The Annual Share (%) of Transactions by Flipper Type (Cook County Single Family Sales)

Year	Type 1	Type 2	Type3	Type 4
1995	8.1	4.13	0.38	11.61
1996	7.3	3.77	0.25	9.69
1997	11.2	4.41	0.45	13.57
1998	12.9	4.49	0.46	14.25
1999	13.1	4.99	0.63	15.12
2000	15.1	5.23	0.74	17.83
2001	17.5	5.59	0.97	18.83
2002	16.9	6.29	1.06	18.82
2003	16.2	7.01	1.07	19.21
2004	17.4	7.41	1.41	21.29
2005	18.3	7.7	1.34	21.62
2006	19.6	8.13	1.47	20.89
2007	15.7	7.11	0.81	17.08
2008	9.8	5.62	0.5	12.47
2009	4.8	4.13	0.2	7.31
2010	3.4	3.12	0.13	5.51
Average	12.96	5.57	0.74	15.32

2.3. Annualized Returns to Flippers

Profit motivation - that is, the opportunity to purchase a home at a low price and sell it at a higher price - may have caused flippers' increased participation in housing transactions during this time period. The question of interest is then to ask if a holding period mattered in determining the profit level during the study period. It is difficult know the base price of a house to calculate the exact net profit from a sale. However, based on the annualized gross rates of return from housing transactions data shown in Figure 2, short-term holders of less than two years realized much higher rates of return than long-term holders of more than two years, especially between 2000 and 2006 when the housing market boomed⁹. It is interesting to note that the capital-gains tax-exemption did not appear significant to these short-term holders, perhaps because they had realized adequate returns for the risk they took in the transactions. This may indicate that these short-term holders truly possessed the speculative spirit of house flippers. In fact, their highest annualized return of 17.3% was reached in 2006.

Figure 2: Annualized Rates of Return from House Transactions by Different Holding Periods

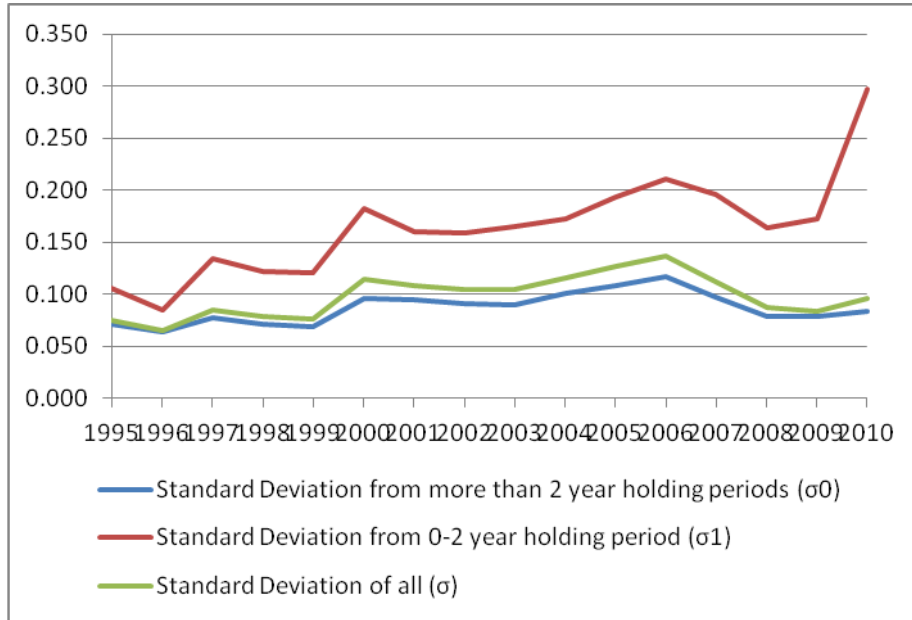


2.4. Risks to Flippers

Figure 3 shows the standard deviations of the annual returns corresponding to the annualized return data shown in Figure 2. These standard deviations, as a measure of investment risk, closely reflect the return patterns. Essentially, short-term holders had higher risk than the long-term holders during all 17 years of study, possibly supporting the modern portfolio theory of high return with higher risk. However, what is different from Figure 2 and thus, interesting, is the overall gradual upward trend in the standard deviations shown in Figure 3. Despite the length of holding periods, there was an upward tendency in standard deviations until the burst of the

housing bubble in 2007. The explosive uptick in 2010, however, may reflect factors that were not present during previous years, such as increased transactions of foreclosed or underwater houses which might have added greater uncertainty in their profit opportunities.

Figure 3: Standard Deviation of Annualize Returns per Holding Period



3. Econometric Models

Based on repeat sales index values that we calculate for the Chicago MSA, we utilize the multilevel mixed regression model (MMRM) to estimate the specific role played by each of the four types of flippers between 1995 and 2010. We also use the multivariate adaptive regression splines (MARS) to estimate any natural break point(s) – known as knots or thresholds – in the data that identify when the nature of housing market changed due to the participation of flippers. A summary description of these two estimation models is presented here below.

3.1 Multilevel Mixed Regression Model (MMRM)

We initially construct a multilevel repeat sale index model, assuming that the quality attributes and the coefficients are constant in any two sale periods, as follows:

$$\ln(p_i) = \beta_0 + \beta_1 D_i + \beta_2 H_i + e_i \quad (1)$$

$$\text{where} \quad \beta_1 D_i = \beta_{11} D_{1i} + \beta_{12} D_{2i} + \cdots + \beta_{1t} D_{ti};$$

$$\beta_2 H_i = \beta_{21} H_{1i} + \beta_{22} H_{2i} + \cdots + \beta_{2k} H_{ki}$$

and the subscript i represents the number of transactions in time period, t ; k is the number of hedonic variables, H_i ; p_i is the repeat sales index; β_i is the estimated coefficients; D_i is a repeat-sale time-dummy variable; and e_i is the regression error term with normality conditions. Using this model, we calculate a cumulative return per period and the repeat sale index, with January of 2000 as a base month for the study. We then construct a multilevel mixed regression model by adding, specifically, the role of house flippers to the repeat sale price model as follows:

$$\ln(p_{ij}) = \beta_0 + \beta_1 H_{ij} + \beta_2 D_{ij} + u_{0j} + u_{1j} F_{ij} + e_{ij} \quad (2)$$

where $u_{0j} + u_{1j} F_{ij}$ represents the effect of house flippers. By adding this term to the repeat sale index equation, we assume that flippers' impact has a constant or fixed portion, u_{0j} , and a variable portion of $u_{1j} F_{ij}$. That is, the estimated effect of flippers is defined as:

$$u_j = u_{0j} + u_{1j} F_{ij} \quad (3)$$

where

$$u_j = \begin{cases} u_{0j} + u_{1j} & \text{if } F_{ij} = 1 \text{ (Flipper)} \\ u_{0j} & \text{otherwise} \end{cases}$$

and $E(u_j) = E(u_{0j} + u_{1j} F_{ij}) = u_{0j} + w_j u_{1j}$ with the following assumptions: $E(u_{0j}^2) = \sigma_0^2$, $E(u_{1j}^2) = \sigma_1^2$, and $E(u_{0j} u_{1j}) = \sigma_{01} \neq 0$. Note that w_j is the weight given to the flipper activity based on the number of flippers present in each period. Therefore, the model identifies the overall effect as the sum of the fixed effect present at the time of sale and the variable effect created by flippers. As the number of flippers increases, the influence by flippers will increase and thus, the value of w_j will increase. Of course, the opposite case of a decreasing influence of flippers will be observed when the number of flippers decreases. One important feature of this multilevel mixed regression model is that it can handle the heteroscedasticity nature of housing prices by utilizing each period's own mean and variance parameters. This property allows us to disentangle the impact of normal

transactions and the impact of flippers as we incorporate these values in the second stage of estimation. The use of the flipper dummy variable, F_{ij} , also adds an extra dimension to understanding the marginal effects of flippers on the house price change.

3.2 Multivariate Adaptive Regression Splines (MARS) Model

The second econometric model that we use is the Multivariate Adaptive Regression Splines (MARS) model¹⁰. This model is of great value in identifying a knot or threshold value(s) where a regression equation can be splined into two or more segments. Because the descriptive statistics of the data discussed in Section 2 seem to indicate an asymmetric behavior of home prices as the market goes through a boom-and-bust cycle, we can infer that the impact of flippers on the housing price can be nonlinear and may be identified with the existence of a knot(s). That is, the presence and magnitude of a knot(s) in the data can enable us to identify a critical role played by flippers.

Based on Friedman (1991) and Stokes (1997), we construct a standard MARS model as follows:

$$y = f(x) = \sum_{i=1}^m \beta_i M_i(x) \quad (4)$$

where β_i is a constant coefficient for the i -th basis function, $M_i(x)$, and x is a predictor variable. The basis function can be an intercept term or a hinge function that takes the form of $\max(0, x - \tau^*)$ or $\max(0, \tau^* - x)$ where τ^* is the fixed knot value. Therefore, it can alternatively be expressed as:

$$y = \beta_0 + \beta_1(x - \tau^*)_+ - \beta_2(\tau^* - x)_+ + e \quad (5)$$

which implies that $y = \beta_0 + \beta_1 x + e$ for $x > \tau^*$ and $y = \beta_0 + \beta_2 x + e$ for $x < \tau^*$. Also, $()_+$ denotes a right truncated spline function that takes a positive value. Therefore, equation (5) allows a piecewise threshold regression model where the knot value can be identified. MARS automatically selects variables and their values to identify an optimal knot in a hinge function. A product of various combinations of these hinge functions, based on forward and backward passes, is ultimately obtained via a modified generalized cross validation (MGCV) process of the following form:

$$MGCV = [(1/N) \sum_{i=1}^N (y_i - f(x_i))^2] / [1 - (C(M)^* / N)^2] \quad (6)$$

where N is the number of observations and $C(M)$ is a complexity penalty function represented as $C(M)^* = C(M) + \delta M$. The default complexity penalty function is set as a function of the effective number of parameters.

The important feature of this MARS model is its ability to identify the existence and magnitude of a knot or threshold value(s) via an optimal search routine that allows numerous iterations of various combinations of underlying functional relationships.

4. Empirical Results

4.1 Results from the Multilevel Mixed Regression Model (MMRM)

We summarize in Table 3 the estimation results of the multilevel mixed regression model specified in Equation (2). The variance of u_0 , $\text{Var}(u_0)$, which measures the fixed impact of house flippers are positive and significant at the 5% significance level for all 4 types of flippers. Also, their values, ranging between 0.0083 and 0.0085, are remarkably stable and indicate that they did play a constant and steady role in inflating housing prices during the study period. When the timing effect of flippers' entries to the house transactions was measured by the sign and magnitude of the variance of u_1 , $\text{Var}(u_1)$, it is once again noted that they are all positive and significant at the 5% significance level, except for Type 3 flippers whose statistical significance fails at the 5% significance level. Therefore, we can broadly conclude that when flippers enter into house transactions, they create a positive upward price movement. The interaction between u_0 and u_1 , as measured by the covariance (u_0, u_1), shows a statistically significant negative relationship for Type 1 and 4 flippers, but not for Type 2 and 3 flippers. This indicates that the offsetting influence between fixed effect and variable effect can be found for the large sample cases of Type 1 and 4 flippers.

Table 3: The Estimation Results of the Multilevel Mixed Regression Model

Statistics	Flipper Type 1	Flipper Type 2	Flipper Type 3	Flipper Type 4
$\text{Var}(u_0)$	0.0084 (0.0010)*	0.0085 (0.0010)	0.0083 (0.0010)	0.0085 (0.0010)
$\text{Var}(u_1)$	0.0029 (0.0005)	0.0020 (0.0004)	0.0001 (0.0002)	0.0017 (0.0003)
$\text{Cov}(u_0, u_1)$	-0.0011 (0.0005)	-0.0002 (0.0004)	0.0010 (0.0007)	-0.0008 (0.0004)
$\text{Var}(e_{ij})$	0.1118 (0.0003)	0.1118 (0.0003)	0.1120 (0.0003)	0.1118 (0.0003)
Interclass correlation**	0.070	0.071	0.069	0.071
Log Restricted - likelihood	-81228.2	-81249.6	-81334.8	-81227.9
Wald Chi(192)	148643	157586.1	158605.3	151508.7

*The value in a parenthesis is the respective standard error.

**Interclass correlation = $\text{Var}(u_0)/(\text{Var}(u_0) + \text{Var}(e_{ij}))$

The variance of error terms from the first-level estimation of the repeat sales index, $\text{Var}(e_{ij})$, also shows stable values of 0.1118 and 0.1120, indicating that the underlying repeat sales index was calculated efficiently for all 4 types of flippers. Lastly, interclass correlation values, ranging between 0.069 and 0.071, show that the contribution of the multilevel mixed regression model in explaining the repeat sales index variability was about 7%. This contribution is significant in determining the fixed and variable impact of house flippers.

When the information contained in Table 3 is presented graphically, we can better visualize the role played by flippers. As shown in Figure 4, when the fixed effect and the variable effect are separately plotted for all 4 types of flippers, we note that the fixed effect was relatively more volatile during the recent housing bubble period of 2007-2010. What is particularly interesting is the behavior of Type 2 flippers whose fixed and variable effects are together more volatile than the other types of flippers. Given that Type 2 flippers are frequent traders of houses, it demonstrates that they have had a major impact on the housing market since 2000, but with more fervor during the recent housing bubble period of 2007-2010.

In Figure 5, we net out both fixed and variable effects from the repeat sale index to measure the specific role played by flippers. For all four types of flippers, the difference between the repeat sale indices with and without the impact of flippers starts increasing from 2004, reaches its peak in 2007 and remains high till early 2010. This indicates that the impact of house flippers was much more pronounced during the 2004-2010 period when there was a drastic boom-and-bust cycle in the Chicago housing market. It is remarkable to find that regardless of flipper types, their impact in the housing market was significant, especially between 2004 and 2010 when there was a boom-and-bust cycle.

4.2 Results from the Multivariate Adaptive Regression Splines (MARS) Model

The MARS model as specified in Equation (3) identifies and measures the knot values which indicate the timing impact of flippers. Intuitively, when we have a large number of flippers entering the housing market, we may observe a higher price movement than otherwise.

In Table 4, we present the summary results of the knot or threshold values that are chosen by the MARS process. First, we note that there are multiple knots, which indicate the nonlinearity of the relationship between changes in the repeat sales index and the flipper participation rate. Second, all coefficient values are significant at the 5% significance level, except the intercept term of the Type 1 flipper estimation. This gives a very strong support to the claim that the marginal additive impact of all types of flippers had measurable impact on housing prices. For example, the first model that estimated the impact of Type 1 flippers shows a knot value of 0.0238 and a corresponding coefficient value of 0.324. This means that if the participation effect of Type 1 flippers is greater than 0.0238, it will increase the repeat sale index by 0.324 percent given a one percent increase in Type 1 flippers' returns. However, if the participation effect of Type 1 flippers is less than 0.0238, it will still increase the

repeat sale index but by a smaller magnitude of 0.227 percent. This illustrates that the impact of Type 1 flippers on the repeat sale index is not uniformly the same. In fact, their impact is larger when more of them participate in the housing market and less when less of them participate in it. Also important is the role of the fixed effect. When the fixed effect is greater than 0.0183, the repeat sale index decreases by -0.663 whereas it increases by 0.436 when the fixed effect is greater than -0.0265.

Table 4: MARS Estimation Results for Flippers' Impact on the Repeat Sale Index

Threshold Variables	Coefficients	Standard Error	Approximate Adjusted R Square
<u>A. Model for Type 1 Flippers</u>			
Constant	-0.002	0.004	0.198
MAX(TYPE1- 0.0238, 0.0)	0.324	0.097*	
MAX(0.0238 - TYPE1, 0.0)	0.227	0.092*	
MAX(FIXED - 0.0183, 0.0)	-0.663	0.212*	
MAX(FIXED + 0.0265, 0.0)	0.436	0.104*	
<u>B. Model for Type 2 Flippers</u>			
Constant	-0.008	0.003*	0.148
MAX(FIXED - 0.019, 0.0)	-3.061	1.172*	
MAX(FIXED + 0.025, 0.0)	0.313	0.126*	
MAX(FIXED - 0.014, 0.0)	2.336	1.143*	
<u>C. Model for Type 3 Flippers</u>			
Constant	-0.005	0.002*	0.252
MAX(0.004 - TYPE3, 0.0)	-3.487	0.821*	
MAX(FIXED - 0.018, 0.0)	-0.965	0.251*	
MAX(FIXED + 0.006, 0.0)	0.828	0.157*	
<u>D. Model for Type 4 Flippers</u>			
Constant	-0.032	0.010*	0.211
MAX(TYPE4 - 0.012, 0.0)	0.234	0.081*	
MAX(FIXED - 0.018, 0.0)	-1.135	0.308*	
MAX(0.018 - FIXED, 0.0)	0.395	0.175*	
MAX(FIXED + 0.026, 0.0)	0.894	0.246*	

* indicates a significance at the 5% significance level.

The model for Type 2 flippers shows that when the fixed effect of Type 2 flippers increases beyond 0.019, the index decreases by -3.061, whereas it increases by 0.313 and 2.336 percent as the fixed effect increases above 0.025 and -0.014, respectively. This also shows a strong impact that Type 2 flippers had in the housing market. The model for Type 3 and 4 flippers also show that given multiple knots, there are significant impacts on the repeat sale index as the fixed and variable effects of these flippers are incorporated. For example, when the fixed effect for Type 3 and 4 flippers exceeds 0.018, Type 3 flippers show a -0.965 percent impact, and Type 4 flippers show a -1.135 percent impact. These results indicate that additional participation by these types of flippers has had a dampening effect on the repeat price index. However, we also see the opposite case. When the fixed effects of Type 3 and 4 flippers increase beyond -0.006 and -0.026, respectively, we note that they increase the repeat sale index by 0.828 and 0.894 percent, respectively. Therefore, the estimated results show a strong influence of flippers on housing prices measured by the repeat sale index. The fact that there are many knot values suggests that the housing market is impacted by flippers by different degrees at different stages of the boom and bust cycle. Nonetheless, the impact on the housing market by flipper participation was undeniably significant, despite the different types of flippers examined.

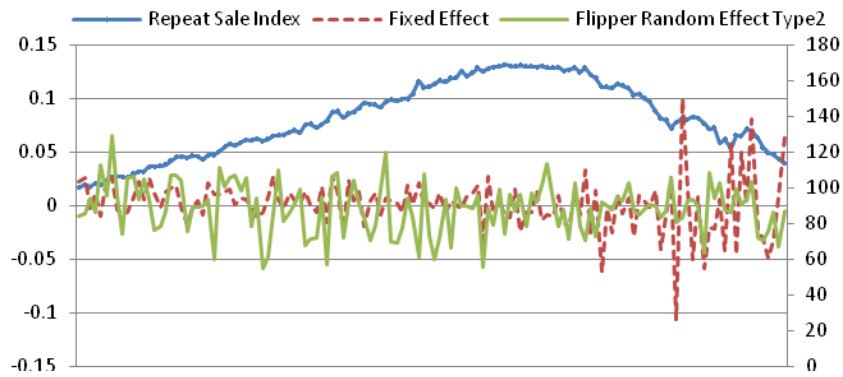
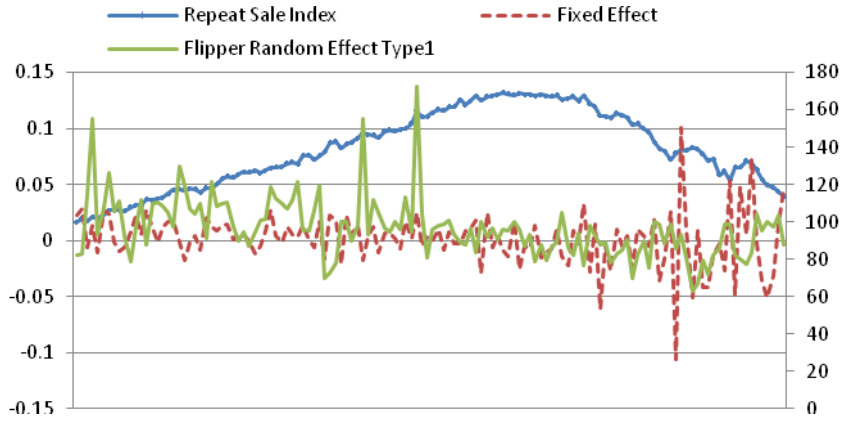
5. Summary and Conclusions

Using the actual single-family house transactions data of the Chicago MSA during the 1995-2010 period, we examined if the house flippers with a speculative motive had a significant role in influencing the home price fluctuation. The descriptive statistics on returns show that there was a rapid increase in flipper activity during the 2000-2006 period, possibly peaking between 2004 and 2006. And short-term house holders of less than two years realized much higher rates of return than long-term holders of more than two years, especially between 2000 and 2006 when the housing market boomed. However, short-term holders had higher risk than the long-term holders during all 17 years of study. In particular, Type 2 flippers who are frequent traders of houses showed a stronger impact on the housing market than other types of flippers during the recent housing bubble period of 2007-2010. Overall, regardless of flipper types, their impact in the housing market was significant, especially between 2004 and 2010 when there was a boom-and-bust cycle.

These findings were substantiated by the estimation results of the multilevel mixed regression model (MMRM) and the multivariate adaptive regression splines (MARS) model. In addition, the MMRM result showed that when more flippers enter the housing market, they create a positive upward movement in house price whereas the MARS model revealed a nonlinear relationship between housing prices and the fixed and variable effects of flipper participation in the housing market. Multiple knots or threshold values indicated that flippers impacted the market differently as the frequency and magnitude of flipper participation in the housing market changed. The overall conclusion is that all four types of house flippers had a

significant impact on the Chicago housing market during the study period, particularly during the 2007-2010 period.

Figure 4: Fixed Effects and Random Effects by Flipper Type from MMRM



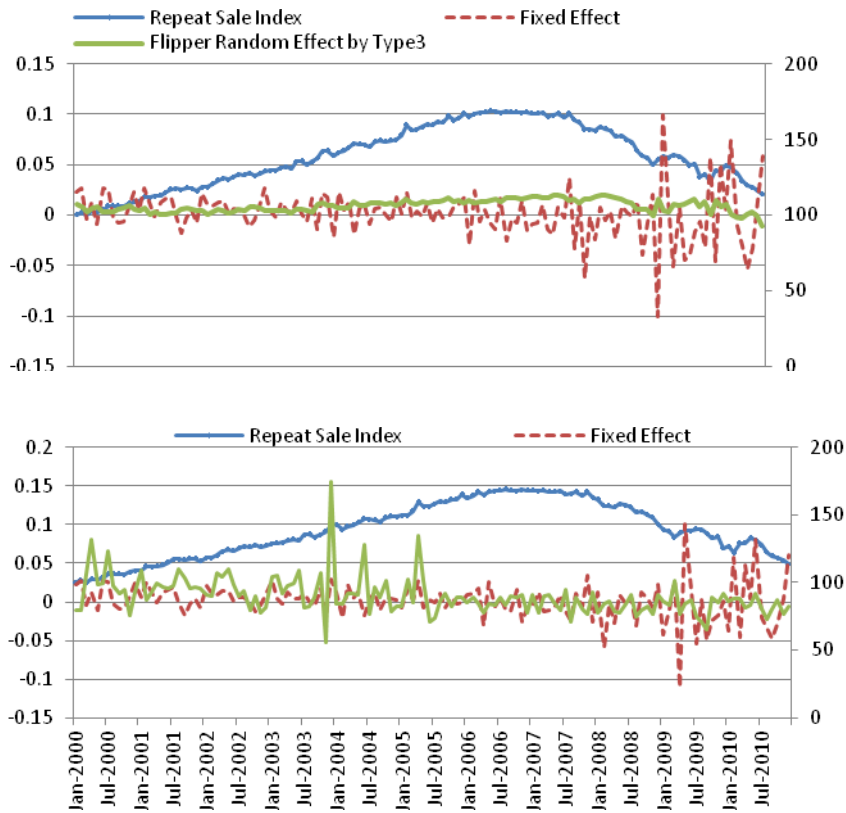
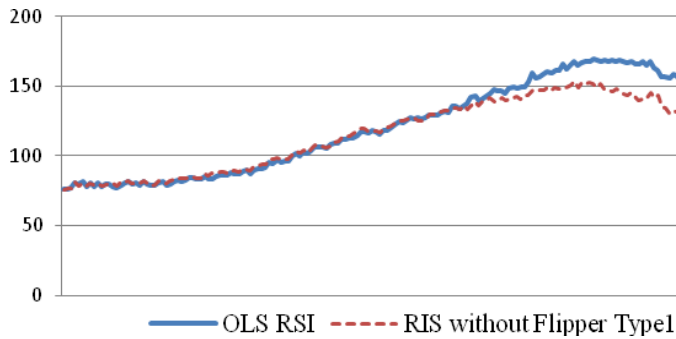
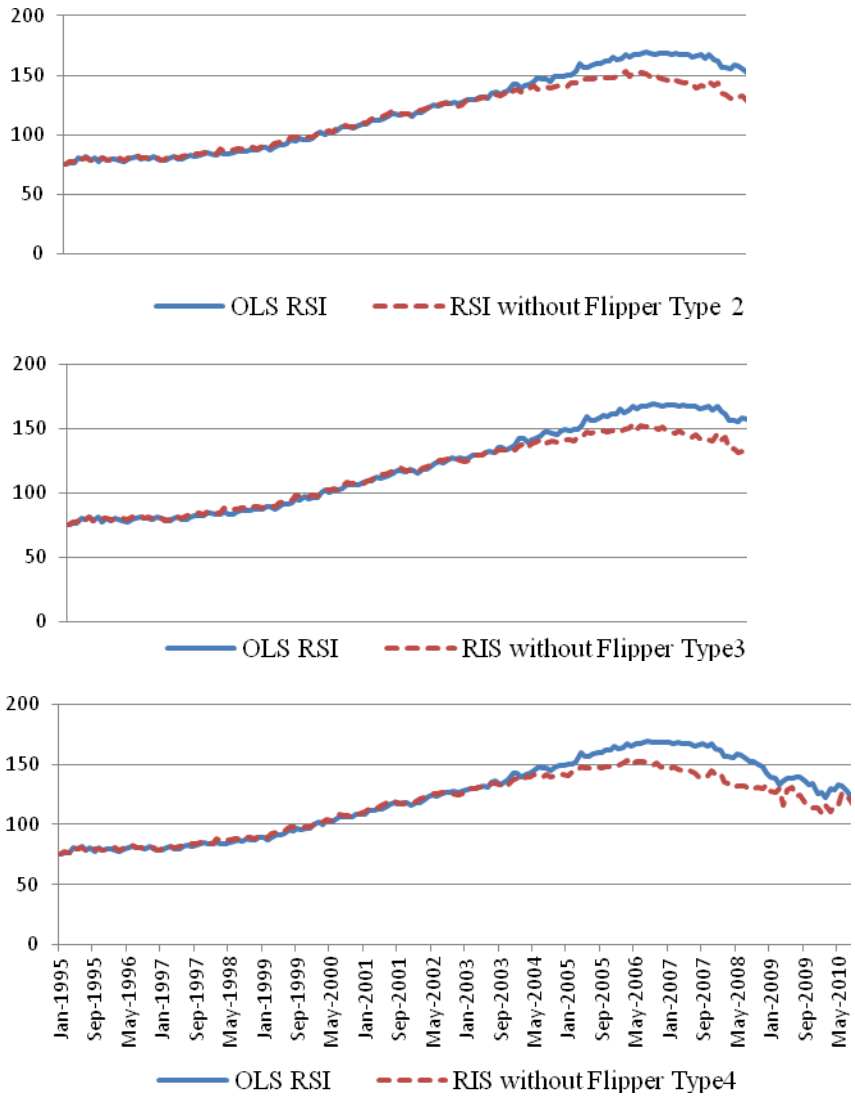


Figure 5: Net Impact on the Repeat Sale House Price Index by Flipper Type, 1995-2010





OLS RSI: Repeat Sale Index by Linear Regression without Level variable

6. Notes

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2. There are many books and reports that provide hypotheses and detailed explanations of the various causes for the financial crisis. Among them are the Financial Crisis Inquiry Commission (2011), Sorkin (2009), and Wessel (2009).
3. The Act gave a capital gains tax exemption of \$250,000 for a single person and \$500,000 for a married couple if the owner(s) resided in the house for any 2 years out of the recent 5 year period.
4. This may include those who had no intention of being a flipper to take advantage of fluctuating prices such as someone who may be transferred out of the recent home he had just purchased.
5. We excluded from our sample any property that was converted from a multifamily unit to a single family unit such as a typical condo conversion and any institutional transaction of single-family houses on the assumption that institutions do not have a primary motive of flipping single-family houses for short-term gains.
6. We did not look for the possible transaction type that is equivalent to the typical short selling strategy of a stock or a bond, where a stock is sold first and then bought back later. This type of transaction cannot work for houses due to the very nature of a house not being a homogeneous product like stocks or bonds.
7. Within this group, some flippers were clearly more active than others. Therefore, this group could have been further divided into experienced and inexperienced flippers based on the number of trades made during a certain length of time. We chose not to examine the behavior of these subgroups in this study.
8. In this study, we use a transaction pair or a transaction to mean a purchase of a house matched with its sale at a later time.
9. One additional point of interest is the uptick movement of returns in 2010 for the short-term holders in relation to the long-term holders. This may be more closely related to the transactions of foreclosed houses whose prices were depressed initially and then, recovered via additional investments for gentrification.
10. A detailed description of this model can be found in the seminal work done by Friedman (1991) and other later works done by different scholars such as Lewis and Stevens (1991) and Stokes (1997).

7. References

- Clark, Steven P, and Coggin, T. Daniel, “Was there a U.S. House Price Bubble? An Econometric Analysis Using National and Regional Panel Data”, 2011, *The Quarterly Review of Economics and Finance*, 51, pp 189-200.
- Clayton J, N. Miller, and L. Peng (2010), “Price-volume Correlation in the Housing Market: Causality and Co-movements”, *Journal of Real Estate Finance and Economics*, Vol. 40, issue 1, 14-40.
- Coleman IV, Major, LaCour-Little, Michael, and Vandell, Kerry D., “Subprime Lending and the Housing Bubble: Tail Wags Dog?”, 2008, *Journal of Housing Economics*, 17, 272-290.
- Crawford, G., & Fratantoni, M. (2003). “Assessing the forecasting performance of regime-switching, ARIMA and GARCH models of house prices”, *Real Estate Economics*, 31, 223–243.
- Financial Crisis Inquiry Commission (2011), *The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States*, 2011.
- Friedman, J.H. (1991). "Multivariate Adaptive Regression Splines", *Annals of Statistics*, 19(1): 1-67.
- Milers W. (2008), “Boom-Bust Cycles and the Forecasting Performance of Linear and Non-Linear Models of Housing Prices”, *Journal of Real Estate Financial Economics*, Vol. 36, 249-264.
- Sorkin, Andrew Ross. (2009), *Too Big to Fail*, Viking, the Penguin Group.
- Stokes, Houston H., *Specifying and Diagnostically Testing Econometric Models*, Second edition, Quorum Books, 1997.
- Wessel, David. (2009), *In Fed We Trust*, Crown Business.

Tackling Rural Energy in India: An Institutional Way Forward

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Abstract. India's rural per capita energy consumption is only one-fourth that of its urban. The state controlled energy institutional arrangement has allowed its participants to indulge their perverse incentives for long, creating significant mismatch between supply and need, with rural populations bearing the brunt. Environmental challenges make it imperative to shift to cleaner and efficient energy. This paper suggests an institutional way forward to enhance rural energy access while addressing environmental concerns. It requires that the rural consumers be vested with appropriate property rights to manage their energy such that their incentives are compatible with social efficient energy use.

JEL Classification: L97, O13, P48

Keywords: Sustainable rural energy, Energy institutions, Property rights

1. Introduction

About 70% of India's population that lives in rural areas accounts for only about 40% of the country's energy consumption. Household energy accounts for a significant proportion of rural energy consumption. Firewood, agricultural and animal wastes contribute to 81% of the energy consumed by Indian households and almost all of this is in rural areas. These are largely non-commercial sources of energy that are gathered and used for cooking and heating mostly in inefficient and polluting ways (IEP Report, 2006). The quality of other energy sources accessed by rural India is also much poorer compared to urban localities. Electricity accounts for 50% of the energy consumed for agriculture. The average hours of electricity available to rural areas is only about 6 hours a day though the actual access can vary between 2 hours and 22 hours depending on the state and the season (Prayas, RGGVY, 2011). When electricity does flow, the quality is variable and voltage fluctuations high causing significant damage to electrical motors and other gadgets. Availability of subsidized kerosene to low income households is through the public distribution system outlets. These would open only for a day or two in a month based on receipt of stocks which in turn would be arbitrary and uncertain. Diesel is also available at subsidized rates and these subsidies are the same as in urban areas.

In terms of per capita income levels and standard of living, rural India fares poorly compared to its urban counterpart. The positive correlation between per capita energy access and per capita income generation is well established. Hence, in order to raise the income levels, access to quality health care and education and overall

quality of life in rural India it is imperative that the urban-rural divide in terms of energy access be bridged by significantly enhancing the quantity and quality of rural energy access. This has to be achieved in the face of a situation that the average per capita energy consumption for the country as a whole is only about one-fourth the world average per capita energy consumption. India has to sustain a growth rate of 8% per annum over the next two decades if it has to eradicate poverty and meet its human development goals. To support this growth, its primary energy supply must grow at a rate between 4.3% and 5.1% while its commercial energy supply must grow between 5.2% and 6.1% (IEP Report, 2006).

Environmental quality concerns dictate that current proportions of fossil fuel use have to be considerably brought down and current levels of efficiency in harnessing energy have to be improved. This transition means higher energy costs at least in the short and medium term. Also this transition has to be achieved by an energy sector characterized by a significant proportion of non-commercial energy use, large subsidies for commercial energy use, loss making entities that have been in the red over many decades and a lot of unmet demand. Given these multiple and sometimes even conflicting challenges it is easy to recognize that ensuring rural energy security is a formidable task.

This paper suggests an institutional way forward that could help convert some of the challenges into opportunities to raise and sustain the level and quality of rural India's energy access as also its economic development. To place this in perspective the origin, evolution and limitations of the existing institutional arrangement for the energy sector are discussed and the advantages of the proposed modifications for rural energy access and for sustainable energy use in the emerging economic and environmental scenarios are highlighted.

2. Background

The Directive Principles of State Policy enunciated in the Indian Constitution and the Parliament resolution in 1954 to adopt a socialist pattern of society as the broad framework for the country's social and economic policies envisaged the state to play a catalytic role in achieving rapid economic development with social justice. It was hence decided that basic and strategic industries and public utility services should be in the public sector. This underlying ethos shaped the institutional arrangement for the energy sector. It was felt that only the state could provide sufficient investments to this sector which is capital intensive and characterized by a high degree of asset specificity, long gestation periods and long asset life. Also given the natural monopoly characteristics of energy services industry it was felt that private monopolies would lead to concentration of wealth and would not address the needs of economically weaker regions and sections of the population. Hence, public sector entities that were largely controlled by the state were entrusted with the responsibilities of energy services.

Under the stewardship of these state owned entities the energy infrastructure and its reach significantly expanded. Bringing commercial energy sources to rural populations at affordable prices was one of the major objectives. The central government was responsible for the investment and pricing decisions for coal and petroleum products. For electricity, which was included in the Concurrent List of the Constitution whereby both the central and the state governments have jurisdiction over the sector, the state governments were largely responsible for these. Quasi-autonomous state-owned statutory monopolies known as State Electricity Boards (SEB) were responsible for the electricity supply in all the states. The SEBs handled the generation, transmission and distribution aspects of electricity in a vertically integrated manner. Investment finances for these entities came from government budgetary allocations and were supplemented by soft loans from public sector financial institutions. The guiding principles adopted for pricing decisions were parity and equity subject to realizing a small rate of return. Electricity consumption by small farmers and very low income households was subsidized based on equity considerations. The public sector energy enterprises were performing well till the seventies and earning a positive return on investments.

3. Outcomes for Rural Access

3.1 Electricity

Electricity accounts for fifty percent of the energy consumed in agriculture. Starting from the early eighties subsidies for electricity consumed by agriculture were significantly increased. The Green Revolution, during the sixties, introduced high yielding variety crops and these required larger and assured quantities of water. To meet this requirement groundwater, which was costlier, had to be increasingly relied on to supplement surface water irrigation. In order to make the costs of tapping groundwater comparable to those of accessing canal water, state governments decided to increase the subsidies for electricity used by irrigation pumps. These subsidies were higher for small farmers (who were also mostly economically weaker) compared to those offered to large farmers. During the seventies these subsidies were at levels such that the electric utilities could still earn some positive financial returns. Starting with the eighties, however, various political parties across different states started competing with each other in promising more and more subsidies for groundwater pumping. It became a race to the bottom and many states began offering electricity for irrigation free of cost except for nominal annual charges, to all farmers irrespective of their land holding sizes and income categories. Specific targets were also given to the utilities for the number of additional irrigation pumps that were to be connected each year. As the subsidy amounts kept rising the state governments were unable to compensate the electric utilities the full amount. As a result the utilities went deeper and deeper into the red. Between 1992-93 and 2005-06 the average value of the losses incurred by electric utilities to the total outlays in the power sector was over 70%, with the actual values for each year

ranging from 35% in 1993-94 to 124% in 1999-2000 (Compiled from data in Indiastat). Given this financial situation most of the utilities were unable to expand capacity sufficiently to meet the ever-growing demand and there is a significant level of unmet demand. The average peak power shortages in India are estimated to be over 10% and energy shortages are estimated to be about 7%.

Apart from the financial losses, the manner in which these subsidies were given created considerable negative externalities and the social costs of these externalities outweigh the direct financial burden of the subsidies. Since the agricultural consumption was paying next to nothing and since this payment was not related to consumption levels, the utilities decided that it was not 'cost-effective' for them to monitor this consumption. During the eighties, electricity meters for this category were removed! Electricity consumption for agriculture accounted for one-fourth of the total electricity consumed in the country at this time. With such a sizeable proportion going unmetered a lot of illegal tapping of electricity was encouraged. Over a period of time unaccounted electricity had risen to between 60 and 80% of what was generated. This unaccounted energy comprised Transmission & Distribution (T&D) losses, consumption by irrigation pumps and stolen electricity. Over the years, knowledge about the share of each of these components got increasingly blurred. The utilities were not concerned about this. They assumed a certain proportion to be T&D losses and booked the rest under agricultural consumption and claimed the related subsidy amounts from the governments. Today the unaccounted energy, after allowing for a certain percentage of consumption by agriculture, is euphemistically referred to as Aggregate Technical and Commercial (ATC) losses, while a former minister for electricity referred to it as 'Theft & Dacoity' losses.

The target driven approach to energize irrigation pumps combined with farmers having to pay almost nothing for the energy consumed helped to significantly expand the agricultural demand for electricity. Free electricity also encouraged increasing use of cheap and inefficient irrigation pumps which reduced the effective water output per unit of energy use. The cropping pattern shifted in favor of better paying water intensive crops even in areas where the water table would not be able to support it. Groundwater was harvested indiscriminately. The water table fell to dangerous levels in many areas. This led to informal water markets where small farmers who did not have the wherewithal to tap the groundwater from very deep down had to buy water from larger farmers and had to pay about one-third of their produce for it. This was the price they had to pay for their electricity subsidies.

The rural consumers also bear a larger proportion of the burden of inadequate supply of electricity. As the number of electric irrigation pumps soared, the resource strapped utilities were unable to meet the unfettered peak demand. Hence, supply to rural feeders is limited to a few hours (an average of 5-6 hours) in a day during the off-peak period. Often there is no supply during mornings and evenings when it is most needed. The distribution network capacities in rural areas are also inadequate

and poorly maintained. As a result the quality of electricity that flows is very poor - characterized by low voltages and a single phase supply most of the time and sometimes highly fluctuating voltage levels, unannounced and unpredictable interruptions and significant delays in repairing faulty transformers or lines. As a result motors frequently burnout, household gadgets don't work or fail frequently and efficient lighting technologies like CFLs report a higher rate of failure.

3.2. Diesel

Diesel is another important component of energy consumed for agriculture. Given the irregularity and insufficiency of electricity supply, rural economic activities could not entirely depend on grid electricity. It is estimated that around 40-50 lakh diesel irrigation pumps are currently being used in the country as backup or as substitution options. Diesel prices are subsidized compared to petrol and this subsidy is the same for both urban and rural localities. It is also reported that about 50,000 villages in the country are powered by diesel generating sets, often with a distribution network and billing mechanisms (RGGVY, Prayas, 2011). Thus there is inefficient duplication of capacity and inefficient and more polluting use of energy.

3.3. Non-Commercial Energy

The 55th Round of the National Sample Survey in 1999-2000 has revealed that 86% of rural households use traditional fuels like firewood, dung cakes and woodchips as the primary source of cooking energy (IEP report, 2006). Most of these are not purchased but gathered. A study based on an integrated survey of about 15,293 houses from 148 villages in four states of India in 2004-05 revealed that 96% of rural households used biomass energy, 11% used kerosene and 5% used LPG with many of them using multiple fuels. 85 million households were estimated to spend 30 billion hours annually in firewood gathering. The need to gather firewood deprives many girl children of their schooling. These traditional fuels are also burnt in inefficient ways causing a lot of indoor pollution which mostly affect women and girl children who spend many hours near the hearth. The total economic burden of the biomass energy used thus in households, which includes the opportunity cost of gathering and preparing the fuel, working days lost due to eye infections and respiratory diseases and the cost of medicines, was estimated to be around Rs. 299 billion assuming a wage rate of Rs.60 per day (Jyoti Parikh, India Development Report 2004-05).

4. Energy Sector Restructuring

As part of the structural changes the Indian economy embarked on during the nineties and in order to tackle the problems and shortcomings in the energy sector the institutional arrangement for energy supply in India underwent some restructuring. In the coal sector captive mining by private entrepreneurs for their own use was allowed in 1993 and a Bill to allow private participation for commercial mining of coal was proposed in 2000, though it is still pending. The distribution of

coal by rail from the mines to various users in different states is still controlled by a linkage mechanism that is determined by an inter-ministerial committee. Coal prices were decontrolled in 2000 but with no competing suppliers for the state owned monopolies this has adversely affected consumer interests. There is not yet an independent regulatory authority for coal. The petroleum and natural gas sector is also devoid of any competition and independent regulatory oversight though there is private sector participation in refining and in retailing. Till 1975 prices of petroleum products were based on import parity. From 1976, an Administered Pricing Mechanism was followed that was based on retention pricing concept. This mechanism was dismantled in a phased manner between 1998 and 2002. Since April 2002 the prices of all petroleum products are again determined on an import parity basis, with the exception of diesel, Liquid Petroleum Gas (LPG) for domestic consumption and kerosene supplied through the public distribution system, that are subsidized. However, there is no real competition in the sector and the existing prices and taxation policies offer significant protection to private refineries.

The electricity supply industry began a major restructuring process during the nineties. The immediate objective was to bring in private investments for capacity expansion in the sector which was facing a resource crunch. However, based on the wave of electricity restructuring happening in many other parts of the world India also decided to unbundle (generation, transmission and distribution), corporatize and privatize the State Electricity Boards. The idea was to introduce competition and thereby encourage efficiency and competitive prices. Independent electricity regulatory commissions were set up at the Centre and in all the states, and were entrusted with the responsibility of regulating the natural monopoly segments of the sector and ensuring a level playing field in the competitive segments. The regulatory commissions were also required to facilitate the financial viability of the unbundled entities by requiring the state governments to provide, in advance, the financial burden of any subsidized prices proposed by them, to the concerned electric utilities. However, twenty years down the line more than 85% of the electricity sector is under public sector ownership, largely controlled by the central and state governments and prices are determined on a cost-plus basis as approved by the regulatory commissions. The gaps between demand and supply still remain very high and rural consumers bear a higher burden of this mismatch.

5. Energy Institutions - A Critical Appraisal

In spite of adopting an approach to energy development that was clearly meant to address the needs of the rural population and the economically weaker sections, after sixty years there is still a significant divide between the urban and rural access to energy. Rural energy access in India has all along been heavily subsidized and therefore over the years has also been significantly compromised. While the immediate policies and approaches related to this sector are responsible, the larger institutional framework and the incentives it provided along with the manner in which various groups responded to these incentives has had a significant bearing.

The institutional framework for energy adopted soon after independence was crafted at a time when patriotic feelings were very high, was driven by the rising concerns, objectives and constraints of that time and was influenced by the given ideology, know-how and learning. The state was to therefore play a dominant role. In this framework either the central or/and state governments, were to be responsible not only for providing the broader legal and policy framework, but also for designing the detailed organizational and governance structures, deciding on the financing arrangements, fixing or approving the pricing mechanisms and the price levels and specifying grievance redressing arrangements. Separate ministries for coal, petroleum & natural gas, power (electricity) and new & renewable resources oversaw the production and supply of these energy sources through state controlled public sector enterprises. Finances for these public sector enterprises mostly came from state budgetary allocations and thus investment decisions were influenced by the state. Prices were also determined or controlled by the state. The functioning of these public enterprises was driven by the physical targets set by the ministries or state governments – targets for number of new villages to be electrified, targets for number of irrigation pumps to be electrified, targets for number of solar cookers to be distributed, targets for coal linkages, targets for wind electricity generating capacity to be realized and so on. These targets were not based on economic considerations. In the earlier decades, at least financial viability was taken into account in fixing these targets but subsequently this was also not of concern.

The energy sector thus came to be characterized by large centralized and bureaucratic entities managing the energy services of different energy sources using a compartmentalized and top down approach. Over time 'state' control translated into control by political parties in power that started engaging in rent-seeking for political and/or monetary gains and in the process encouraged a lot of vested interests. Subsidy to rural consumers and to the economically weaker sections was a convenient route that was largely exploited to facilitate this rent seeking. The magnitude of subsidies flowing through these entities became a very significant proportion of the additional capital investments. The cumulative losses of the public sector energy enterprises were a sizeable proportion of India's GDP. Supply was ever lagging behind growing demand. The vested interests created by the policies and approaches of these entities were large and powerful. Given all this, efforts at reforming and restructuring the institutional arrangement have met with very limited and inadequate success. There is yet no independent regulation for the coal and petroleum sectors and prices are controlled. Regulatory commissions for the electricity sector are not really independent and are often not able to effectively enforce their orders. The regulatory commissions, whose members are selected by the state, are required to regulate enterprises owned and controlled by the state, which is inherently problematic. For example, a regulatory commission can mandate that the state government pay the electric utilities, in advance, the financial burden of the subsidies announced by it but it has no powers to enforce it.

Efforts to reform the sector have also basically sought to find solutions within the existing framework using the same top-down, target-driven and bureaucratic methods and these have had limited success. For example, the Rajeev Gandhi Grameen Vidyutikaran Yojana (RGGVY) is a flagship program of the central government for rural electrification. When this program was launched in 2005, a quarter of India's villages and 50% of its rural households had no access to electricity. The objective of this program was to electrify all un-electrified villages, provide access to electricity for all rural households (including free access to Below Poverty Line (BPL) households) and to augment the electricity distribution network in already electrified villages, by 2009. Ninety percent of the estimated capital costs of Rs. 160 billion was to be subsidized by the central government. The rural electricity distribution under this program was to be managed by franchisees, that could be non-governmental organizations (NGOs), user associations, cooperatives or individual entrepreneurs with the Panchayats (village level local bodies) also associated. This program was to be implemented by a state level electricity distribution company, or a public sector undertaking owned by the state/centre, by setting up franchisees that would manage the rural distribution. An elaborate three tier quality monitoring mechanism comprising the project implementing agency (i.e. the distribution company) as the first tier, the central government owned Rural Electrification Corporation in the second tier and the Ministry of Power as the third tier has been set up. Additionally, District Committees set up by the state governments were to take care of local monitoring at the district level with village level panchayats (local bodies) playing an advisory and supervisory role. An official memo issued by the Ministry of Power in 2005, in the context of the RGGVY says *"states must make adequate arrangements for supply of electricity and there should be no discrimination in the hours of supply between the rural and urban households"*.

By 2009, only 30% of the target number of villages and 3.5% of the target number of households were electrified. In 2008 it was decided to continue the program till 2012 and the cost estimate shot up to Rs. 520 billion which was over three times the original estimate. However, it is expected that by 2012 the RGGVY program would meet 73% of its target for village electrification and 28% of its target for household electrification (with a higher proportion of success with respect to the BPL households compared to non BPL). Thus, the record of expanding the physical infrastructure has been good. But the program has not been able to ensure that enough energy flows through it. The Ministry of Power therefore watered down its requirement in a new memo issued in 2008 stating that *"state governments must guarantee a minimum daily supply of 6-8 hours of electricity in the RGGVY network with the assurance of meeting any deficit in this context by supplying electricity at subsidized tariff..."* The franchisee system also did not take off. Only 38% of the villages electrified under RGGVY are managed by franchisees and preliminary evaluation reports on the functioning of these franchisees indicate that

while the consumer base, quality of service and revenue collection in these franchise areas have gone up, their commercial viability seems a very tough or impossible proposition. The RGGVY program had also required the state governments to provide the required revenue subsidies to the state level distribution companies that were supplying to the RGGVY networks. With the significant increase in rural electrification and the number of BPL consumers brought on by the RGGVY program the subsidy burden of the state governments worsened and many of them have been unable to provide the revenue subsidies.

Why have things gone so badly wrong? Why have the gross inefficiencies and inadequacies continued to sustain for decades? A whole lot of immediate factors could be identified to explain specific inefficiencies in specific contexts, locations and points of time. However, a common underlying cause can be identified which is that incentives provided by the institutional framework to different individuals and groups have not been compatible with the larger social agenda. As Ostrom et al. state, “participants in the design, construction, finance, operation, maintenance and use of infrastructural facilities face perverse incentives. Rather than presume that individuals involved intend to develop unsustainable infrastructure, we assume that they are rational decision-makers trying to generate net benefits. These individuals, however, face considerable uncertainty and some may behave opportunistically. Thus, they may make decisions that inadvertently or purposely either harm some members of a community or leave others much better off. When incentives are better matched to the situation individuals make decisions that yield outcomes that are personally and socially more rewarding. The admittedly difficult task, therefore, is to design the institutional arrangements that will produce such incentives”, (Ostrom et.al 1993).

The institutional arrangement for the energy sector in India vested the state with the authority to legislate, own and control/manage its investment and pricing decisions. The ‘state’ in a democratic framework is basically the political party that is in power that aspires to remain in power or to get back into power at a future opportunity. And as a participant in the energy sector it responds to its own perverse incentives. When the various participants in the energy supply industry responded ‘rationally’ to their perverse incentives it created inefficiencies from a social perspective. To tackle these inefficiencies again the state is responsible to carry out reforms and in doing so the political party in power would not want to alienate either the monetarily and politically powerful vested interests or its larger vote bank. The state therefore, pushes its access to public funds to the limits to prevent any drastic changes to status quo and this allows the inefficiencies to sustain over a very long time-frame. In this framework therefore incentives for individuals/groups are not compatible with socially efficient outcomes.

This does not imply that the energy sector could be completely left to market forces presuming that it would automatically lead to socially efficient outcomes. It is true that earlier arguments of energy supply being a public good because of its natural monopoly characteristics have been questioned. Efforts are ongoing since the

mid-eighties in many parts of the world to separate the potentially competitive segment from the purely natural monopoly segments of the industry and allow market forces to be the regulator for these while an independent regulatory authority oversees the performance of the natural monopoly segment. The track record of these efforts, however, does not convincingly suggest that private sector participation regulated purely by market forces would lead to socially efficient outcomes. It requires a combination of factors like the underlying socio-political ethos, the structural aspects of the economy in which the sector is embedded, the pre-reform institutional arrangement and its inertia or resistance to change, the technological and resource options and so on, to be favorable. Also, the potential for market power in the energy sector is quite high and even the competitive segments require strong regulatory oversight to ensure a level playing field which in turn raises the transaction costs. In some situations it is not clear whether the benefits of opening the sector for private participation really outweigh the transaction costs of regulatory oversight.

The market power issues apart, given the present challenges of energy security and environmental concerns, the way energy is harnessed by individuals and nations has very strong implications for regional, global and inter-generational social welfare. Hence, the *manner in which energy is harnessed* is essentially *a public good* and there is an increasing need to align individual/group incentives strongly with the incentives for the larger social good. To answer the question of what would be the best institutional arrangement to manage this 'public good', one should move away from the two idealized forms of a perfect market and a single centralized hierarchy. There is a whole range of possible hybrid arrangements that can combine the various elements of the two idealized forms to serve best the given social objectives. The appropriateness of any possible hybrid arrangement would depend on how best its property rights and incentive mechanisms would align individual incentives with social welfare objectives, the transaction costs involved in moving to this arrangement from the existing and the potential for its long-term sustainability. Fortunately, the need to manage India's energy consumption in a sustainable manner opens a good opportunity for significantly improving and sustaining India's rural energy access which in turn can help promote rural economic and social development.

6. Rural Energy Services – Current Approach

The terms of trade between the rural and urban sectors have always been in favor of the urban populations and the per capita income levels in rural areas have been below urban levels. Moreover, the proportion of poor and the absolute levels of their poverty are high in rural areas. The policies and efforts in India since Independence have been to 'protect' agriculture and to some extent the form of protection and its indefinite continuation has stunted the growth and income potential of the rural sector.

Rural populations being more dispersed, the unit cost of energy service to this population is higher than for the densely populated urban segments. With the rural capacity to pay being limited, the approach to rural energy supply has been to heavily subsidize it which in turn, given the economic realities, has led to inadequate access. In response to this, over the years, the perspective of rural consumers has been to demand more and more subsidies and any effort to raise prices meets with stiff resistance because they are not convinced that the level and quality of their energy access would improve and are also aware of the gross inefficiencies and leakages in the energy supply system. It is hence, not only politically difficult to lower subsidies but also attractive to bring additional, even undeserving, groups under its cover as it offers an easy way to political popularity with public money paying for it. The approach has therefore always been to provide only limited increments in rural energy supply given the sector's limited paying power.

India's rural sector, as a result, has been destined to a low level inefficient 'disequilibrium' that sustains over a very long term and that poses serious limits to its growth potential. To enable rural India to break out of this and to unleash its inherent potential for growth it is important to move away from the existing mindset of the need to keep it permanently and increasingly under dole through the controls and protection of a state. It is important to provide an institutional arrangement that *enables* rather than *controls* the rural growth potential. Given that the costs of renewable energy technologies are getting closer to fossil fuel based energy costs inclusive of their environmental externality costs and given the emerging options and provisions in the energy supply sector the potential to move towards such an institutional arrangement seems good.

7. Way Forward

At present, efforts to promote renewable energy in India are also within the top-down, compartmentalized and target driven approach. The targets chosen are *ad hoc* and not based on social costs and benefits. In the case of electricity supply, as per the provisions in the Electricity Act 2003 and based on the policies for climate change and energy, the state electricity regulatory commissions now specify the renewable portfolio obligation for each of the electricity distributing licensees. Accordingly, each distributing licensee is required to generate or purchase a specified proportion of its total energy from renewable sources. The proportion specified varies from state to state and in some states the share of each specific renewable technology within this is also given. Additionally, the price at which the distributing licensee should purchase the energy generated from each renewable energy source is also specified by the regulatory commission. Thus both the features of the renewable portfolio standards (RPS) and the feed-in-tariff (FIT) mechanisms are combined here and there is not much room for market forces. This passes on the entire burden of the costs of increasing the share of renewable electricity to the final consumers. The Ministry of New and Renewable Energy at the same time encourages the use of various renewable sources of energy, particularly in rural areas, by specifying targets

and providing *ad hoc* incentives. There is no coordination between the efforts of the Ministry of Power and the Ministry of New and Renewable Energy. And since the incentives given by each are *ad hoc* and not based on social cost benefit estimates, the outcome for the manner in which renewable resources are harnessed for various end-use services may not be the socially efficient one.

If optimal shares of renewable energy and optimal levels of energy efficiency are to be achieved then it is important to signal to final consumers the true opportunity costs of energy use from different sources and the social benefits of improving energy efficiencies. To a large section of urban consumers this can probably be done through well-designed price structures. However, in the context of the rural consumers, given the existing framework, it would be politically very difficult to raise prices to required levels and to effectively target subsidies only to truly deserving groups. Additionally, it is important to move away from the top-down, hierarchical and compartmentalized approach to a bottom-up decentralized and integrated approach for sustainable harnessing of energy. In this context it seems important to entrust the rural consumers with appropriate property rights to manage both their energy supply and energy use and allow them the residual rights to the benefits flowing from increased efficiencies of use. A potential institutional arrangement that could assign such property rights and provide the right kind of incentives for efficient and sustainable use of energy is broadly outlined below. The larger benefits of this arrangement are highlighted and the nature of regulatory oversight needed to enable its smooth and efficient functioning is presented.

8. Rural Energy Enterprise

Decentralized organizations in rural areas that could generically be referred to as Rural Energy Enterprises (REE) could take up the responsibility for managing both the energy supply and use within the areas under their jurisdictions, which could be a single village or a group of villages. Each REE should be jointly owned by local stakeholders, local Panchayat(s) and private investors i.e. it should be a Stakeholders-Panchayat-Private Partnership (SPPP). It should function combining cooperative principles with those of corporate governance. The needed technical and managerial expertise must work with local stakeholders' priorities and insights to ensure sustainable energy access. It should manage the local energy supply, either by purchasing from existing suppliers or by generating on its own, and should encourage efficient use of energy from different sources in an integrated manner. It could make use of the various subsidies provided by the state and central governments in a holistic manner and could design suitable price and non-price mechanisms within its jurisdictions. The REEs would, in the process of managing the local energy supply and use, generate local livelihood opportunities that would improve the income levels and paying capacities for many.

8.1. Ownership and Constitution

The REE should be jointly owned by local stakeholders, the local Panchayat(s) and private investors. Local stakeholders would be the long-term property-owners and long-term residents of the area. The 'long-term' period must be defined suitably to avoid the problem of temporary residence or property ownership being sought as a means to derive short-term benefits from these enterprises. The proportion of the ownership rights enjoyed by the panchayats, private investors and stakeholders must be determined in such a way that the controlling and residual rights of the three groups are well balanced and would provide checks against strong political interference, dominance of vested private investor interests and possible holdups by either of the groups or by local stakeholder subgroups. In the case of the economically weaker long-term residents who cannot pay for their ownership rights, the government (at the centre or state) could provide individual grants or very long-term loans at low or zero interest rates, to pay for their ownership rights. The REE should be allowed to function as a profit making enterprise, but there should be proper mechanisms to guard against short-term profit motives. For example, it may be initially required for a certain length of time that all profits are ploughed back into the enterprise. There could be restrictions on sale of ownership rights for a certain length of time. Essentially, the nature of property rights should create the incentives to work for long-term sustainability of the enterprise and its financial viability.

8.2. Management

The technical and managerial expertise needed to efficiently manage the REEs would mostly not be locally available and will have to come from the urban sector. In order to induce such experts to contribute to the efficient functioning of the REEs they should initially be offered some ownership rights and subsequently given bonus shares based on performance. The compensations, perks and bonus shares should be designed so as to create strong incentives for the managers to work for the long-term profitability of the enterprises. Given the present urban rural divide in terms of access to education, health care and developmental infrastructural facilities and entertainment opportunities the biggest challenge would be to entice the technical and managerial expertise available in urban localities to move into rural areas. To get around this problem, it would help to initially start REEs in the peripheral locations of urban areas and expand into more remote locations in a radial manner.

8.3. Responsibilities and Functioning

The REE should be responsible for assessing the energy needs within its jurisdiction, planning and providing for access to energy services. It could decide on how much should be purchased from existing energy service providers and how much should be generated locally. It should be able to choose the appropriate mix of energy from various sources based on cost and profit considerations. The REE should also manage the energy use pattern within its area and encourage its shift to a more

efficient one. It should design an appropriate set of price and non-price mechanisms to pay for its energy management services.

The existing and emerging institutional arrangement and technical potential for energy in India affords the scope and flexibility for the REEs to function as suggested. The REE could become a franchisee for supply of electricity within its area, similar to the provisions in the RGGVY program. It could initially lease or buy the distribution network from the local distribution licensee and purchase the electricity it needs, either from the local distribution licensee or from a third party through open access. It could choose to generate its own electricity from renewable resources like biomass, wind or solar. It could generate and supply piped biogas to its customers. The REEs should however be strongly discouraged from using diesel/kerosene based generating sets to produce electricity since this would be a very inefficient and polluting way of addressing local energy needs though the subsidized prices of diesel/kerosene would make this attractive. Thus based on the local needs, energy resource availability and costs the REE could choose the most suitable combination of energy resources and the appropriate mix of self generation and purchases to meet the energy needs of its customers. The REE should also encourage the end-use efficiency of energy consumed by the customers within its jurisdiction. This could be done through monetary and other incentives. By virtue of handling the responsibility for both energy supply and end-use efficiency for its customer base the REE could explore and devise innovative technologies and methods of energy use. For example, wind power could possibly be used to lift groundwater and store it which can be used for drip irrigation. The uncertainty and variability of wind potential may not be a constraint in this context and this could help save a lot of energy drawn from the grid. Solar water heating may be promoted so that biomass that is currently used to heat water in inefficient ways could be now used for generating electricity or cooking gas or for organic manure.

8.4. Subsidies and Pricing

A whole range and combination of government subsidies is currently available to reduce both the capital cost of access to energy and the cost of consuming energy for rural consumers. The REE can, given the subsidy regime and options, use it in a holistic manner to buy, harness and use energy within its jurisdiction in a cost-effective manner. In the case of electricity for example, it can make use of the capital subsidy provided by schemes like the RGGVY to build up the distribution network. The state governments provide subsidies for consumption by agriculture pumps and low income households. The payments made by agricultural consumers are not related to the energy consumed but are fixed annual charges based on the horse power ratings of their irrigation pumps. This form of subsidy creates a lot of negative externalities. The REE should ensure that all electricity consumption is metered and billed. It can subsidize the electricity consumed for irrigation by economically weaker farmers by allowing them to pay for a lower proportion of their bill while at the same time specifying an upper limit for the amount of such subsidized electricity

that can be availed. Any consumption above this limit should be charged the full price. For other farmers it can gradually raise the price for energy consumed to cover the full cost of service. The REE could collect a lump sum amount as subsidy from the state government for irrigation related consumption by farmers and for consumption by low income households. This amount could, for example, be equal to the highest subsidy amount that was due to that local area based on the last three years' consumption. Or it could be related to the potential consumption based on suitable efficiency norms. Thus, the REE could facilitate the process of shifting away from the present unsustainable forms and levels of subsidy to a better targeted one. This kind of a shift would benefit local stakeholders due to the financial returns on their ownership shares of the REE and also due to the increased efficiency in the use of water and energy which would improve the long-term sustainability of their access. It would also benefit the local panchayats and the managers of the REE. The state governments can benefit too by bringing down their subsidy burdens over a period of time. This approach would hence be compatible with the incentives for various groups.

It is also important that the REE combines potentially loss-making services with some really profitable services in its portfolio so as to ensure a reasonable financial return to sustain itself. That is why it is also important for the REE to combine a portfolio of energy sources and technologies so as to minimize its risks. For example, the REE should serve industrial and commercial customers along with the agriculture and domestic groups. It should combine conventional with renewable energy sources and combine self generation with purchases in its supply options.

8.5. Value Addition to Rural Economy

The REEs would create livelihood opportunities in the local areas by transforming some of the non-commercial sources of energy like biomass and animal waste into commercial sources. These resources would now acquire additional value due to their demand for renewable energy based generation and the opportunity cost of the human effort that was earlier spent in gathering them for personal use would also go up. This improves the income potential for some of the participants. Local technical and managerial capacity to manage the supply and use of energy from various sources will get developed over a period of time. As the quality and availability of energy services improves both the social and the developmental infrastructure in the area will improve which in turn can support greater rural economic growth.

8.6. Potential for Channeling the CDM Finances

A large number of REEs could be brought under a 'Small Scale Clean Development Mechanism Program of Activity' so that their combined contributions to increasing energy efficiencies and renewable energy shares would be large enough to qualify for receiving carbon credits under the CDM framework of the United Nations Framework Convention on Climate Change. If properly financed and implemented a

significant part of the benefits of the CDM financing can directly flow to the REEs and would largely benefit the rural consumers.

8.7. Process for Formation

Creation of such REEs should be based on a fairly well structured and effective consultative process particularly with local stakeholders and governing bodies (Panchayats). It must be recognized that in the existing climate of leakages from the system, vested interests, inadequate access and investments on costly back-up options, arbitrariness in policy-making, short-term objectives and short-cut approaches driving individual and group decision-making and the resultant uncertainties and distrusts it would take a lot of persuading and convincing to get all the stakeholders to see the merit of the proposed system. Any idea of such long-term collective involvement of rural groups is likely to be received with a lot of pessimism. There would not be enough patience to wait for the benefits that will come in the medium and long-term. To get over these problems it is necessary to drive home the nature and magnitude of the potential negative impacts of consuming energy as is done now and the significant direct and indirect benefits that will be gained by the local stakeholders in taking the REE approach outlined here. It is thus important that the local stakeholders and governing bodies are convinced of the merits of this organizational approach and are interested in participating voluntarily.

8.8. Regulatory Framework

The proposed institutional changes cannot yet depend on market forces to ensure its fair and efficient functioning. There has to be independent and efficient regulatory oversight. The form of regulation should be so as to ensure that the chosen controlling and residual rights for the different participant groups are effectively enforced. It should be more an enabling rather than a controlling form of regulation. It should guard against any misuse of rights and privileges afforded the REE and ensure fair treatment for all participants. Given that the REEs are to adopt an integrated approach across various energy sources and technologies the regulating bodies should also have the necessary rights and capabilities to exercise their authority across various energy source options and technologies in the context of their regulating the REEs. Towards this the central government could set up an independent Energy Regulatory Authority as an apex authority with independent district level regulatory authorities working under its umbrella. The need for district level regulatory bodies arises because the REEs would be large in number and a regulatory body at the state level would not suffice for effective regulation of the large number of these dispersed entities. Additionally, by decentralizing the powers to regulate at the district level, it can minimize any potential capture of regulatory powers by political interests at the state level. It would be important also to allow any participating individual or group within an REE to approach any regulatory authority at any district level for its grievance redress. This potential competition

would help to minimize regulatory capture by any local participating groups or political powers.

9. Conclusion

India's approach to energy, as in all other sectors, was to promote development while at the same time being sensitive to the needs of the economically backward rural areas and economically weaker sections. The institutional arrangement crafted for this purpose indeed balanced both these objectives well while at the same time earning a small return on investments. However, over the decades, the different groups of individuals participating in the sector responded to their perverse incentives and the resulting outcomes became socially inefficient and imbalanced. The rural sector had to bear a bigger burden of the inefficiencies and imbalances. The approach to rural energy supply, as with the broader approach to the agricultural sector, had increasingly focused on 'protection', given the economic handicaps and low paying capacities of most of the rural population. The form of protection offered and its indefinite continuation has, however, stunted the growth potential rather than promoting it. The incentive mechanisms offered to consumers in the process became out of line with what was needed for improved and sustainable access. At the same time, given the environmental challenges, India has to increase the share of renewable energy sources in its energy mix. Renewable energy resources are not centralized like coal, oil and large hydro and their technologies do not require large sized power generating units for cost economies. Most of the emerging renewable energy resources are available in rural areas and agricultural operations are more amenable to some of the renewable energy technologies. This opens up a good opportunity to move away from the top-down, centralized and compartmentalized approach to energy supply towards a bottom-up, decentralized and integrated approach.

Various efforts are ongoing in India to set up decentralized renewable resource based electricity supply systems in rural areas. These are mostly in remote areas where it is difficult to extend the electricity grid. International aid agencies provide funding for some of these and they are to be managed by local government authorities, electricity distributing licensees or non-governmental organizations (NGO) or in some cases as cooperatives. Some of the supply systems did well for a certain time frame. However, when the funding from aid agencies ran out the projects were not able to sustain their operations. The Ministry of New and Renewable Energy has also initiated and funded decentralized electricity generation in some states to be implemented by the concerned state's Energy Development Authority. However, there has been no replication of such efforts happening in a big way. Most of these supply systems are based on a particular renewable energy source and a specific technology, and are managed either by a local government, a public sector enterprise or an NGO. The focus is on supplying a minimum amount of electricity to the households – for example, to charge mobile phones, and to operate a couple of lights and fans and a television for a limited number of hours. Being

small and managing a renewable resource based supply in a remote area that is focused on providing a minimum level of electricity these enterprises could not sustain their financial viability once the project funds dried up. There was no risk pooling happening between potentially loss-making and profit-making operations. It was not possible to attract the needed technical and managerial expertise to remote rural areas and the human capital available locally was not well-equipped to run the enterprise efficiently.

The institutional change proposed here through the formation of REEs seeks to create sufficient long-term incentives by carefully designing the ownership structure as also the controlling and residual rights. By vesting the property rights to manage both the supply and energy use efficiency of the local area with the REE, in which the local stakeholders have significant stake, it aligns individual/group incentives with the larger social objective. It seeks to pool the risks between self generation and purchases and the risks between conventional and renewable options. It makes it attractive for technical and managerial expertise to invest time and effort for the long-term sustainability and financial viability of the enterprise. By managing the subsidies in a holistic manner this institutional change can also gradually reduce the subsidy burden on public funds.

10. Notes

1. R. Hema is Associate Professor at Madras School of Economics. The idea for the institutional way forward presented here is a precursor to the setting up of Rural Hybrid Energy Enterprise Systems by a consortium of UK and Indian academicians and practitioners with funding from Research Councils UK and Department of Science and Technology India under the theme “Bridging Urban Rural Divide” Comments on a presentation made at the World Institute for Sustainable Energy, Pune, October 18-19, 2011 are gratefully acknowledged. e-mail: hema@mse.ac.in

11. References

- Integrated Energy Policy, (2006), Report of the Expert Committee, Planning Commission, Government of India, New Delhi
- Ostrom, E., Schroeder, L. and Wynne, S., (1993), “Analyzing the Performance of Alternative Institutional Arrangements for Sustaining Rural Infrastructure in Developing Countries”, *Journal of Public Administration Research and Theory: J-PART*, Vol. 3, No. 1 (Jan., 1993), 11-45.
- Sreekumar, N., and Dixit, Shantanu, (2011), *Rajeev Gandhi Rural Electrification Program: Urgent need for Midcourse Correction*, Prayas, Pune

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