ABSTRACT

Title of dissertation: THE RELATIONSHIP BETWEEN INCOME, WEALTH, AND LIFE SATISFACTION

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This dissertation inquires into the relationship between income, aspirations, and life satisfaction in post-transition Russia. It first explores the channels through which adaptation and social comparison contribute to higher income aspirations. The results show that social comparison is a strong agent in shaping aspirations, while the effect of adaptation is relatively weak. Subsequently, the dissertation tests for the effect of aspirations on two separate satisfaction indices, satisfaction with life and satisfaction with economic conditions. This dissertation uses a Chamberlain random-effects ordered probit estimation to control for time-invariant unobservable individual traits. In contrast to previous studies, the results suggest that increases

in aspirations have a positive effect on life satisfaction. This dissertation argues that this is caused by the expectations contained in income aspirations. Higher aspirations reflect an increase in needs commensurate to changes in own and others' income, but they also reflect improved income expectations based on the information provided by the present income of relevant others. The improved outlook embedded in the higher income aspirations causes the latter to have a positive effect on life satisfaction. This suggests that, ten years into the transition process, the reaction patterns of life satisfaction in Russia differ substantially from those in developed countries.

While the relationship between life satisfaction and income or institutions has recently received a lot attention, the relationship between life satisfaction and accumulated wealth remains unexplored. This dissertation makes use of the 2008 Gallup World Poll and a novel wealth database compiled by the World Bank to evaluate the effect of wealth, produced capital, and natural resources on life satisfaction. The dissertation finds that both produced capital and natural capital have a positive effect on life satisfaction. The effect of good institutions and informal safety nets is also positive. However, in results that parallel findings from the resource curse literature, this dissertation shows that the positive effect of natural capital is due to diffuse natural resources like cropland, pastureland and forestry. Subsoil asset wealth has no significant effect on life satisfaction.

Blood feuds represent a significant challenge to law enforcement, institutional consolidation and economic development due to the violence they generate and the other forms of crime they contribute to. This paper seeks to model and explain

the decision making dynamics behind blood feuds. Rather than a simple retaliatory act, the violence associated with blood feuds is very much an integral aspect of an institutional framework that reflects a different set of ecological conditions and preferences. This paper incorporates different cultural and ecological aspects of various societies into a theoretical model that explains how blood feuds are sustained in a society. In addition, the model developed in this paper helps explain the longevity of blood feuds and reconcile different views from the anthropology literature.

THE RELATIONSHIP BETWEEN INCOME, WEALTH, AND LIFE SATISFACTION

by

Ermal Hitaj

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park in partial fulfillment
of the requirements for the degree of
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Acknowledgments

I owe my gratitude to all the people who have made this dissertation possible and because of whom my graduate experience has been one that I will cherish forever.

First and foremost I would like to thank my main advisor, Professor Peter Murrell, for giving me invaluable advice and guidance from the first day I came to the University of Maryland. It has been a pleasure to work with and learn from such an extraordinary individual. I would also like to thank my advisor, Professor Ingmar Prucha, for his superb insight and for constantly challenging me to go one step further. Thanks are due to Professor Raymond Guiteras for his comments and ideas, and to Professor Charles Butterworth and Professor Nuno Limao for agreeing to serve on my dissertation committee.

I jam thellësisht mirënjohës familjes sime - nënës, babait, motrës, dhe bashkë-shortes - për mbështetjen, durimin dhe dashurinë me të cilat më kanë rrethuar gjatë gjithë jetës sime. Gjithashtu përgëzoj të sapolindurin tim bir, Aaron Ymer, dhe e falënderoj për durimin që tregoi duke ardhur në këtë botë dy orë pasi mbrojtja e këtij disertacioni kishte përfunduar.

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It is impossible to remember all, and I apologize to those I have inadvertently

left out. Thank you all!

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Chapter 1

Introduction

It has been widely assumed that as income increases, social comparison and adaptation contribute to higher income aspirations, which in turn mitigate the effect of income increases on life satisfaction. This process is believed to have been the cause behind the flat relationship in time between income and happiness in industrialized countries after World War II. On the other hand, studies on transition countries show that life satisfaction has increased in time parallel to real income, especially during the early years of transition, indicating that in these countries the response patterns of life satisfaction are significantly different from those in industrialized countries. This dissertation first explores the channels through which adaptation and social comparison contribute to higher income aspirations. The results show that social comparison is a strong agent in shaping aspirations, while the effect of adaptation is relatively weak. Subsequently, the dissertation tests for the effect of aspirations on two separate satisfaction indices, satisfaction with life and satisfaction with economic conditions. The dissertation uses a Chamberlain random-effects or-

dered probit estimation to control for time-invariant unobservable individual traits. In contrast to previous studies, the results suggest that increases in aspirations have a positive effect on life satisfaction. This dissertation argues that this is caused by the expectations contained in income aspirations. Higher aspirations reflect an increase in needs commensurate to changes in own and others' income, but they also reflect improved income expectations based on the information provided by the present income of relevant others. The improved outlook embedded in the higher income aspirations causes the latter to have a positive effect on life satisfaction. This suggests that, ten years into the transition process, the reaction patterns of life satisfaction in Russia differ substantially from those in developed countries.

1.1 Aspirations and Life Satisfaction in Transition:

How Wanting More Increases Happiness

Recent years have witnessed a blooming of the literature on life satisfaction with a focus on the relationship between income and happiness.[1] A number of studies on industrialized countries suggest that, though individuals with higher income are generally happier than those with less, an increase in income does not have a permanent effect on satisfaction with life. This phenomenon, which became known as the Easterlin paradox, was illustrated by the fact that in the four decades after World

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War II average life satisfaction remained constant even though per capita income in the industrialized countries almost doubled Clark et al. (2008). Easterlin's results have been challenged by several recent papers that make use of newly available data to show the existence of a positive effect of income on life satisfaction. Deaton (2008) finds a strong cross-country relationship between per capita GDP and life satisfaction. Sacks et al. (2010) confirm that, and also find that life satisfaction increases with economic growth. Guriev and Zhuravskaya (2009), in a study that uses data from the World Values Survey, also find that higher income is associated with higher happiness levels. This paper contributes to the life satisfaction literature by conducting an aspirations-based analysis of the determinants of life satisfaction in transition Russia.

Easterlin (1974, 2003b) argued that what he saw as a lack of a significant correlation between income and happiness was explained by the negative effect of increases in aspirations on life satisfaction. Increases in individual income as well as income of other individuals lead to an increase in aspirations, which reduces satisfaction with life. The two main processes that affect individuals' aspirations have been identified in the literature as social comparison and adaptation.[2] Thus, individuals adjust their aspirations to the income and consumption level of relevant others[3] (social comparison) and to their own past income levels (adaptation). Clark et al. (2008) internalize both social comparison and adaptation in a utility function

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[2]Clark et al. (2008) would describe social comparison and adaptation as the two processes that contribute into an individual's relative evaluation of income, whereas Stutzer (2004) identifies them as the two processes that contribute to the formation of an individual's aspirations.

[3]Relevant others can be defined as individuals with similar job market characteristics (Senik 2004) or as individuals one is likely to be in constant interaction with (Stutzer 2004).

that provides the theoretical framework necessary to reconcile the effect of income on happiness at any given time with the essentially flat happiness curve in industrialized countries. While these studies assume that an increase in relevant others' income has a negative effect on life satisfaction, Hirschman and Rothschild (1973) pointed out the possibility of a positive effect, particularly in a developing country context. They argue that if income and opportunities are increasing in a developing country, a higher income of relevant others might act a positive signal as regards one's own future income, and thus increase life satisfaction. They label this the "tunnel effect"[4] and argue that, once a country reaches a certain threshold of economic development, the effect should vanish and social comparison should regain its negative effect on life satisfaction. Senik (2004) finds a positive effect of relevant others' income on satisfaction in Russia during the early years of transition.

In Easterlin's analysis, however, aspirations are regarded as the key agent that shapes individuals' reaction to events and the influence these events have on satisfaction with life. Social comparison and adaptation affect life satisfaction through the increase they cause on material aspirations. As such, a good grasp of the process through which material aspirations are formed and evolve is a crucial component of the study of life satisfaction and its determinants. This paper offers an aspirations-based analysis of life satisfaction in Russia in the later stage of transition.[5]

The relationship between income and life satisfaction in transition has been

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[5]The analysis of this paper is based on three consecutive waves of the Russian Panel, 2000, 2001 and 2002.

explored by Lokshin and Ravallion (2000) and Frijters et al. (2006), whereas Senik (2004) focuses on the relationship between life satisfaction and income distribution. All of these studies use individual or household data from the Russia Longitudinal Monitoring Survey (RLMS), which is also the data used in this study. However, these studies do not estimate the aspiration-building process, nor do they inquire into the role of aspirations (as revealed by individuals themselves) in individuals' life satisfaction adjustment.

This paper uses one of the questions of the RLMS posed in four rounds from 1998 to 2002 to capture individuals' aspirations and proceeds to explore the conditions through which income aspirations are formed. To that end, this paper tests for the impact of two processes on aspirations: (1) the impact of individual income changes from previous periods (adaptation), and (2) the impact of changes in the income level of the social group one would likely compare oneself to (social comparison). The results suggest that social comparison is a considerably stronger agent in shaping aspirations than adaptation is. Aspirations respond strongly to changes in reference group income, whereas the effect of individual income changes is quite weak.

After establishing the role of these two processes in the formation of aspirations, this paper explores the trends and determinants of satisfaction and tests for the presence of hedonic adaptation and social comparison. The focus is on two different measures: satisfaction with life and satisfaction with economic conditions. In contrast to previous work on RLMS, this paper not only controls for the effect of income, employment and asset ownership, but also places a special focus on as-

pirations as the main agent through which adaptation and social comparison exert their influence on satisfaction.

The results show that aspirations have a significant impact on life satisfaction but not on satisfaction with economic conditions. However, contrary to what Easterlin (1974, 2003b) predicts about the effect of aspirations on life satisfaction and what empirical studies to date (Easterlin, 2001b; Stutzer, 2004) have found, this paper finds that aspirations increases have a positive effect on life satisfaction. This is due to the double functionality of aspirations. They reflect an increase in needs commensurate to changes in own and others' income, but they also reflect improved income expectations based on the information provided by the present income of relevant others. These results point to the existence of a "tunnel effect" similar to the one predicted by Hirschman and Rothschield (1973) for developing countries. The improved expectations embedded in the higher income aspirations cause increases in the latter to have a positive effect on life satisfaction.

1.2 Wealth and Happiness of Nations:

The Resource Curse from a New Angle

While the relationship between life satisfaction and income or institutions has recently received a lot attention, the relationship between life satisfaction and accumulated wealth remains unexplored. This dissertation makes use of the 2008 Gallup World Poll and a novel wealth database compiled by the World Bank to evaluate the

effect of wealth, produced capital, and natural resources on life satisfaction. This dissertation finds that both produced capital and natural capital have a positive effect on life satisfaction. The effect of good institutions and informal safety nets is also positive. However, in results that parallel findings from the resource curse literature, this dissertation shows that the positive effect of natural capital is due to diffuse natural resources like cropland, pastureland and forestry. Subsoil asset wealth has no significant effect on life satisfaction.

The determinants of happiness have been an increasingly popular research topic during the past decade. Several studies have focused on the effects on happiness of income, institutional quality and freedom. A consensus has emerged that seems to suggest that, while in industrialized countries increasing income does not contribute to rising life satisfaction, there appears to exist a positive relationship between the two in developing countries. Clark et al. (2008) report that happiness in industrialized countries has essentially remained stable for the last three decades, while real income has almost doubled. Oswald (1997) finds that in both Western Europe and the United States the average level of satisfaction with life has risen very slightly. On the other side, Frijters et al. (2004) find that in Eastern Germany life satisfaction has increased significantly in from 1991 to 2002 and the rising income has had a significant and positive effect on happiness.

Cross-country studies such as Inglehart et al. (2008) find a significant correlation between development and happiness. In another cross-country study, Di Tella et al. (2003) find that, after controlling for country fixed effects, happiness is strongly correlated with present and lagged GDP per capita. Deaton (2008) also

finds a strong cross-country relationship between per capita GDP and life satisfaction. Better institutions also seem to have a positive effect on life satisfaction. Inglehart et al. (2008) and Frey and Stutzer (2000) find that institutional variables, such as free choice and possibilities of individual participation have a significant and positive effect on happiness. Furthermore, Alesina et al. (2004) and Graham and Felton (2006) find that inequality has a negative effect on happiness.

The studies listed above are the most prominent of a burgeoning literature that is increasingly enabling a better understanding of the interaction between income, institutions and life satisfaction. However, what remains unexplored is the relationship between accumulated capital, natural resources and life satisfaction. Accumulated wealth, natural or produced, reflects a country's long term productivity and institutional quality and captures the effect of national wealth in a way that income cannot. Furthermore, the ability to distinguish between produced and natural capital, as well as between different sources of natural capital, enables a review of the effect of the resource curse on national well-being from a different perspective.

The research on the relationship between natural resources and economic and institutional performance has been gravitating towards the conclusion that natural resource abundance is likely to have a negative effect on economic growth (Sachs and Warner, 1995), contributing to the so-called resource curse theory. Roos (2001) and Sala-i-Martin and Subramanian (2003) also find that oil and mineral resources have a negative impact on institutional development. Murshed (2003) and Isham et al. (2005) draw the distinction between economies with point-based resources and those with diffuse resources, finding that the resource curse is more likely to

describe the state of affairs in the former.

This dissertation seeks to bridge the gap between the life satisfaction literature and the natural resource literature. It does so by combining data from a newly available wealth database from the World Bank (World Bank, 2006) and the 2008 Gallup World Poll (Gallup, Inc., 2009),[6] and gauging the effect of produced and natural wealth on life satisfaction.

We find that both produced and natural wealth have a positive and significant on life satisfaction. However, after disaggregating natural wealth into extracted and non-extracted wealth, we find that only non-extracted wealth has a positive effect, whereas the effect of extractive wealth is insignificant. Puzzling as these results might appear, they do not contradict the prevailing wisdom in the area.

A country affected by the resource curse will typically be characterized by a combination of overinvestment in the resource-rich sector and underinvestment in other sectors, high exposure to commodity price fluctuations and concentration of economic and political influence in the hands of small elites. And the resource curse typified by these features is likely to negatively affect life satisfaction in a country through the limitations in investment, employment and political participation opportunities.

However, not all resource riches need to lead to a resource curse. As argued by Acemoglu et al. (2001) and demonstrated by Isham et al. (2005), conditions that facilitate a more equitable distribution of investment and income (such as land abundance or soil quality) need not be conducive to economic and political insti-

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[6]Summary Statistics are presented in Tables B.1 and B.2 in the Appendix.

tutions similar to those experienced by resource curse countries. It is the existence of natural wealth that is highly valued in international markets (such as oil or gas) and can only be taken advantage through extractive industries where ownership is more likely to be concentrated in a few hands that will be more likely to lead to resource curse conditions.

1.3 Blood Feuds: The Economics of a Dismal Institution

Blood feuds represent a significant challenge to law enforcement, institutional consolidation and economic development due to the violence they generate and the other forms of crime they contribute to. This dissertation seeks to model and explain the decision making dynamics behind blood feuds. Rather than a simple retaliatory act, the violence associated with blood feuds is very much an integral aspect of an institutional framework that reflects a different set of ecological conditions and preferences. This dissertation incorporates different cultural and ecological aspects of various societies into a theoretical model that explains how blood feuds are sustained in a society. In addition, the model developed in this dissertation helps explain the longevity of blood feuds and reconcile different views from the anthropology literature.

The institutional composition of a society, that is the network of legal, political and economic institutions together with the set of beliefs and expectations these

institutions generate and are, in turn, supported by, has been shown to have a substantial effect on growth and economic performance. North (1990) assesses the importance of well-designed institutions on economic performance and Acemoglu et al. (2001) supply a thorough analysis of the effects of different institutional setups on the long-term economic performance of various regions in Africa, Oceania, and the Americas that were ruled or colonized by Europeans.

Of all institutional features, a well functioning legal system and a political entity with a strong law enforcement capacity are indispensable prerequisites for the existence of a well-functioning market economy; without them even the most basic rights to security of life and property are severely under threat, rendering the proper functioning of a market economy impossible. For a legal system to be successful, its acceptance by every person in a given country or region is a basic condition; it is threatened by remnant components of conflicting legal systems, which reflect different preferences and could encourage types of behavior that run counter to the official legal system.

This dissertation focuses on the effects of an informal enforcement structure on welfare, stability and the behavior it encourages in countries or regions where it has not been fully and successfully replaced by a modern, government-enforced legal system. That enforcement structure is the blood feud. In the societies this dissertation focuses on, it appears to be the case that, though customary law has lost its normative power, particular types of behavior and institutions associated with it in the past continue to exist. For instance, in Northern Albania, one of the main study areas, although the historical customary code of conduct pertaining to many

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aspects of life in a society has widely disappeared and ceased to regulate people's lives, the blood feud continues to exist with detrimental effects to the security of life and property.

A blood feud consists of a chain of reciprocal killings between members of two opposing clans and often lasts for generations. Far from being regarded as isolated spurs of violence, anthropological research has viewed the blood feuds as an institution that has regulated violence and provided a "cohesive force" (Black-Michaud 1972) for the societies in which they have been present throughout centuries. As such, blood feuds display a number of strictly regulated features and are generally supported by a wider set of societal norms. In Northern Albania, they have been supported and regulated by the Kanun of Leke Dukagjini, a wide body of customary law in existence since the middle of the 15th century. Among various Bedouin tribes in Israel, blood feuds are regulated by a set of norms that is predominantly orally transmitted rather than codified in writing.

Blood feuds have also been and continue to be present in Afghanistan and Northern Pakistan (Rubin, 2002; Schoffield 2003). It is even argued that blood feuds fueled the civil war in Afghanistan, although Nojumi (2002) rejects that argument. While there is not necessarily an established link between blood feuds and illegal activity in all countries[7] in which blood feuds have persisted, there is a connection between blood feuds and organized crime in Albania and Brazil (De Souza Mello Bicalho and Hoeffle, 2005). Some of the institutional features that support blood feuds, such as disregard for the formal legal structure, clan discipline and

[7] Afghanistan, Albania, Brazil, Israel, Mexico, Pakistan.

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a propensity for violence could easily become valuable assets for organized crime. Eradicating blood feuds and replacing their supporting institutions would go beyond establishing law and order, and have deeper implications for future crime prevention, institutional consolidation and social cohesion and for the development of a region in general. In order to eradicate the blood feud as an institution, it is necessary to better understand the decision-making process of feuding clans, the dynamics of the feud's replication in time, and the conditions under which they can be dismantled.

The major questions this dissertation sets out to answer include: (1) What is the blood feud's typical longevity? (2) How do blood feuds persist through time and resist competition from other institutions (including government-sponsored modern legal systems), or how are they not only "self-enforcing" but also "self-re-enforcing" (Greif, 1994)?

There is no consensus in the literature (Middleton and Tait, 1958; Peters, 1967; Black-Michaud, 1975) on the answer to the first question - whether the blood feud is finite or infinite. This dissertation introduces a model that combines both views and demonstrates how both types of conflict can coexist in a society.

This dissertation focuses on collective responsibility as the main cause behind the persistence of blood feuds and argues that only societies that have successfully completed a transition from collective to individual responsibility have been able to eradicate blood feuds. The capacity of a society to alter its institutions in the long run is explored by treating the institution of "collective responsibility" as endogenous in an environment of changing economic opportunities. This dissertation concludes that while payoffs are determined in the short run by the existing insti-

tutional structure, in the long run changes in payoffs contribute to a change in the institutional structure.

1.4   Outline

This dissertation is organized as follows. Chapter 2 explores how income aspirations are formed, and how they affect life satiscfaction. Chapter 3 inquires into the effect of accumulated wealth on life satisfaction across countries. Chapter 4 models the interaction between clans in a blood feud. Finally, chapter 5 provides the conclusion to the dissertation.

Chapter 2

Aspirations and Life Satisfaction

in Transition:

How Wanting More Increases

Happiness

2.1 Introduction

Recent years have witnessed a blooming of the literature on life satisfaction with a focus on the relationship between income and happiness.[1] A number of studies on industrialized countries suggest that, though individuals with higher income are generally happier than those with less, an increase in income does not have a permanent effect on satisfaction with life. This phenomenon, which became known as the

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Easterlin (1974, 2003b) argued that what he saw as a lack of a significant correlation between income and happiness was explained by the negative effect of increases in aspirations on life satisfaction. Increases in individual income as well as income of other individuals lead to an increase in aspirations, which reduces satisfaction with life. The two main processes that affect individuals' aspirations have been identified in the literature as social comparison and adaptation.[2] Thus, individuals adjust their aspirations to the income and consumption level of relevant others[3] (social comparison) and to their own past income levels (adaptation). Clark

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et al. (2008) internalize both social comparison and adaptation in a utility function that provides the theoretical framework necessary to reconcile the effect of income on happiness at any given time with the essentially flat happiness curve in industrialized countries. While these studies assume that an increase in relevant others' income has a negative effect on life satisfaction, Hirschman and Rothschild (1973) pointed out the possibility of a positive effect, particularly in a developing country context. They argue that if income and opportunities are increasing in a developing country, a higher income of relevant others might act a positive signal as regards one's own future income, and thus increase life satisfaction. They label this the "tunnel effect"[4] and argue that, once a country reaches a certain threshold of economic development, the effect should vanish and social comparison should regain its negative effect on life satisfaction. Senik (2004) finds a positive effect of relevant others' income on satisfaction in Russia during the early years of transition.

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The relationship between income and life satisfaction in transition has been explored by Lokshin and Ravallion (2000) and Frijters et al. (2006), whereas Senik (2004) focuses on the relationship between life satisfaction and income distribution. All of these studies use individual or household data from the Russia Longitudinal Monitoring Survey (RLMS), which is also the data used in this study. However, these studies do not estimate the aspiration-building process, nor do they inquire into the role of aspirations (as revealed by individuals themselves) in individuals' life satisfaction adjustment.

This paper uses one of the questions of the RLMS posed in four rounds from 1998 to 2002 to capture individuals' aspirations and proceeds to explore the conditions through which income aspirations are formed. To that end, this paper tests for the impact of two processes on aspirations: (1) the impact of individual income changes from previous periods (adaptation), and (2) the impact of changes in the income level of the social group one would likely compare oneself to (social comparison). The results suggest that social comparison is a considerably stronger agent in shaping aspirations than adaptation is. Aspirations respond strongly to changes in reference group income, whereas the effect of individual income changes is quite weak.

After establishing the role of these two processes in the formation of aspirations, this paper explores the trends and determinants of satisfaction and tests for the presence of hedonic adaptation and social comparison. The focus is on two different measures: satisfaction with life and satisfaction with economic conditions. In contrast to previous work on RLMS, this paper not only controls for the effect

of income, employment and asset ownership, but also places a special focus on aspirations as the main agent through which adaptation and social comparison exert their influence on satisfaction.

The results show that aspirations have a significant impact on life satisfaction but not on satisfaction with economic conditions. However, contrary to what Easterlin (1974, 2003b) predicts about the effect of aspirations on life satisfaction and what empirical studies to date (Easterlin, 2001b; Stutzer, 2004) have found, this paper finds that aspirations increases have a positive effect on life satisfaction. This is due to the double functionality of aspirations. They reflect an increase in needs commensurate to changes in own and others' income, but they also reflect improved income expectations based on the information provided by the present income of relevant others. These results point to the existence of a "tunnel effect" similar to the one predicted by Hirschman and Rothschield (1973) for developing countries. The improved expectations embedded in the higher income aspirations cause increases in the latter to have a positive effect on life satisfaction.

After providing some institutional background for the data and results (Section 2.2), the paper proceeds with a brief data overview and description of key variables for the analysis (Section 2.3). Section 2.4 explores the process through which individuals' income aspirations are generated, and Section 2.5 tests for the presence of hedonic adaptation in the relationship between the two satisfaction indices and income. Section 2.6 concludes this paper.

2.2 Institutional Background

Individual attitudes in the face of changing conditions are formed within a certain economic and social reality. Abrupt changes of this reality will have a role of their own in shaping individuals' reaction to individual shocks. For example, in a free-market economy where unemployment is recognized as a fact of life, an individual's reaction to becoming unemployed is bound to be different from the reaction to the same event in a society where unemployment is a relatively unknown phenomenon.

The multi-faceted transition process in Russia was accompanied by the emergence of a host of phenomena that, while widely recognized and accepted as features of the economic reality in countries with a relatively free market and a significantly large private sector, were almost entirely unknown prior to transition. Income and employment volatility and income disparity were some of these new phenomena in transition countries. Before the start of the economic and political transition individuals used to enjoy virtually unquestioned income and job security and, although regional and, to a lesser extent, individual income disparities did exist, it is only after the start of the transition that they experienced income and job fluctuation and witnessed significant income inequalities. Milanovic (1998) points to "...declining incomes and rising inequality" and reports that, during the 1988-1994 period, unemployment increased from 0 to 7 percent in Russia and 15 percent in Poland. In Russia (ibid.) real wages were cut in half and the Gini coefficient doubled from 24 to 48 during the same period. Hence, due to the associated introduction of these and many other new economic and social phenomena, the transition process in Eastern

Europe can be best depicted as a meta-event that altered the way in which people think, behave and react in an unprecedented way. Roland (1999) describes the transition in Eastern Europe (and Central Asia) as "... one of the most important events of the twentieth century, along with the transition from capitalism to socialism and the Great Depression."

Individuals in transition countries had to adapt rapidly to phenomena most of them were exposed to for the first time in their lifetimes. Their attitudes and reactions to these phenomena were strongly influenced by the unfolding transition process. The study of the relationship between life satisfaction and income changes takes on a different significance in an environment where income fluctuations and the behavioral reaction to them are a novelty. This renders transition countries a fertile experimental ground for the life satisfaction literature.

The life satisfaction literature, in turn, can contribute to transition studies in terms of evaluating the impact of economic and political reforms. Layard (2006) concludes that the inclusion of self-reported measures of well-being in the realm of public economics is bound to revolutionize the discipline, leading to a better informed analysis and improved policy-making. The assumption behind this conclusion is that the concept of happiness is too complex to be captured by the simplified model of cardinal utility.[6] Subsequently, self-reported measures of well-being enable us to approximate an individual's utility in a way that has been unavailable until now, equipping policy makers with a set of parameters to use in their decision-making.

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[6]Layard simplifies the cardinal utility function as $u = u(y, h)$, $u_1 > 0$ and $u_2 < 0$, where y denotes real income and h denotes work hours.

The degree of political, economic and societal change that affected individuals' life quality in transition countries was unprecedented. The changes were overwhelming and affected every facet of life. The centralized economy was replaced by a free market, and freedom of expression and democratic elections were in some countries re-introduced after at least four decades or were entirely novel occurrences in others.[7] The impact of these changes on individuals' lives stretches well beyond the explanatory power of commonplace indicators such as growth, inflation and unemployment. As such, transition countries provide the milieu where the argument of Layard holds *par excellence.* It can be argued that self-reported life satisfaction in these countries is the best indicator of the impact of the reforms undertaken in these countries on individual welfare, as it reflects changes in attitudes and reactions related to a mix of events and phenomena never experienced before. Thus, a better understanding of the determinants of life satisfaction in transition countries enables this paper to better evaluate the impact of reforms on the life quality of individuals beyond the commonly used economic and institutional criteria.

The Russian panel has been used by several studies to gauge the welfare impact of transition and explore the determinants of life satisfaction.[8] However, there is

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[7]A number of countries that formed after the dissolution of the Soviet Union had never been democratic societies before (Polity IV Dataset 2007).

[8]Lokshin and Ravallion (2002), Ravallion and Lokshin (2001), Senik (2004) and Frijters et al. (2006) are similar to this paper in terms of methodology and objectives. Ravallion and Lokshin (2001) use the 1994 and 1996 waves of the panel and focus on economic self-ranking rather than life satisfaction or satisfaction with economic conditions as a proxy for individual welfare. Their earlier paper in 2000 uses the 1996 and 1998 waves to evaluate the welfare impacts of the 1998 crisis and the response of the public safety net. Senik (2004) uses the RLMS rounds from 1994 to 2000 and focuses on the effect of inequality on individuals' life satisfaction. Frijters et al. (2006) use the survey rounds from 1995-2001 in a fixed-effects ordinal estimation and also employ a decomposition analysis that accounts for panel attrition in attempting to asses the role of increases in real income on life satisfaction.

no study based on the Russian panel that focuses on the processes of adaption and social comparison through which aspirations are shaped.[9] Most importantly, none of the studies described above has, as of yet, made use of the Russian panel to inquire into the effect of changing aspirations and consumption standards on life satisfaction and test for the existence of hedonic adaptation in a transition context. This study aims at filling this research gap by estimating the aspiration-formation process and providing an aspiration-based analysis on the patterns of life satisfaction and hedonic adaptation in transition Russia.

2.3   Data and Overview

This paper uses individual data from the Russia Longitudinal Monitoring Survey (RLMS, 2006), a series of nationally representative surveys designed to monitor the effects of Russian reforms on the health and economic welfare of households and individuals in the Russian Federation.[10] The RLMS has been administered 13 times from 1992 to 2006, skipping the years 1997 and 1999. It was designed mainly as a repeated cross-sectional survey of dwelling units rather than as a panel. However, it does keep track of individuals that were respondents in previous rounds.

This paper constructed a panel that includes the survey rounds conducted

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[9]Senik (2004) finds that reference group income has a positive effect on life satisfaction, which suggests that individuals use it as a predictor of their income in the future (tunnel effect) rather than for present comparison purposes. Her work, however, does not focus on the relationship between social comparison and aspirations, but rather attempts to assess the direct effect of social comparison on life satisfaction.

[10]The author thanks the European Bank for Reconstruction and Development for making the RLMS database available to him while he was working there. Most of the research for this paper was completed during this time.

from 1995 to 2006, in which all individuals are included that were present for at least two consecutive rounds (about 9000 respondents per round). The question used to gauge income aspirations was asked only in the four rounds from 1998 to 2002. The question regarding satisfaction with economic conditions was asked from 2000 to 2002. It is formulated as: "In your opinion how much money would be needed per month for your family to live normally?".[11] The question used to measure satisfaction with life is: "How satisfied are you with your life?", where 1 is coded as "not at all satisfied," 2 as "less them satisfied," 3 as "neither satisfied, nor dissatisfied," 4 as "rather satisfied," and 5 as "fully satisfied." Lastly, satisfaction with economic conditions is measured by the question: "How satisfied are you with your economic conditions?", which is asked after the life satisfaction question.[12] The answers are coded in the same way. Table 2.1 displays the number of responses for the questions asked to obtain individuals' monthly income, economic aspirations, satisfaction with life and satisfaction with the economic conditions during the rounds in which all questions listed above were asked.

Table 2.1: Number of Observations for Selected Variables, By Year

Year	2000	2001	2002
Satisfaction with Life	8831	9433	9650
Satisfaction with Economic Conditions	7977	8610	9010
Monthly income	8692	9244	9437
Aspirations	8266	8859	9246

As depicted in Figure 2.1, income, aspirations and both measures of satisfac-

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[11] A broader discussion on the options for a variable that captures aspirations and on our choice for it will be provided in Section 2.4.

[12] The "Satisfaction with Economic Conditions" question is asked right after the "Satisfaction with Life" question. The "Aspirations" question is placed in the next page after the two "Satisfaction" questions and about three pages after the "monthly income" question.

tion increase steadily during the respective periods. While income and aspirations increase parallel to each other, the slope of the life satisfaction curve clearly flattens with time. In fact, the average level of life satisfaction drops slightly in 2003, after which it recovers and settles around a fixed level, although income keeps increasing during the same period. Frijters et al. (2004) find a similar trend of life satisfaction in East Germany and also demonstrate that after an initial increasing trajectory following re-unification with West Germany, life satisfaction settled around a constant value. Figure 2.1 shows that the slope of life satisfaction over time in Russia becomes and remains flat in 2004. GDP per capita in Russia (and in the panel) in 2004 still remained lower than in the industrialized countries (IMF, 2007), yet after a certain income level was reached, life satisfaction responded only weakly, if at all, to income increases. Thus, the process of adaptation to higher income levels articulated by Easterlin (1974) and modeled by Clark et al. (2008) that results in a flattening of the life satisfaction curve over time can occur even if the income level in that country is relatively low. It would, thus, appear that the key to adaptation is not necessarily a process at the end of which a country enters the ranks of relatively rich countries, but rather a process during which individuals are subjected to a continuous change in their own income and in the income of others over a sufficiently long period.

In addition, the trajectory of satisfaction with economic conditions mimics that of life satisfaction, staying below the latter for the whole period in which the satisfaction question is asked. The reported score of satisfaction with life is equal to the
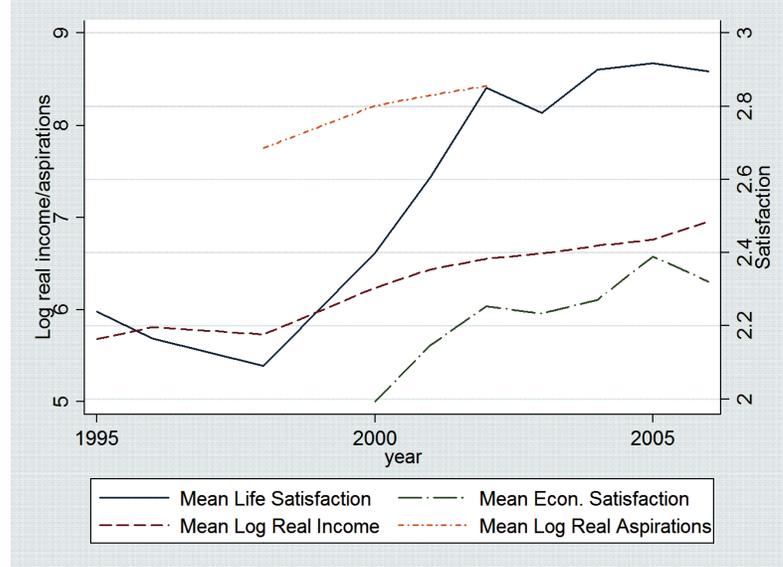
Figure 2.1: Satisfaction with Life, Satisfaction with Economic Conditions, Log of Real Income, Log of Real Aspirations.

reported score of satisfaction with the economic conditions in 46.3% of the cases,[13] greater in 44.2% of the cases, and smaller in only 9.5% of the cases. This suggests that individuals are able to differentiate between satisfaction with life in general and satisfaction with economic conditions. This differentiation makes satisfaction with economic conditions a variable worth studying alongside life satisfaction, as one might expect these two variables to respond differently to significant life events.

Some of the appeal of the happiness economics literature is based on the assumption that "measures of self-reported subjective well-being can serve as proxies for utility" (Frey and Stutzer, 2002). In addition, when the subject of inquiry is the relationship between income and happiness, the latter is often treated as a proxy for "utility from income" (Clark et al., 2008). Herein lies the significance of the variable measuring satisfaction with economic conditions.

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[13]In a pooled dataset across all years.

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Like satisfaction with life, satisfaction with economic conditions is bound to capture the effect of regional economic conditions, such as the fact that one might work in a certain profession and other non-individual parameters. Unlike the former, however, it helps remove the effect of non-economic variables such as relationship, family, climate and political situation. Since it narrows the response down to capture only the effect of economic events, satisfaction with economic conditions could be a better proxy for "utility from income" than satisfaction with life in general.

2.4 Aspirations, Adaptation and Social Comparison

Measuring income aspirations has proved to be a formidable task for researchers and no widely accepted method is yet established. Easterlin (2003a) measures them by using individuals' stated views on which big-ticket consumption goods they think are necessary to have a good life. The responses are generated by handing the respondent a card with a list of 24 items, 10 of which are big-ticket consumption goods that range "...from a home, car, and television set to travel abroad, a swimming pool, and a vacation home," and asking: "When you think of the good life – the life you'd like to have, which of the things on this list, if any, are part of that good life as far as you personally are concerned?".

Stutzer (2004) approximates aspirations in two ways, both of which differ from Easterlin's "big-ticket consumption goods" approach. The first is through an

income evaluation question similar to the one posed by Van Praag (1971). The question is stated as follows: "What income would you indicate as good or bad in your circumstances? Please try to state what income per month (before taxes) for your entire household you consider to be: 'very bad,' 'bad,' 'insufficient,' 'sufficient,' 'good', and 'very good'," where the options are listed separately. Stutzer uses the income stated under the "sufficient" option as his first aspirations proxy. His second aspirations proxy is provided by the answers to the minimum income question, stated as: "What household income per month would you consider an absolute minimum in order to make ends meet and without running into debt even if you reduce your needs to a minimum? We do not only mean housekeeping allowance but all essentials, including insurance, rent, taxes and so on." Stutzer argues that capturing aspirations through a direct, monetary approach is at least as reasonable as using the "big-ticket consumption goods" approach which fails to take into account the different conceptions that individuals might have of the prices of these goods.

This paper adopts a similar strategy to Stutzer's and captures aspirations using the income levels provided as an answer to the following question: "In your opinion how much money would be needed per month for your family to live normally?" This question is very similar to a reduced version of the income evaluation question above. Here, "the amount of money necessary to live normally" is the only amount respondents are asked to provide their judgment on. In contrast to the Minimum Income Question, this question does not ask for a valuation of the minimum income necessary to make ends meet; instead it uses the rather loose term, "normally," which should capture individuals' valuation of the income necessary

to attain their (self-defined) mean expected welfare, i.e. their income aspiration level. In addition, in Stutzer (2004) the analysis of the determinants of aspirations is based on responses to this question from one single year.[14] This paper estimates the aspiration-formation process using individual data collected in three consecutive years, from 2000 to 2002.[15] This allows controlling for unobservable differences in the respondents' perception of aspirations by employing an individual fixed-effects analysis. Most importantly, it enables a better assessment of the effect of adaptation and social comparison by exploring how aspirations respond to changes in individual income as well as relevant others' income.

An inspection of the data shows that the values provided as an answer to the question above are considerably higher than individuals' monthly income. Rather than considering it as a question about the minimum required income to get by, the respondents adopted a more generous interpretation of "living normally" and perceived it as a question about their aspired income level. This supports viewing the question as measuring income aspirations.

This section explores the determinants of income aspirations, in particular the relationship between aspirations and the processes of social comparison and adaptation. These processes, described in detail in the following subsections, are considered to be the driving force behind aspiration increases and their subsequent effect on life satisfaction (Easterlin, 2003b). The income aspirations function 2.1 depends on reference group income, mean income of the district in which the survey

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[14]Stutzer (2004), however, has data for two consecutive years for the minimum income question, which he uses to complement the aspirations analysis.

[15]As previously mentioned, the analysis includes only individuals that remain in the panel for at least two consecutive years.

was conducted,[16] and individual income.

$$\ln Y_{it}^* = \lambda \ln Y_{it} + \mu \ln Y_{it}^{mkt} + \eta \ln Y_{it}^{dis} + \pi X_{it} + c_i + u_{it} \tag{2.1}$$

Aspirations are denoted as Y_{it}^* and individual income as Y_{it}. Both income and aspirations are in real terms and have been deflated using regional consumer price indices, reflecting possible differences in the cost of living across regions. The variables Y_{it}^{mkt} and Y_{it}^{dis} are two different measures of reference group income (described below) that aim at capturing the effect of social comparison on aspirations. Income aspirations are quite likely to be correlated with unobservable personality traits such as self-esteem or optimism, hence an individual fixed effect denoted by c_i is included. In addition, a fixed-effects estimation allows capturing the response of aspirations to changes in individual income and reference group income. X_{it} is a set of additional controls.

2.4.1   Social Comparison and Reference Group Income

Social comparison has been defined as "comparing oneself with others in order to evaluate or enhance some aspects of the self" (Suls et al., 2002). In economic literature it has been studied as a phenomenon that contributes to a relative notion of utility that depends also on the income and consumption level of relevant others, often defined as a reference group. As such, it received early attention in the

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[16]The original notation from the translated questionnaires is "site." A site is a representative cluster of (on average) 42 households from the same district. Thus, the average income level in this sample is a fairly good proxy for the income level of community members one is likely to interact with on a daily basis, regardless of their education or profession.

works of Veblen (1899) and Duesenberry (1949), and has been revived by recent work in happiness economics. A higher income and consumption level of relevant others have been assumed to have a positive effect on aspirations (Easterlin, 2003b; Stutzer, 2004). The subset of "relevant others" that provide a benchmark for social comparison could be realistically[17] defined as community members one is likely to interact with (Stutzer, 2004) or individuals with similar job market characteristics (Clark and Oswald, 1996).[18]

This paper tries to capture the social comparison effect on aspirations through two separate variables that reflect two comparison or reference groups. The first group is based on one's broadly defined job market characteristics, i.e. gender, education, age group, profession and the region in which one lives. The "profession" variable is categorized according to the one-digit occupational code list (International Standard Classification of Occupations) and the "region" variable denotes one of the eight major regions of Russia.

Similar to Senik (2004), this paper first predicts the real individual income based on one's job market characteristics as described above.[19]

$$
\begin{aligned}
Y_{it} &= f(\text{gender, age group, education, profession, region}) \\
Y_{it}^{mkt} &= \text{predicted}(Y_{it})
\end{aligned}
$$

Then the post-estimation predicted individual income, Y_{it}^{mkt}, is obtained. As

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[17]Non-realistic definitions could include very rich people (Veblen, 1899), pop-stars, professional athletes etc.

[18]Senik (2004) also defines the income reference (social comparison) group as individuals with similar job market characteristics who live in the same region.

[19]Also included in the estimation is a time period control.

this predicted income represents the income one would expect individuals with similar attributes to earn, it is used as a proxy for the income of the reference group as defined above and is referred to as market-based reference group income.

The second group that can act as a comparison benchmark are community members one interacts with frequently. To capture the effect of comparison with that group, the mean real income of a survey sample from a particular district, Y_{it}^{dis}, is compiled. This sample is defined as a "survey site" and is a representative cluster of (on average) 42 households from the same district. The mean district income is compiled separately for each individual and excludes the individual's own income. The average income level in this cluster is a fairly good estimate for the income level of community members an individual is likely to interact with on a daily basis, regardless of education or profession. Hence, it is included as the second measure of reference group income when estimating equation 2.1 above and is referred to as proximity-based reference group income.

2.4.2   Adaptation

The psychology literature defines adaptation as the process that results in a reduced effect of repeated stimuli (Frederick and Loewenstein, 1999). In describing the role of income increases in the adaptation process, Easterlin (1974, 2003b) argues that, although initially an income increase would have a positive effect on satisfaction, individuals internalize this increase into the formation of expectations of future income (aspirations) with the result that they need an even higher income to maintain

the initial increase in satisfaction. Hence, adaptation to income increases is argued to have a negative effect on satisfaction through the increase in aspirations. This paper, similar to Stutzer (2004), controls for the effect of adaptation on aspirations by including the natural logarithm of real individual income among the regressors. The fixed-effects estimation used in this paper ensures that the income coefficient captures the adaptation of aspirations to individual income changes.

X_{it} consists of several indicator variables pertaining to employment and relationship status. The fixed-effects estimation limits the controls to only variables that change across time periods for a given individual. Education and profession, apart from displaying minimum individual variation across years, are also used to predict market-based reference group income, so they are excluded to avoid multicollinearity.

2.4.3   Results

Summary statistics are presented in Table 2.2. The regression results (Table 2.3) indicate the presence of a weak adaptation effect on income aspirations. A 10% increase in real income translates into only an approximately 0.1% increase in income aspirations, suggesting that changes in individual income are only minimally internalized into the aspiration formation process.

Social comparison, on the other hand, appears to have a strong effect on income aspirations. This paper finds that both reference group income measures have a positive and significant effect on income aspirations. A 10% increase in

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market-based reference group income is associated with a 2.3% increase in aspirations, whereas a 10% increase in site income is associated with a 2.5% increase in aspirations. This suggests that both comparison to individuals in the same job market cohort and comparison with individuals living in the same area are equally strong channels through which social comparison affects aspirations. In addition, the proximity-based reference group income is constructed without regard to contact with neighbors,[20] which makes exposure rather than interaction more likely to be the case behind its effect on aspirations. In sum, the results indicate that "keeping up with the neighboring Joneses" provides as strong a motivation in shaping aspirations as the income earned by one's job market cohort. Employment appears to have a positive effect on aspirations, whereas the effect of getting divorced is negative.

Overall, the results support the conclusion that both adaptation and social comparison have a significant effect on aspirations. However, the adaptation effect is minimal and the strongest agent that shapes income aspirations in transition Russia is social comparison. This is somewhat surprising, as Stutzer (2004), using Swiss data, estimates that own income has about twice as high an effect on aspirations as proximity-based reference group income.[21] This difference could be an indicator that the aspiration formation process can differ quite substantially across countries that are at different stages of development. Unfortunately, to the best knowledge

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[20]Stutzer (2004) makes use of a question that inquires into contact with neighbors and uses it as a proxy for interaction.

[21]Stutzer (2004) performs an OLS estimation and this paper uses fixed-effects. The results of an OLS estimation that includes lagged income still show that the effect of past and present income is very low when compared to the effect of both reference group incomes.

of the author, Stutzer (2004) is the only other empirical work that estimates the aspiration formation process, so a comparison with other countries is not possible.

2.4.4   Aspirations in Different Age Groups

The adjustment of aspirations to changes in one's or relevant others' income is a process that essentially translates information into expectations. While this process might reflect unobservable character traits and evolve differently across individuals, it is also fair to assume that this process might differ across age groups. Thus, aspirations of individuals with a longer history of economic activity and employment are likely to be shaped in a different way than those of younger individuals that have only been part of the workforce for a relatively short time. To test this assumption, the regressions described above are run separately for three age groups: individuals below the age of 35, individuals between the ages of 36 and 55, and individuals above the age of 55. The results are presented in Table 2.4.

The results show that adaptation does not affect the aspiration formation of the individuals above the age of 55. Income changes only have a significant effect on the aspirations of the younger and the middle-aged. Similarly, the effect of market-based reference group income is significant only for the younger and middle-aged individuals. Proximity-based reference group income affects the aspirations of both categories roughly to the same extent as does market-based reference group income. However, the effect of both reference group incomes is about 50% higher among the middle-aged than among the younger, suggesting that aspirations of individuals in

this age group respond more strongly to social comparison. As regards individuals older than 55, their aspirations are only affected by the income of people living in their proximity.

Marital or relationship status also affects aspirations differently among the three age groups. Being divorced has a negative effect only on the aspirations of the youngest group, whereas living together has a positive effect only on the aspirations of the middle-aged. Quite interestingly, becoming unemployed has a positive effect on the aspirations of the younger individuals, suggesting that this group does not view unemployment as a lasting phenomenon and does not revise its aspirations downwards.[22]

The results from Table 2.4 indicate distinctly different patterns of aspiration formation among the three age groups. Most importantly, "keeping up with the Joneses" is the only channel through which social comparison affects aspirations among older individuals. The income of individuals with similar job-market characteristics is only important for the aspiration formation process of younger and middle-aged individuals. As people grow older and have more work (and life) experience, the income of individuals with similar qualifications ceases to provide any signal as regards their own income aspirations and they only care about attaining an income and consumption level comparable with that of their neighbors.

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[22]The two other groups do, but the effect is not significant.

2.5 The Effect of Income and Aspirations on Satisfaction

2.5.1 Model

This section examines the factors that affect satisfaction and tests for the effect of aspirations on satisfaction (hedonic adaptation). The focus is on two dependent variables, "satisfaction with life in general" and "satisfaction with economic conditions." As discussed in Section 2.3, the index scores for satisfaction with life and satisfaction with economic conditions suggest that the two are not perfect substitutes. Instead, individuals are able to process the two respective questions as distinct questions that try to capture their reactions to two different situations and hence, provide different answers. The life satisfaction scores are, on average, 20% higher than the scores provided for satisfaction with economic conditions. As such, apart from exploring the correlation between the two different satisfaction indices and various life events, the research question that this paper tries to address is: Do these two satisfaction scores react differently to different life events and why? Particularly and more importantly, does each satisfaction score react differently to changes in aspirations?

The psychology literature on subjective well-being is nearly unanimous in asserting that fixed personality traits such as extroversion and self-esteem (Diener et al., 1999) have a significant effect on life satisfaction. However, these individual traits are unobservable, so in order to remove the potential bias of these traits

on the estimators, it is necessary to employ an estimation method that uses the within-individual variation of the regressors over time. This is accomplished by using the ordered probit version of the Chamberlain random effects model, allowing the individual unobservable effects to be correlated with the regressors as described below.[23]

The model is:

$$LS_{it}^* = X_{it}'\beta + c_i + u_{it}, \quad u_{it}|X_i \sim N(0,1). \tag{2.2}$$

LS_{it}^* is latent life satisfaction, captured by LS_{it}, an ordered variable that takes integer values from 1 to 5 and is related to LS_{it}^* through the threshold model (3),[24] where a higher value indicates a higher satisfaction level.

$$LS_{it} = \begin{cases} 1 & \text{if} \quad LS_{it}^* \in (-\infty, \lambda_1) \\ 2 & \text{if} \quad LS_{it}^* \in [\lambda_1, \lambda_2) \\ 3 & \text{if} \quad LS_{it}^* \in [\lambda_2, \lambda_3) \\ 4 & \text{if} \quad LS_{it}^* \in [\lambda_3, \lambda_4) \\ 5 & \text{if} \quad LS_{it}^* \in [\lambda_4, \infty) \end{cases} \tag{2.3}$$

X_{it}' is a vector of observable characteristics, such as income, aspirations, age, education, employment status, and asset ownership.

c_i is time-invariant individual characteristics, related to the observable char-

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[23]See the Appendix for further details.

[24]In this specification, the thresholds (λ_j) pertaining to the relationship between the latent dependent variable and the observed satisfaction index are not individual-specific and are treated as parameters to be estimated along with the β.

acteristics as follows:

$$c_i = \bar{X}_i'\gamma + \alpha_i \tag{2.4}$$

where $\bar{X}_i$ is the average of X_{it} over time and $\alpha_i|X_i \sim N(0, \sigma_\alpha)$. The latent response model can then be rewritten as:

$$LS_{it}^* = X_{it}'\beta + \bar{X}_i'\gamma + \alpha_i + u_{it} \tag{2.5}$$

where a_i and $u_i = (u_{i1} \ldots u_{iT})$ are independent conditional on X_i, $\alpha_i|X_i \sim N(0, \sigma_\alpha)$ and $u_i|X_i \sim N(0, I_T)$.

Based on the results from Section 2.3 and similar to Stutzer (2004), this paper assumes that relative income concerns are already internalized in individuals' aspiration formation process. Thus, this paper only includes the variable that captures aspirations in the regression with life satisfaction as the dependent variable. Following Diener and Suh (1997), Diener et al. (1999), and Stutzer (2004), the variables age, education, marital status and employment status[25] are included among the covariates. Also included is ownership of durables to help assess the effect of accumulated wealth.

The equation that relates satisfaction with economic conditions to the same set of covariates can be written in a similar way:

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[25]Indicator variables are generated for employed, unemployed and self-employed individuals. The omitted category is "out of the work force."

$$ES_{it}^* = X'_{it}\beta^{es} + \bar{X}'_i\gamma^{es} + \alpha_i^{es} + u_{it}^{es} \tag{2.6}$$

ES_{it}^* is latent satisfaction with economic conditions, income, aspirations and the rest of the covariates are denoted in the same way. The superscript es is added to denote that the coefficients are different from those in equation 2.5.

2.5.2 Results

Tables 2.5 and 2.6 present the determinants of satisfaction with life and with economic conditions, respectively. Both tables show the results of a simple random-effects and a Chamberlain random-effects estimation. The following discussion focuses on the results of the Chamberlain random-effects estimation. Both tables show that income has a positive and significant effect on life satisfaction. The results also show that the two indices of satisfaction respond rather differently to changes in the main variable of interest, income aspirations. Income aspirations have a positive and significant effect on life satisfaction but a small and insignificant effect on satisfaction with economic conditions.

Material aspirations are widely argued to have a negative effect on life satisfaction (Easterlin, 2001a). Similarly, Stutzer (2004) uses a measure of aspirations very similar to the one used in this paper and finds that higher aspirations have a negative effect on life satisfaction.

However, the results from Table 2.5 show that life satisfaction in Russia does not respond to aspirations in the way predicted and tested by Easterlin (1973, 2001a,

2003b) and Stutzer (2004). On the contrary, higher aspirations have a positive and significant effect on life satisfaction. Essentially, this means that people who want more in a general sense are happier than those who want less. This paper argues that this is caused by the "information effect" inherent in the aspiration formation process.

Section 2.4 of this paper finds that social comparison is a stronger mechanism in shaping aspirations than adaptation. Aspirations are positively affected by increases in both individual income and (both types of) reference group income but the effect of the latter is considerably stronger. Reference group income can act as a comparison benchmark, but it can also carry an important information value as regards one's expected future income (Hirschman and Rothschild, 1973; Senik, 2004), especially in developing countries that experience high income growth rates as compared to developed countries. The intuition is straightforward, particularly as regards market-based reference group income. Even if one is not earning as much as the average individual with the same job market characteristics, the income earned by the latter could be taken as an indicator of the income one is likely to earn in the near future. Using the Hirschman and Rothschild metaphor, it reflects the belief that, if most relevant others are "moving forward," the income and opportunities must be increasing, so one can aspire to *and* expect a higher income for oneself. As such, an increase in aspirations can reflect not only higher standards one aspires to, but also more optimistic expectations about future income. Thus, the cognitive process through which income aspirations are projected onto life satisfaction is shaped by two main components, the comparison effect and the information ef-

fect (Senik, 2004). The comparison effect, which Easterlin has focused on, reflects the relative nature of utility and has a negative influence on life satisfaction. The information effect emphasized by Hirschman and Rothschild reflects the internalization of available knowledge in predicting future income and affects life satisfaction positively.

The results of the empirical analysis of this paper indicate that the information effect embedded in individuals' income aspirations dominates the comparison effect. Aspirations have a positive influence on life satisfaction due to the associated higher expectations about future income. These results support the argument of Hirschman and Rothschild (1973) and the conclusions of Senik (2004), who finds that reference group income[26] has a positive effect on life satisfaction and attributes this relationship to the information effect. As such, it could be said that the reaction patterns of life satisfaction in Russia ten years into the transition process are close to the patterns assumed by Hirschman and Rothschild for developing countries.

If one extrapolates from the Russian example and accepts these results as representative of countries in the aftermath of significant change or reform, certain policy implications would follow. If individuals are not concerned about the fact that others are earning more, but use that information as a predictor of their own future earnings, governmments in these countries should not place too much importance on redistributive policies. Instead, they should use their limited resources on expenditure areas that generate economic growth. This would mean that expendi-

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[26]The reference group income Senik uses is similar to the market-based reference group income from this paper.

ture categories such as education and infrastructure investment should make up for a relatively larger chunk of the budget than social security expenditures.

On the other hand, the fact that the two satisfaction indices respond rather differently to changes in aspirations is not that surprising. The data overview in Section 2.3 suggested that a significant number of respondents display attitudes representative of "there's more to life than money" and that satisfaction with life in general can capture a much broader feeling than utility from income or utility from consumption. Furthermore, transition Russia went through multiple simultaneous processes of political, societal and institutional change. Democratic institutions, free speech, a wider range of consumption goods, and abounding professional opportunities are among the institutional changes with impacts on how individuals perceive life and satisfaction that can reach well beyond their economic implications. Higher income aspirations only have a positive effect on life satisfaction. Satisfaction with economic conditions seems to be affected more by the "here and now" and is not influenced by the higher income expectations embedded in the aspirations variable.

The effects of the other covariates on satisfaction are similar across both indices. Being unemployed is negatively associated with both indices, whereas being employed has no significant effect on either of them. This suggests that once the income effect is accounted for, being employed *per se* does not significantly contribute to any of the satisfaction measures. Education is positively correlated only with life satisfaction, suggesting that education adds to satisfaction beyond its economic implications. Almost all the variables pertaining to marital status have a negative effect on life satisfaction. This could be due to the fact that the excluded category

is "never married" and a large number of the younger individuals, who on average report a higher satisfaction with life, belong to this category.

2.6   Conclusion

A number of studies, notably Easterlin (1974, 2003b) have found that in developed countries life satisfaction in the long run is essentially unresponsive to increases in income. The explanation provided stressed the constantly adapting nature of aspirations to changes in income as the main reason for the lack of increase in life satisfaction. Social comparison and adaptation have a positive effect on aspirations, whose increase has a negative effect on life satisfaction, thereby canceling out any initial increase in satisfaction due to the increase in income (Easterlin, 2003b). These results, however, have been challenged by a number of recent studies that show that life satisfaction is positively correlated to income accross individuals, countries and time periods. This paper adds to the latter group and shows that in transition Russia income does have a positive effect on satisfaction, especially when the income level is still relatively low. The data from the Russian Panel show that life satisfaction hits a flat portion during the late phase of transition, suggesting that the effect of social comparison and adaptation might materialize after individuals have been exposed to income fluctuations for a sufficiently long period.

Evaluating the aspiration formation process is one of the purposes of this paper and a closer analysis of panel data from the beginning of this decade in Russia shows that the effect of adaptation on income aspirations is weak and the

main factor behind the increases in aspirations is social comparison. The effects of proximity-based reference group income and market-based reference group income are of comparable magnitude, suggesting that the income of individuals one is in constant interaction with is as important to one's aspirations formation process as is the income of individuals with similar job market characteristics. In addition, the effects of the two reference group income measures vary across age groups. Both reference group income measures have a significant effect on the aspirations of young and middle-aged individuals, but among older individuals aspirations are affected only by proximity-based reference group income.

In a departure from results of previous studies (Stutzer, 2004), this paper finds that aspirations have a positive effect on life satisfaction. This can be explained by the income expectations embedded in aspirations; increases in aspirations may reflect not only higher needs and consumption standards, but also a higher expected income. Hirschman and Rothschild (1973) argue that in a developing country a higher income of relevant others can act a positive signal about one's own expected income and have a positive effect on life satisfaction. The aspiration-centered analysis in this paper supports that argument. Individuals use the income of relevant others to form their aspirations, which come to contain income expectations. The higher income expectations embedded in aspirations cause the latter to have a positive effect on life satisfaction.

Table 2.2: Data Summary

Variable	No. Obs.	Mean	Std. Dev.
Satisfaction w/ economic conditions	27969	2.135078	1.0589
Life satisfaction	27914	2.625779	1.124769
Real aspirations	26371	13351.71	24590.83
Real income	27373	1631.51	3102.018
Age	28119	43.19652	19.158
Married	33708	0.424647	0.4942966
Living together, not married	33708	0.0693307	0.2540195
Divorced	33708	0.0548831	0.2277553
Widowed	33708	0.1210692	0.3262125
Employed	33708	0.4110894	0.4920387
Unemployed	33708	0.1297615	0.3360458
Self-employed	33708	0.0378545	0.1908471
Education	33708	1.951139	1.554887
Gender	32400	0.4204012	0.493631
Regional CPI	33708	115.6353	3.675901
Owns car	28096	0.3141728	0.4641939
Owns other apartment	28079	0.0638556	0.2444998
Owns dacha	28088	0.2048206	0.4035776

Table 2.3: Determinants of Aspirations: Adaptation and Social Comparison

Dependent variable: Income Aspirations (ln)	
Age	0.00520*
	[0.00]
Present individual income	0.01197***
	[0.00]
Market-based reference group income	0.23142***
	[0.02]
Proximity-based reference group income	0.25281***
	[0.03]
Married	0.03919
	[0.05]
Living together, not married	0.04803
	[0.05]
Divorced	-0.11085**
	[0.06]
Widowed	-0.11038
	[0.08]
Employed	0.07416*
	[0.04]
Unemployed	0.06279
	[0.05]
Self-employed	0.00016
	[0.03]
Constant	5.26720***
	[0.20]
Observations	13573
R-squared	0.78

Standard errors in brackets.

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

Table 2.4: Determinants of Aspirations: Adaptation and Social Comparison by Age Groups

Dep. variable: Income Aspirations (ln)	Age Group		
	Younger than 35	Between 36 and 55	Older than 55
Age	0.08344***	0.04627***	0.07639**
	[0.01]	[0.01]	[0.03]
Present individual income	0.01346***	0.01007**	-0.01820
	[0.00]	[0.00]	[0.02]
Market-based reference group income	0.12304***	0.18048***	0.11533
	[0.04]	[0.04]	[0.12]
Proximity-based reference group income	0.11173**	0.17241***	0.23201**
	[0.05]	[0.04]	[0.11]
Married	0.02113	0.17044	-0.02325
	[0.07]	[0.12]	[0.49]
Living together, not married	0.04986	0.22089*	0.24330
	[0.07]	[0.12]	[0.51]
Divorced	-0.21592***	0.09290	-0.10218
	[0.08]	[0.11]	[0.46]
Widowed	-0.21258	0.08320	-0.11036
	[0.64]	[0.14]	[0.46]
Employed	0.12196	0.02606	0.09020
	[0.08]	[0.08]	[0.06]
Unemployed	0.18301*	-0.05565	-0.15241
	[0.10]	[0.09]	[0.11]
Self-employed	0.01457	0.00916	-0.03492
	[0.06]	[0.04]	[0.10]
Constant	5.09573***	4.34553***	1.90404
	[0.33]	[0.37]	[1.47]
Observations	5498	6829	1246
R-squared	0.79	0.79	0.82

Standard errors in brackets.

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

Table 2.5: Determinants of Life Satisfaction

Dep. variable: Life Satisfaction	Random-effects	Chamberlain random-effects
Real aspirations (ln)	0.07891***	0.09238***
	[0.01]	[0.02]
Real income (ln)	0.04088***	0.03307***
	[0.00]	[0.00]
Age	-0.01645***	-0.00879***
	[0.00]	[0.00]
Married	0.00512	-0.00254
	[0.02]	[0.04]
Divorced	-0.28363***	-0.23812***
	[0.04]	[0.06]
Employed	-0.24479***	-0.02566
	[0.03]	[0.04]
Unemployed	-0.47082***	-0.25802***
	[0.03]	[0.04]
Self-employed	-0.02631	-0.02202
	[0.04]	[0.06]
Education	-0.00836	0.03145**
	[0.01]	[0.01]
Owns Car	0.21922***	0.17060***
	[0.02]	[0.03]
Owns other apartment	0.16219***	0.08335*
	[0.04]	[0.05]
Owns dacha	0.24047***	0.21062***
	[0.02]	[0.03]
Observations	25531	25531

Absolute value of z statistics in brackets.

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

Table 2.6: Determinants of Satisfaction with Economic Conditions

Dep. variable: Satisfaction with Economic Conditions	Random-effects	Chamberlain random-effects
Real aspirations (ln)	-0.02034*	0.00153
	[0.01]	[0.02]
Real income (ln)	0.04969***	0.04466***
	[0.00]	[0.00]
Age	-0.00937***	-0.00474**
	[0.00]	[0.00]
Married	-0.03745	-0.04658
	[0.02]	[0.04]
Divorced	-0.41119***	-0.44354***
	[0.04]	[0.07]
Employed	-0.34766***	-0.04370
	[0.03]	[0.04]
Unemployed	-0.51424***	-0.25770***
	[0.03]	[0.04]
Self-employed	0.06770	0.03310
	[0.04]	[0.06]
Education	-0.03772***	-0.03406**
	[0.01]	[0.01]
Owns car	0.28874***	0.18138***
	[0.02]	[0.04]
Owns other apartment	0.13180***	0.01354
	[0.04]	[0.05]
Owns dacha	0.18665***	0.19660***
	[0.02]	[0.03]
Observations	25597	25597

Absolute value of z statistics in brackets.

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

Chapter 3

Wealth and Happiness of Nations: The Resource Curse from a New Angle

3.1 Introduction

The determinants of happiness have been an increasingly popular research topic during the past decade. Several studies have focused on the effects on happiness of income, institutional quality and freedom. A consensus has emerged that seems to suggest that, while in industrialized countries increasing income does not contribute to rising life satisfaction, there appears to exist a positive relationship between the two in developing countries. Clark et al. (2008) report that happiness in industrialized countries has essentially remained stable for the last three decades, while real income has almost doubled. Oswald (1997) finds that in both Western Europe and

the United States the average level of satisfaction with life has risen very slightly. On the other side, Frijters et al. (2004) find that in Eastern Germany life satisfaction has increased significantly in from 1991 to 2002 and the rising income has had a significant and positive effect on happiness.

Cross-country studies such as Inglehart et al. (2008) find a significant correlation between development and happiness. In another cross-country study, Di Tella et al. (2003) find that, after controlling for country fixed effects, happiness is strongly correlated with present and lagged GDP per capita. Deaton et al. (2003) also finds a strong cross-country relationship between per capita GDP and life satisfaction. Better institutions also seem to have a positive effect on life satisfaction. Inglehart et al. (2008) and Frey and Stutzer (2000) find that institutional variables, such as free choice and possibilities of individual participation have a significant and positive effect on happiness. Furthermore, Alesina et al. (2004) and Graham and Felton (2006) find that inequality has a negative effect on happiness.

The studies listed above are the most prominent of a burgeoning literature that is increasingly enabling a better understanding of the interaction between income, institutions and life satisfaction. However, what remains unexplored is the relationship between accumulated capital, natural resources and life satisfaction. Accumulated wealth, natural or produced, reflects a country's long term productivity and institutional quality and captures the effect of national wealth in a way that income cannot. Furthermore, the ability to distinguish between produced and natural capital, as well as between different sources of natural capital, enables a review of the effect of the resource curse on national well-being from a different perspective.

The research on the relationship between natural resources and economic and institutional performance has been gravitating towards the conclusion that natural resource abundance is likely to have a negative effect on economic growth (Sachs and Warner, 1995), contributing to the so-called resource curse theory. Ross (2001) and Sala-i-Martin and Subramanian (2003) also find that oil and mineral resources have a negative impact on institutional development. Murshed (2003) and Isham et al. (2005) draw the distinction between economies with point-based resources and those with diffuse resources, finding that the resource curse is more likely to describe the state of affairs in the former.

This paper seeks to bridge the gap between the life satisfaction literature and the natural resource literature. It does so by combining data from a newly available wealth database from the World Bank (World Bank, 2006) and the 2008 Gallup World Poll (Gallup, Inc., 2009),[1] and gauging the effect of produced and natural wealth on life satisfaction.

We find that both produced and natural wealth have a positive and significant on life satisfaction. However, after disaggregating natural wealth into extracted and non-extracted wealth, we find that only non-extracted wealth has a positive effect, whereas the effect of extractive wealth is insignificant. Puzzling as these results might appear, they do not contradict the prevailing wisdom in the area.

A country affected by the resource curse will typically be characterized by a combination of overinvestment in the resource-rich sector and underinvestment in other sectors, high exposure to commodity price fluctuations and concentration of

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[1]Summary Statistics are presented in Tables B.1 and B.2 in the Appendix.

economic and political influence in the hands of small elites. And the resource curse typified by these features is likely to negatively affect life satisfaction in a country through the limitations in investment, employment and political participation opportunities.

However, not all resource riches need to lead to a resource curse. As argued by Acemoglu et al. (2001) and demonstrated by Isham et al. (2005), conditions that facilitate a more equitable distribution of investment and income (such as land abundance or soil quality) need not be conducive to economic and political institutions similar to those experienced by resource curse countries. It is the existence of natural wealth that is highly valued in international markets (such as oil or gas) and can only be taken advantage through extractive industries where ownership is more likely to be concentrated in a few hands that will be more likely to lead to resource curse conditions.

This paper finds no resource curse effect on life satisfaction. On the other side, there is a significant "bliss" effect, but only as regards non-extracted wealth, which is more likely to provide positive spillovers for other sectors and offer more participation opportunities for a larger portion of society. Freedom in people's life also has a positive and significant effect, whereas the effect of the place religion has in daily life is only marginally positive. Section 3.2 continues with a data overview and descriptive statistics. Section 3.3 lays down the model and discusses the results, and Section 3.4 concludes.

3.2 Data Overview

3.2.1 The Gallup Survey

The life satisfaction data is provided by the World Poll run by the Gallup Organization in 2008 (Gallup, Inc., 2009). The survey samples were probability-based and nationally representative, and the survey questionnaires included a standard set of core questions around the world. This paper makes use of the questions that were part of global core set. The questionnaires included, among others, a number of questions on well-being, health, social issues, and religion and ethics. The 2008 Gallup survey reports life satisfaction scores from 150 countries, representing about 95% of the world's population. This is a significant expansion from the group of 55 countries covered in the early 2000's wave of the World Values Survey, and most of the added countries are developing countries. Figure 3.1 below reports the mean life satisfaction scores from all the countries in the survey.

Similar to the conclusions from Deaton (2008), the global life satisfaction map looks quite similar to an income map. Europeans, North Americans and Australians are relatively happy, whereas Africa hosts the countries with the lowest satisfaction scores. The obvious outlier is the Eastern Europe, where individuals are especially unhappy given the GDP per capita level. Results from both the 2006 Gallup World Poll and the World Values Survey underscore the same exception, suggesting that the post-communist transition might have an impact on life satisfaction that goes beyond the correlation with income. The increased inequality and uncertainty as well as higher pre-transition expectations could be cited as possible causes. In addi-
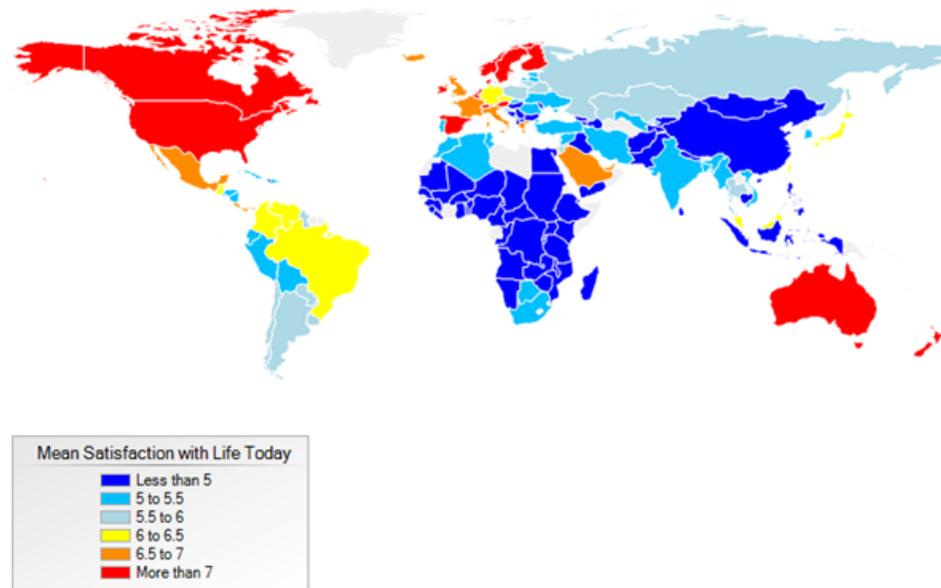
Figure 3.1: Life Satisfaction Across the World

tion, it could well be the case that the comparison group for Eastern Europeans is not countries with similar or lower income levels, but the richer and more prosperous Western Europe in whose proximity they are located. The same trend is obvious also in Figure B.1 in the appendix, which reports the percentage of individuals satisfied with the standard of living.

3.2.2 The World Bank Wealth Database

While the effect of income on life satisfaction has been inquired into in both cross-country and within-country studies, the effect of wealth has not received any attention. It was Samuelson (1961) who argued that, rather than income or consumption, it is wealth that matters more for welfare and "...the only valid approximation to a measure of welfare comes from computing wealth-like magnitudes not income mag-

nitudes. . . " The very same logic resonates with the authors of this paper, as it can similarly be argued that life satisfaction will depend less on per capita income as measured at a particular point in time then on the total accumulated wealth of a society. The latter reflects better on the development stage of a society and its corollaries as regards the quality of a country's infrastructure, public services, educational institutions and the sum total of economic and non-economic factors that make life in a particular country more or less satisfactory. Hence, the focus of this paper is the relationship between wealth variables and life satisfaction.

The wealth variables used in this paper are supplied by a novel World Bank database that reflects several years of data collection and computation from World Bank economists. All wealth variables are on a *per capita* basis. In that database, total wealth is measured "by assuming a future consumption stream and calculating the present value. . . " This methodology corrects for unsustainable consumption patterns, which is indicated by negative net savings levels, by subtracting the amount of negative savings to obtain a sustainable consumption path. The stock of produced capital (wealth) is calculated through the perpetual inventory method. In their definition "produced capital is the sum of machinery, equipment, and structures (including infrastructure)." Natural capital is defined as "the sum of non-renewable resources. . . , cropland, pastureland, forested areas, and protected areas." The value of the natural resources is calculated by computing the present value of resource rents over an assumed lifetime. Finally, intangible capital is calculated as the residual between total wealth and the sum of produced and natural capital.

This paper will focus on the effect of different types of wealth on life satis-

faction, so the stock of produced and natural capital is of particular interest. As can be seen from Figure B.2 in the appendix, the stock of produced capital is a potentially good predictor of life satisfaction. That is not the case with natural capital (Figure 3.2 below), in which case the relationship seems to be more complicated. There are high natural capital countries that figure among the relatively satisfied countries, such as North American and Scandinavian countries, as there are a number of Middle Eastern and Sub-Saharan African countries that are relatively low-satisfaction countries. The relationship between various types of natural capital and life satisfaction will be closely inquired into in the section that follows.
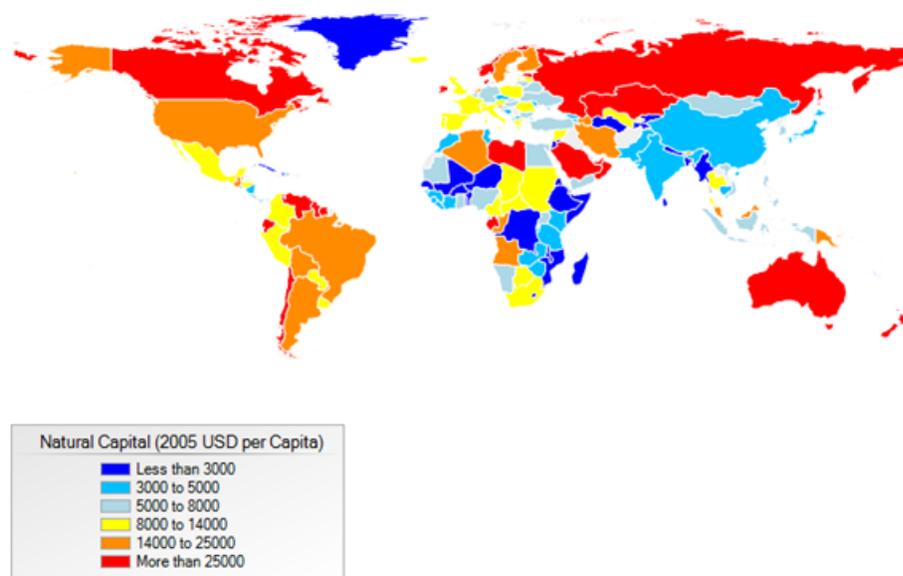

Figure 3.2: Natural Capital per Capita

3.3 Wealth, Produced Capital, Natural Capital and Life Satisfaction

Samuelson (1961) and the team of World Bank economists that compiled the extensive report Where is the Wealth of Nations (2006) argue that "computing wealth-like magnitudes" is a better approximation of welfare than income. It can be argued that the total accumulated wealth in a society is a better indicator of its economic achievements and its ability to deliver welfare. Furthermore, wealth-like magnitudes highlight even more the difference between rapidly growing emerging market economies and industrialized countries. This makes the relationship between wealth and life satisfaction a valid subject of inquiry. As regards the specification of the relationship between wealth and satisfaction, this paper employs a similar specification to that in Deaton (2008), which is a paper this one is closely related to and looks into the cross-country relationship between income and average life satisfaction. Deaton relates average life satisfaction in 2006 in each country i to income in 2003 and life expectancy in 2005 as follows:

$$LS_i = \alpha + \beta_1 \ln Y_i + \beta_2 \Delta Y_i + \beta_3 LE_i + \beta_4 \Delta LE_i + \epsilon_i$$

where Y_i is per capita income (from Heston et al. (2009)) and LE is life expectancy. Deaton also adds the income growth rate from 2000 to 2003 and from 1990 to 2000, as well as the life expectancy growth rate from 1990 to 1995. Life expectancy seems to be a good objective indicator of the quality of health services and general life

quality, so its inclusion seems quite sensible.

This paper relates average life satisfaction in 2008 in each country i to wealth, life expectancy and a number of institutional variables from 2005 as follows:

$$LS = \alpha_i + \beta_1 \ln W_i + \beta_2 \Delta W_i + \beta_3 LE_i + \beta_4 \Delta LE_i + X_i + \epsilon_i \qquad (3.1)$$

where W is wealth and ΔW is the change in wealth from 2000 to 2005.[2] LE is life expectancy in 2005 and ΔLE is the change in life expectancy from 1990 to 2005. The X_i includes age dependency ratio[3] and various measures of institutional development taken from the International Country Risk Guide (ICRG) (PRS Group, 2010). The institutional variables include corruption control,[4] bureaucracy quality, and democratic accountability. In addition, X_i includes the percentage of individuals that say they can count on help from friends or relatives and the percentage of individuals for whom religion occupies an important part in their daily life.

The ability to count on help from others can act as an indicator of the development level of informal safety nets in a society, which would contribute to a higher life satisfaction. One would expect ability to count on help from others to be a crucial factor especially in countries where formal safety nets are weak and insufficient to mitigate the effect of unexpected life events. Religion can contribute to a better psychological coping mechanism (Clark et al., 2008) and a number of

[2]It would be ideal to have the change in wealth and the change in different types of accumulated capital from 1995 to 2005. However, the latter was not compiled for a number of countries in 1995, which would unduly restrict the sample.

[3]The age dependency ratio is measured as the percentage of the population older than 65.

[4]The variable denoted as "corruption control" in this paper is denoted as "corruption" in the ICRG database, and a higher value measures better corruption control in a country.

studies have pointed to the existence of a positive relationship between measures of religiosity and life satisfaction (Kahneman et al., 1999; Greene and Yoon, 2004; Lelkes, 2006). The estimation results are reported in Table 3.1.

Table 3.1: Wealth and Life Satisfaction

Dependent variable Average life satisfaction	(1)	(2)	(3)
Total wealth per capita (ln)	0.57397	0.37825	0.31143
	[8.83]***	[4.16]***	[3.28]***
Life expectancy	0.01085	0.01722	0.00922
	[1.18]	[1.35]	[0.76]
Change in life expectancy 1990-2005	0.0138	-0.00102	0.01487
	[0.97]	[0.05]	[0.76]
Age dependency ratio	-0.02806	-0.03267	-0.02478
	[1.79]*	[1.97]*	[1.25]
Growth rate of total wealth 2000-2005	-0.5999	-0.38943	-0.281
	[3.22]***	[1.91]*	[1.46]
Corruption control		0.15283	0.14938
		[2.25]**	[2.24]**
Democratic accountability		0.02177	-0.00962
		[0.47]	[0.21]
Bureaucracy quality		0.15923	0.16554
		[1.77]*	[1.87]*
Count on help from others			0.02318
			[3.58]***
Religion important part of daily life			0.00181
			[0.54]
Constant	-1.19863	-0.27981	-0.98974
	[2.69]***	[0.48]	[1.33]
Observations	136	119	118
R-squared	0.75	0.78	0.8

Robust t-statistics in brackets.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

As expected, the effect of total wealth on life satisfaction is positive and significant. The results from the first specification indicate that a doubling of per capita wealth leads to an approximate increase of 0.6 units in a country's life satisfaction level. More prosperous countries typically have better institutions, so wealth could capture, in part, the effect of institutions. That this is clearly the case in our data is shown by the fact that the effect of wealth diminishes once institutions are accounted

for. As expected, better institutions contribute to more happiness. Both control of corruption and bureaucracy quality have a strong and positive effect on life satisfaction. The effect of the growth rate of wealth is negative, albeit its significance decreases as further variables are added. As argued by Deaton (2008), it is likely that countries with the high growth rates have relatively low levels of wealth, which would have lower life satisfaction than countries that have been rich for a relatively long period of time. The effect of life expectancy is strongly positive and significant, whereas the effect of changes in life expectancy is insignificant. Also insignificant is the effect of the age dependency ratio. Being able to count on help from others also has a positive effect, indicating that the existence of informal safety nets is a non-negligible factor in determining subjective welfare. The effect of religiosity is insignificant.

3.3.1   Different Types of Capital and Life Satisfaction

Table 3.1, as expected, highlights the positive relationship between wealth and life satisfaction and between wealth and good institutions. However, the main objective of this paper, beyond assessing the effect of wealth on life satisfaction, is to evaluate the separate effects of accumulated produced and natural capital. The former is the stock of capital wealth that includes the stock of machinery, equipment and infrastructure, and the latter is a measure of natural resource wealth. One does not to be a Marxist to understand that the stock of produced capital in a country is of crucial importance to a country's ability to sustain production of manufactured and

industrial goods and engage in product and process innovation. On the other side, natural capital endowment and the revenue that stems from it can play a significant role in a country's development. In other words, apart from the size of accumulated wealth itself, its composition can also be of consequence to life satisfaction in a country. The regression estimated to that effect is very similar to equation 3.1 above, with the difference that total wealth and its growth rate from 2000 to 2005 is replaced by produced and natural capital, and their respective growth rates over the same periods. Table 3.2 reports the estimation results.

Table 3.2: Life Satisfaction: Produced and Natural Capital

Dependent variable Average life satisfaction	(1)	(2)	(3)
Produced capital per capita (ln)	0.08573	0.03221	0.03421
	[3.67]***	[1.35]	[1.66]*
Natural capital per capita (ln)	0.17206	0.14592	0.11919
	[2.34]**	[3.34]***	[3.17]***
Life expectancy	0.05426	0.04207	0.02863
	[5.53]***	[3.34]***	[2.40]**
Change in life expectancy 1990-2005	-0.01414	-0.02568	-0.00348
	[0.88]	[1.46]	[0.18]
Age dependency ratio	0.01793	-0.01826	-0.00608
	[1.02]	[0.98]	[0.29]
Growth rate of produced capital 2000-2005	0.01139	0.02697	0.00444
	[0.74]	[1.10]	[0.13]
Growth rate of natural capital 2000-2005	0.02162	0.01981	0.00106
	[0.13]	[0.12]	[0.01]
Corruption control		0.25651	0.23165
		[3.90]***	[3.28]***
Democratic accountability		0.01934	-0.02851
		[0.42]	[0.64]
Bureaucracy quality		0.2645	0.25489
		[3.08]***	[3.04]***
Count on help from others			0.02401
			[3.74]***
Religion important part of daily life			0.00338
			[0.97]
Constant	-0.59243	-0.04196	-0.93299
	[0.92]	[0.06]	[1.20]
Observations	136	119	118
R-squared	0.65	0.78	0.8

Robust t-statistics in brackets.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results from Table 3.2 show that the effect of produced capital on life satisfaction is positive. However, much like in the case of total wealth, produced capital looses significance and its effect is reduced dramatically once the quality of institutions is accounted for. This points to the strong correlation between accumulated investment capital and good institutions. The effect of natural capital, on the other hand, is about twice as strong and remains significant even after the addition of the institutional variables. Furthermore, the addition of the institutional level does not reduce the effect of natural capital by much. This indicates that good institutions are more likely to have an effect on satisfaction through produced rather than natural capital. The effect of bureaucracy quality and corruption control remains positive and significant as was the case in the specification with total wealth as an explanatory variable. Being able to count on others for help also retains its positive effect.

The apparent surprise that emerges from the results is the strong and positive effect of natural resource capital on satisfaction. This would run counter to intuition, as a number of studies have documented the negative effect of natural resources on both institutions and economic growth. Could there be anything in natural resource endowments that makes people happier while contributing to lower growth and poorer institutions? Luckily there is not, and the discipline is spared another paradox. The answer lies in further disaggregation of the natural resource wealth. The vast majority of the studies from which the "resource curse" consensus has emerged focus on subsoil assets such as oil, gas and minerals. To highlight the variation in the influence of different resource types, this paper disaggregates natural

resource wealth into cropland, pastureland, and forestry wealth on one side, and oil, gas, coal, and minerals on the other. The second group is denoted as subsoil resources, and the results of the regression with the natural resources disaggregated are reported in Table 3.3 below.

Table 3.3: Life Satisfaction: Natural Capital Disaggregated

Dependent variable Average life satisfaction	(1)	(2)	(3)
Produced capital per capita (ln)	0.08187	0.02984	0.03187
	[3.47]***	[1.27]	[1.60]
Cropland, pastureland and forestry wealth per capita (ln)	0.15223	0.10714	0.08341
	[2.16]**	[2.18]**	[2.00]**
Subsoil wealth per capita (ln)	0.01598	0.02268	0.02574
	[0.85]	[1.23]	[1.48]
Life expectancy	0.06424	0.05057	0.0327
	[6.47]***	[4.10]***	[2.66]***
Change in life expectancy 1990-2005	-0.01878	-0.03158	-0.00374
	[1.06]	[1.73]*	[0.19]
Age dependency ratio	-0.00296	-0.03055	-0.01213
	[0.16]	[1.61]	[0.55]
Growth rate of produced capital 2000-2005	0.00713	0.02251	-0.00415
	[0.34]	[0.93]	[0.12]
Growth rate of land and forestry wealth 2000-2005	-0.25264	-0.10674	-0.08928
	[1.60]	[0.69]	[0.64]
Growth rate of subsoil wealth 2000-2005	0.02525	0.01101	0.0063
	[0.47]	[0.15]	[0.09]
Corruption control		0.26644	0.23963
		[3.97]***	[3.30]***
Democratic accountability		0.01365	-0.0369
		[0.28]	[0.76]
Bureaucracy quality		0.24086	0.22829
		[2.62]**	[2.55]**
Count on help from others			0.02681
			[4.21]***
Religion important part of daily life			0.00391
			[1.05]
Constant	-0.94505	-0.17716	-1.12243
	[1.18]	[0.23]	[1.29]
Observations	136	119	118
R-squared	0.64	0.76	0.8

Robust t-statistics in brackets.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results from Table 3.3 are in line with the consensus generated by the natural resources literature. The significantly positive effect of natural resources is almost entirely due to the cropland, pastureland and forestry resources. The effect of the combined subsoil assets on life satisfaction is small and insignificant. As was the case in the previous specification, produced capital looses significance and its coefficient is reduced to about a third of itself once institutional quality is accounted for. The effects of life expectancy and formal and informal institutions remain consistently strong throughout all the regressions with different wealth disaggregation.

The difference between the effects of subsoil and above soil assets corroborates the findings of previous studies that focus on the effect of natural resources on growth and institutions. Murshed (2003) and Isham et al. (2005) draw attention to the different aspects of point-based resources and diffuse resources. The countries that are likely to be hit by the double curse of low growth and inefficient institutions are countries with point-based resources, whose extraction is more likely to get monopolized by the government and enable the latter to engage in rent-seeking behavior. Van Der Ploeg and Poelhekke (2009) argue that the negative effect of resources on growth is due to the former's contribution to higher output volatility, and find that diffuse resources do not contribute significantly to volatility. Goldberg et al. (2008) use U.S. state-level data and argue (similar to Krugman (1991)) that the negative effect of point-based resources is confined to cases where they lead to the establishment of enclave economies with weak linkages to the rest of the country. Whether the presence of natural resources generates enclave economies or positive externalities and increasing returns depends, as emphasized by Krugman (1991), on

transportation costs and the demand of the local market for said natural resources.

In this framework, diffuse natural resources such as cropland, pastureland or forestry, are more likely to lead to a local economy with more participants, positive externalities and stronger growth. The demand for agricultural products is, in most cases, readily available in close proximity. The existence of conditions favorable to production of agricultural goods can support a stronger urbanization process, which in turns generates higher demand. The production and supply chain is generally less monopolistic than in the case of oil and minerals, and hence less likely to contribute to the existence of a rent-seeking government. The same factors that cause diffuse resources to have a positive impact on growth and institutions contribute to the former having a strong effect on life satisfaction as well, and it is possible that they have intangible satisfaction effects that persist even as institutions are accounted for.

Subsoil asset resources, on the other hand, are highly valued in international markets, but not necessarily equally valued in local markets, and also not easy to extract without significant investment. Hence subsoil resources, partly due to lower local demand and partly due to conditions pertaining to their production and transportation, are less likely to contribute to urbanization and positive externalities for the local economy. Despite being a significant source of income for many countries, in most cases subsoil wealth does not contribute positively to democratic institutions or growth. It is this lack of contribution that causes subsoil wealth to not have a significant effect on life satisfaction while other types of wealth, produced or natural, affect the latter in a positive way. Another possible explanation of the dif-

ference in impact is the fact that most diffuse resources are also renewable, whereas subsoil resources are not. Zidansek (2007) finds a positive correlation between happiness and environmental sustainability measures. Hence, the lack of a positive impact of subsoil assets on satisfaction could also reflect concerns about sustainable development.

However, it is important to notice that subsoil assets do not have a negative effect on life satisfaction. The effect, albeit small and insignificant, is positive, and increases in significance once institutions are taken into account. It just seems that individuals would be happier if wealth were to have come in another form.

Where does that leave policy makers? It does appear that geography and initial resource endowments have an impact on satisfaction after all. It is not possible to significantly change a country's resource endowment setting. If a country has oil or gas and a climate and soil that are not favorable to agriculture, there is not much the country can do about it. But from a policy-making perspective it would be wise to establish and sustain good institutions and contribute to a broad-based development, all of which have a direct or indirect impact on life satisfaction. Furthermore, it can be argued that it is not always easy, but in most cases feasible for a government to enact policies that promote capital accumulation in the long run, which would also contribute to higher life satisfaction.

3.4   Conclusion

This paper attempts to bridge the natural resources literature and the life satisfaction literature. It does so by evaluating the effect of different types of accumulated wealth on average life satisfaction across countries. The results show that while both produced and natural capital have a positive effect on life satisfaction, the effect of the latter is stronger and remains significant even after accounting for the quality of formal institutions and the existence of informal safety nets. Democratic institutions and informal safety nets retain their positive effect on life satisfaction. However, when natural wealth is further disaggregated into diffuse resources and subsoil resources, the latter have no significant effect on life satisfaction. Most of the positive effect that natural capital has is due to diffuse resources like cropland, pastureland or forestry. Hence, echoing results from the vast literature on natural resources, this paper finds that the same type of resource endowment that is likely to contribute to higher growth rates and more democratic institutions is also likely to contribute to a higher life satisfaction. Beyond the direct wealth effect, this could be due to the diffuse resources' contribution to a more broad-based and equitable development, as well as their generating a higher level of positive externalities.

Chapter 4

Blood Feuds: The Economics of a Dismal Institution

4.1 Introduction

The institutional composition of a society, that is the network of legal, political and economic institutions together with the set of beliefs and expectations these institutions generate and are, in turn, supported by, has been shown to have a substantial effect on growth and economic performance. North (1990) assesses the importance of well-designed institutions on economic performance and Acemoglu et al. (2001) supply a thorough analysis of the effects of different institutional setups on the long-term economic performance of various regions in Africa, Oceania, and the Americas that were ruled or colonized by Europeans.

Of all institutional features, a well functioning legal system and a political entity with a strong law enforcement capacity are indispensable prerequisites for the

existence of a well-functioning market economy; without them even the most basic rights to security of life and property are severely under threat, rendering the proper functioning of a market economy impossible. For a legal system to be successful, its acceptance by every person in a given country or region is a basic condition; it is threatened by remnant components of conflicting legal systems, which reflect different preferences and could encourage types of behavior that run counter to the official legal system.

This paper focuses on the effects of an informal enforcement structure on welfare, stability and the behavior it encourages in countries or regions where it has not been fully and successfully replaced by a modern, government-enforced legal system. That enforcement structure is the blood feud. In the societies this paper focuses on, it appears to be the case that, though customary law has lost its normative power, particular types of behavior and institutions associated with it in the past continue to exist. For instance, in Northern Albania, one of the main study areas, although the historical customary code of conduct pertaining to many aspects of life in a society has widely disappeared and ceased to regulate people's lives, the blood feud continues to exist with detrimental effects to the security of life and property.

A blood feud consists of a chain of reciprocal killings between members of two opposing clans and often lasts for generations. Far from being regarded as isolated spurs of violence, anthropological research has viewed the blood feuds as an institution that has regulated violence and provided a "cohesive force" (Black-Michaud

1972) for the societies in which they have been present throughout centuries.[1] As such, blood feuds display a number of strictly regulated features and are generally supported by a wider set of societal norms. In Northern Albania, they have been supported and regulated by the Kanun of Leke Dukagjini, a wide body of customary law in existence since the middle of the 15th century. Among various Bedouin tribes in Israel, blood feuds are regulated by a set of norms that is predominantly orally transmitted rather than codified in writing.

Blood feuds have also been and continue to be present in Afghanistan and Northern Pakistan (Rubin, 2002; Schoffield 2003). It is even argued that blood feuds fueled the civil war in Afghanistan, although Nojumi (2002) rejects that argument. While there is not necessarily an established link between blood feuds and illegal activity in all countries[2] in which blood feuds have persisted, there is a connection between blood feuds and organized crime in Albania and Brazil (De Souza Mello Bicalho and Hoeffle, 2005). Some of the institutional features that support blood feuds, such as disregard for the formal legal structure, clan discipline and a propensity for violence could easily become valuable assets for organized crime. Eradicating blood feuds and replacing their supporting institutions would go beyond establishing law and order, and have deeper implications for future crime prevention, institutional consolidation and social cohesion and for the development of a region in general. In order to eradicate the blood feud as an institution, it is necessary to better understand the decision-making process of feuding clans, the dynamics of the

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[1]Section 4.3 of this paper provides a review of the ecological features present in societies with blood feuds

[2]Afghanistan, Albania, Brazil, Israel, Mexico, Pakistan.

feud's replication in time, and the conditions under which they can be dismantled.

The major questions this paper sets out to answer include: (1) What is the blood feud's typical longevity? (2) How do blood feuds persist through time and resist competition from other institutions (including government-sponsored modern legal systems), or how are they not only "self-enforcing" but also "self-re-enforcing" (Greif, 1994)?

There is no consensus in the literature (Middleton and Tait, 1958; Peters, 1967; Black-Michaud, 1975) on the answer to the first question - whether the blood feud is finite or infinite. This paper introduces a model that combines both views and demonstrates how both types of conflict can coexist in a society.

This paper focuses on collective responsibility as the main cause behind the persistence of blood feuds and argues that only societies that have successfully completed a transition from collective to individual responsibility have been able to eradicate blood feuds. The capacity of a society to alter its institutions in the long run is explored by treating the institution of "collective responsibility" as endogenous in an environment of changing economic opportunities. This paper concludes that while payoffs are determined in the short run by the existing institutional structure, in the long run changes in payoffs contribute to a change in the institutional structure.

Section 4.2 examines the implications of different definitions of blood feuds on their longevity and tries to reconcile them. Section 4.3 explores common ecological features of feud societies and factors that contribute to the emergence and persistence of blood feuds. A model that seeks to capture the dynamics of a blood

feud and bridge differing views from relevant anthropological theory is presented in Section 4.4. Section 4.5 provides a non-technical discussion on the conditions under which a society can complete a transition from a feud to non-feud equilibrium, and Section 4.6 concludes.

4.2   Defining Feuds

It is difficult to find a general but precise definition of a blood feud. The following are two definitions from Middleton and Tait (1958) and Peters (1967), respectively.

"By feud we refer to fighting between people as groups, usually undertaken as a response to an offense, the groups being in such a relationship that although they fight, they both accept the obligation to bring the fighting to a close there being machinery to achieve this conclusion..." (Middleton and Tait, 1958)

The blood feud is "...a set of relationships between two tribal groups which are characterized by hostility whenever two or more of their members meet. These hostilities are of a sort that cannot be terminated; feud is not a matter of a group indulging in hostilities here at one moment and there the next, but a sequence of hostilities, which, as far as the Bedouin are concerned, know no beginning and are insoluble...It is a form of behavior associated with a specific structural order, and it is persistent as the structural order itself; in this sense it is eternal." (Peters, 1967)

Black-Michaud (1975) ascribes more to the second definition, refining Peters' definition to include the feud as a provider of "the foundations of internal political

hierarchy" and a means to engage in competition for power without necessarily disturbing the strongly egalitarian character of the societies in which they take place.

Both definitions stress the strictly collective, rather than individual, character of the conflict as well as the fact that the conflict might continue well after the individuals responsible for its initiation are dead. However, they diverge sharply when it comes to the duration of the conflict and the possibility of termination. Middleton and Tait seem to underestimate the fact that the conflict might deliver some utility to both parties involved, hence it might be in their best interest to continue it even when there exist clear opportunities to end the hostilities. Black-Michaud and Peters, stressing the role of feuds as a "set of relationships" and a "cohesive force", seem to overlook the fact that, while feuds as a mode of interaction can continue to dominate the relationships between tribal groups in a society, the effort for reconciliation will always be present and several individual feuds might well be short-lived. That is because the group that has "shed the last blood" might find it optimal to seek mediation and reconciliation in order to prevent further loss of life on their side, and sometimes the other group might find it in their best interest to accept it. In sum, the blood feud can be defined as a well-regulated conflict consisting of a sequence of orderly killings between two tribal groups under conditions of collective responsibility with a possibility of the conflict ending after each killing.

What is clear from all three definitions presented above is that blood feuds are not similar to the occasional vendetta or isolated honor killings. Honor has

been a prize worth fighting over, and thus a major reason for unorganized violence in a number of societies in history, such as Medieval Europe, and the Southern and Western "frontier" United States. Indeed, Cohen et al. (1996) find that the Southern culture of honor has a significant effect on individuals' reaction to offenses and predisposition for conflict. However, with few exceptions (such as the infamous Hatfield vs. McCoy conflict), blood feuds have not been the mode in these societies. Hence, a strong valuation of one's honor (status) and the obligation of preserving it are not sufficient for the emergence and persistence of the blood feud as a central institution. The next section lists some common features of feud societies. The presence of these features is typically accompanied by a certain level of violence between groups, which has a high probability of being channeled into blood feuds.

4.3 Common Sociological and Ecological Features of Societies with Blood Feuds

Nearly all feud societies display a combination of traits that are important to understand the historical, sociological and ecological context in which blood feuds emerge and get sustained. The central role of honor and a strong notion of collective responsibility have been singled out by the anthropology literature as the most essential features of acephalous societies that develop and sustain blood feuds. This section aims at presenting a short review of both traits as deconstructed by the anthropology literature. Thus, the arguments below reflect and elaborate on the findings of

this literature and are not derived from field research conducted by the author. This paper accepts the central role of honor and collective responsibility in causing and sustaining blood feuds and treats them as key factors in the determination of the initial assumptions of the model in section 4.4, and the elaboration that follows is important as regards providing a theoretical background for these assumptions.

4.3.1 Total Scarcity and the Centrality of Honor

This paper focuses on sedentary agricultural societies because in these societies blood feuds occur in particularly violent and persistent patterns relative to nomadic pastoral societies. In order to provide a satisfactory explanation of the central role of honor and its implications in feuding societies, one needs to gain a better understanding of the action space of a conflict. In addition, it is necessary to introduce the concept of "total scarcity" (Black-Michaud, 1975) in sedentary agricultural societies.

The agricultural societies with high occurrence and persistence of blood feuds are typically located in mountainous, land-locked areas with scarce arable land and population growth that outpaces the growth of agricultural production. In these conditions, economic surplus is a virtual impossibility, hence consumption consists only of livelihood necessities and individuals live close to subsistence level. The fact that life is conducted on the brink of subsistence renders competition over wealth infinitely destructive and, hence, socially undesirable. A competition between two groups over land could lead to the destruction and extinction of one of these groups, as there is no accumulated wealth reserve that a group could lean on once deprived

of its land or water resources.[3]

Black-Michaud (1975) describes total scarcity as "...the moral, institutional and material premise of a certain type of society in which everything felt by the people themselves to be relevant to human life is regarded by those people as existing in absolutely inadequate quantities." Furthermore, not only does the society end up in a situation where economic surplus is non-existent, but it also fails to produce any power differentiation and subsequent institutional structure based on wealth accumulation.

The impossibility of building a political and social hierarchy based on wealth accumulation is part of the explanation for the occurrence of "institutional scarcity." Establishing and maintaining political leadership has a cost, which no group can shoulder under conditions of total scarcity. As a result, the lack of a political elite leads to a failure to establish adequate power institutions as well as a failure to establish a legal framework and social order that is enforceable by these elites. In addition, due to the ecological features that lead to the condition of total scarcity, these areas have proven hard to conquer and control, making successful establishment of sustainable power institutions by an alien agent virtually impossible.

In these conditions of total scarcity the concept of honor emerges as a proxy for power and as a means of social differentiation (Black-Michaud, 1975). Honor becomes a proxy for power in the sense that, by engaging in a feud to protect it, groups and individuals give the signal that they are ready to protect their right

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[3]It appears that an all-out conflict after which one of the clans is completely eradicated is an extremely rare occurrence. The literature does not clearly explain why a clan would not want to annihilate the other, apart from the shared general concern about survival in the future. As explained in the following paragraphs, an all-out war is precisely what the blood feud prevents.

to live in that area without actually fighting over resources, which would lead to the destruction of at least one group. Groups are aware that both open conflict over resources and signals of weakness can be fatal to the group. The blood feud is therefore used as a signal of strength to avert open conflict over resources. Limiting conflict to the sphere of honor is not just an option, but a crucial condition for survival. Furthermore, in societies lacking an economic or political hierarchy, honor is the only marker of status that one can change through one's actions. In a closed, sedentary agricultural society, competition over honor is fierce, since it is the only marker of status.

The definition of honor in a society can be intentionally loose. Members of a group are willing to define every conflict as a conflict over honor, since it entails the death of a single individual (or a finite number of individuals over time), in order to avoid open conflict over resources that could potentially lead to the destruction of the whole group.

As a result, blood feuds arise as a "dismal institution" under conditions of total scarcity, but they really provide an institutional structure that helps regulate and organize violence and save the society from destruction. In these conditions, engaging in a feud to protect and avenge one's honor is, unlike in the case of a duel, not just an option or an isolated individual action, but an action encouraged and required by the society, and in fact, a necessary condition for that society to divert conflict into a less destructive realm and survive. The concept of honor is the intermediary that provides the foundation and generates the social consensus that supports these institutions.

4.3.2   Deconstructing Collective Responsibility

This paper argues that collective responsibility is the main cause of the replication dynamics of the blood feuds. Both Black-Michaud (1975) and Ginat (1987) provide a thorough treatment of the structure of a group of agnates that shares collective responsibility, with Ginat emphasizing the role of collective responsibility in perpetuating feuds.

Collective responsibility can be defined as the whole group reacting to tort or aggression committed against any individual member of the group as well as dealing with the consequences of aggression or tort of a group member to another party. The responsibility of the group in case of tort or aggression suffered by group members consists of avenging the victim or negotiating the reconciliation with the offender's group. The responsibility of the group in case of unjustified aggression by own group members against outsiders consists of seeking mediation and, eventually, reconciliation, paying the blood debt (Arabic "diyya") to the injured group and suffering the consequences when reconciliation is rejected; namely, the group accepts the fact that revenge can be extracted upon every member of the group and adjusts activities accordingly.

The group of agnates or the collective bargaining unit responsible for the consequences of actions by or against their members will henceforth be called the clan. The same structure is called the "diyya group" among the Arabs (Ginat, 1987). The importance and functions of the clan reach well beyond the realm of blood feuds, making its understanding crucial to explaining the dynamics of the

blood feud.

Blood feuds are a persistent feature of societies that, due to inability to produce ruling elites, have experienced prolonged spells of relative anarchy and lack of an enforceable legal structure. For this reason, the clan in these societies fills the institutional void and acquires a different set of functions and characteristics that go beyond the traditional roles of family. In fact, in the absence of control by government or other societal groupings, the clan has stepped in to become the most important organizational unit of society. The main functions of the clan can be listed as:

i) Providing security to its members: The clan retaliates against injustice to any clan member, providing a deterrent to potential injurers (Ginat, 1987; Michaud, 1975).

ii) Providing economic help in case of hardships: The clan fills the role of a mutual insurance scheme by redistributing wealth among members in times of need (Ginat, 1987).[4]

iii) Arbitrating property (or other) disputes within agnates: There is a fair amount of intra-group disputes, for which resolution by forceful means would undermine the survival of the whole clan. In these cases, the clan elders provide the "in-house justice."

iv) Providing the community with a sense of belongingness and self-identification: The concept of nation state and identification by ethnic belongingness is fairly new

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[4]It is unclear whether the clan has the optimal size of an insurance scheme in the above mentioned conditions. Perhaps, the nucleus family is too small to deliver any benefits, while the whole village is too large of a group to be managed efficiently.

to the Eastern Mediterranean area, as historically it was through clan membership that individuals would identify themselves.

The benefits of clan membership are of such importance that dissociation from the clan because of inability to comply with the requirements or expulsion in cases of extreme misconduct would signify a loss of protection of life and property as well as a loss of insurance. It would be practically impossible to survive in an area when the clan expulsion is common knowledge. Cases that would merit clan expulsion include intra-clan murder and failure to act in accordance with clan expectations during a blood feud. For example, in a blood feud it is the responsibility of the eldest brother of the victim to avenge a murder in the name of the clan. If one fails to do so, one immediately singles oneself out as a member of the group that cannot share the protection cost. In addition, one becomes a liability to the clan in the sense that one's behavior might have an effect on outsiders' perception of the clan's toughness. If a clan is perceived as slow or unwilling to react and extract revenge, it becomes an easy target and the survival of the whole clan is jeopardized. Hence, such an individual (and the immediate family) would be declared "excluded" from the group and would lose all vital benefits of clan membership.

The scope and functions of the clan clearly transcend managing the situations that arise during a blood feud. The clan delivers a great deal of social welfare and acquires a much broader societal significance. In fact, its extra-feud functions are likely of greater importance than its feud-related functions. However, it exists in a symbiotic relationship with the blood feud, which remains the basic element through which the clan is defined. The situation is best described by Black-Michaud (1975):

"... [The] feud, that is the struggle itself, is identical with the social system. It is therefore, not an institution, but a summary of all those institutions which in other circumstances go to make what is known as society."

While the centrality of honor in societies characterized by total scarcity is a major reason behind the emergence of blood feuds, collective responsibility with its institutional implications can be singled out as a major reason for why they persist for very long periods of time. The model presented in the next section attempts to combine both concepts and to show how they interact in causing blood feuds to emerge and persist. It also tries to explain the longevity and distribution of feuds in a society at any given time, in an attempt to reconcile the two different definitions of blood feuds and their different implications.

4.4 Model

The model outlined in this section seeks to capture the inter-clan interaction that leads to and continues during a blood feud. The model agents are therefore clans. Several assumptions are made to reflect that collective responsibility is the *modus operandi* of the justice system in an acephalous society. It is assumed that every individual is member of a clan (1), every clan member shares the same collective utility function (2), every clan acts as a single rational entity conditional on the utility function (3), and every clan is able to act according to their payoff structure (4). The fourth assumption means that actions are well specified within a clan, i.e. there is no uncertainty about the identity and the willingness of the individual

member responsible to act upon a clan decision. The model is based on one developed by Kreps and Wilson (1982) and Fudenberg and Kreps (1987) to describe the concession game between an incumbent monopolist and a potential market entrant. In addition, to reflect the centrality of honor in feud societies, this paper postulates that an individual's utility depends on honor as well as income. Furthermore, it is assumed that, although an individual's honor is common information, clans differ in their *valuation* of honor.

Production Function

Assuming a collective production function follows naturally from the "collective responsibility" assumption. All clan members are collectively responsible for production and protection of the output. In addition, it is postulated that the economic activity of every clan is organized so that each member has a well-defined role and a specific skill to contribute to the production process and a member's absence has a disproportionately negative effect on the production level. Furthermore, the loss of a clan member implies that less protection is provided, as the other functions of the clan, such as security of property are positively correlated with the size of the clan. The size of the clan also acts as insurance in case of prolonged conflict; i.e. a clan's threat of engaging in or continuing a conflict loses credibility if their numbers are too low to sustain a prolonged chain of hostilities. These assumptions are best satisfied by a convex production function $f(n)$ of a clan with n members, which internalizes the protective effect of large numbers. One could also think of $f(n)$ as a function that encompasses all the benefits of large numbers, economic and not.

Every individual's share from the common output is $f(n)/n$.

Utility Function

This paper assumes that in a blood feud society there are two types of clans, weak (denoted by W) and strong (denoted by S), depending on their honor valuation. A clan's honor is denoted by h and the number of people in a clan is denoted by n. Furthermore, the per capita output of a clan is denoted by $y = f(n)/n$, with $f(.)$ denoting the production function which satisfies $\partial y/\partial n = [f(n)/n]/\partial n > 0$, as per the discussion in the previous subsection. The two types of clans have the same production function $f(.)$, and the utility of both types will depend on honor and per capita output. However the two types of clans are distinguished by different utility functions denoted by:

$$U^W(h, y) = U^W(h, f(n)/n)$$

for a clan of type W, and

$$U^S(h, y) = U^S(h, f(n)/n)$$

for a clan of type S. It is assumed that within a clan each clan member has the same utility functions, and that $\partial U^W(h, y)/\partial y > 0$ and $\partial U^S(h, y)/\partial y > 0$, and consequently $\partial \left[U^W(h, f(n)/n)\right]/\partial n > 0$ and $\partial \left[U^S(h, f(n)/n)\right]/\partial n > 0$. Furthermore, it assumed that both $\partial U^W(h, y)/\partial h > 0$ and $\partial U^S(h, y)/\partial h > 0$. How the two types

differ in their honor valuation will be clarified shortly below.

Let there be two clans I and J that interact with each other. The functions $U^W(.)$ and $U^S(.)$ are common knowledge in a society. However, each clan knows only its own type, but the type of the other clan is unknown. It is further assumed that at the start of a conflict the honor levels of both clan I and J (denoted respectively as h_I and h_J) are equal to $\hat{h}$, i.e. $h_I=h_J=\hat{h}$. The number of clan members for clan I and J (respectively n_I and n_J) at the beginning of the conflict is also the same and it equals $\hat{n}$, i.e $n_I=n_J=\hat{n}$. Thus, the utility levels of clan I and J at the beginning of a conflict are respectively denoted as:

$$
U_I = U_I(\hat{h}, f(\hat{n})/\hat{n}) =
\begin{cases}
U^W(\hat{h}, f(\hat{n})/\hat{n}) & \text{if clan } I \text{ is of type } W \\
U^S(\hat{h}, f(\hat{n})/\hat{n}) & \text{if clan } I \text{ is of type } S
\end{cases}
$$

and

$$
U_J = U_J(\hat{h}, f(\hat{n})/\hat{n}) =
\begin{cases}
U^W(\hat{h}, f(\hat{n})/\hat{n}) & \text{if clan } J \text{ is of type } W \\
U^S(\hat{h}, f(\hat{n})/\hat{n}) & \text{if clan } J \text{ is of type } S
\end{cases}
$$

The action space for each clan during the interaction is $A = \{k, c\}$ where k stands for kill, and c stands for concede. Let $a_I \in A$ and $a_J \in A$ denote the actions of clan I and J, respectively. Honor and output will depend on the actions of both clans (a_I, a_J), which therefore indirectly affect the utility. Thus, at any point during a conflict, the utility of both clans can be alternatively described as the utility associated with a particular strategy profile, $S(a_I, a_J)$.

"Weak" and "Strong" Types Clarified

The basic trade-off during a retaliatory conflict is that between an increase in a clan's honor and a decrease in a clan's number of members. The strong types are the ones with a high-valuation of honor, for which, essentially, the increase in honor more than compensates for the loss of life during a conflict.

If clan I decides to kill following an offense, its honor stock increases from $\hat{h}$ to $\hat{h} + s$. If clan J chooses to further retaliate, clan I's number of members decreases from $\hat{n}$ to $\hat{n} - 1$ and per capita output becomes $y_I = f(\hat{n} - 1)/(\hat{n} - 1)$.

A strong clan values the increase in honor more than the decrease in per capita output, which means that at the end of a period with retaliatory conflict their utility is higher than at the beginning of the period. So, for a strong clan I, the first-period utility associated with retaliatory conflict equals:

$U_I = U^S(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1))$, which is s.t. $U^S(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1)) > U^S(\hat{h}, f(\hat{n})/\hat{n})$.

A weak clan values the increase in honor less than the decrease in per capita output, and at the end of a period with retaliatory conflict they are worse off than at the beginning. For a low-valuation (weak) type the utility associated with retaliatory conflict is:

$U_I = U^W(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1))$ s.t $U^W(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1)) < U^W(\hat{h}, f(\hat{n})/\hat{n})$.

Thus, essentially, a high or low valuation of honor translates respectively into a high or low valuation of conflict. It is assumed that a clan is strong with *a priori* probability p^*, reflecting the ratio of strong groups in a society, which is common

knowledge.

4.4.1   Conflict Sequence and Timing

Two clans I and J are paired up with each-other in a potential conflictual situation. In addition, nature allocates the right to start a conflict by flipping a fair coin. The clan that has the right to make the first move has the choice to act or walk away. In this context, the conflictual situation is defined as one where a dispute arises which can be interpreted by the clan with the right to the first move as an offence. The clan with the right to the first move has the option of reacting to what they consider an offence by killing a member of the other clan or of not taking offence and walking away. If they choose to strike, the other clan faces the option of whether to retaliate by killing an opposite clan member or to not retaliate, concede and end the conflict. If they retaliate, the opposing clan faces the same choice and so on, until one of them backs out of the conflict and the conflict ends. The sequence of actions in the first period is depicted in Figure 4.1.

In this game, the clan with the right to the first move is the counterpart of the entrant and the other clan is the counterpart of the incumbent in the entrant-incumbent game. Hence, there are two sub-periods in every period: In the first sub-period the clan with the right to move first (which, for the sake of simplicity, is designated to be Clan I) decides whether to initiate a conflict or not. In the second subperiod the responding clan (Clan J) decides whether to retaliate or not. The feud ends when any of the parties decides not to retaliate at any given point.

The payoffs are realized at the end of every period, or alternatively at the end of a subperiod after which the conflict relationship ends.
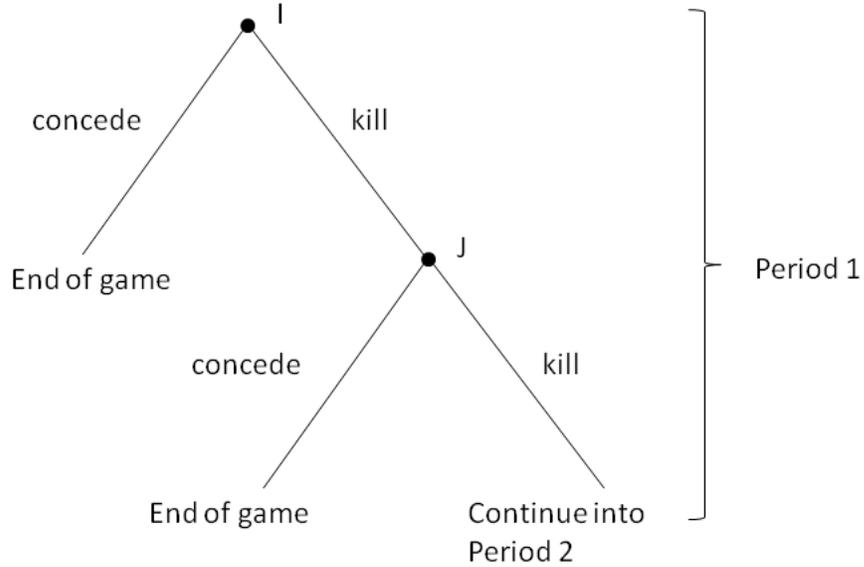

Figure 4.1: Game Tree

Payoffs for Clan I (Initiating Group)

As defined above, the utility of clan I when deciding not to act upon the offence and concede, or their no-conflict utility, is:

$$
U_I = U_I(\hat{h}, f(\hat{n})/\hat{n}) =
\begin{cases}
U^W(\hat{h}, f(\hat{n})/\hat{n}) & \text{if clan } I \text{ is of type } W \\[2mm]
U^S(\hat{h}, f(\hat{n})/\hat{n}) & \text{if clan } I \text{ is of type } S
\end{cases}
$$

Let it be assumed that both a strong and a weak clan normalize their no-conflict utility above, (i.e. their period 0 utility) to 0. The no-conflict utility will, thus, become the benchmark against which both types of clans will evaluate their utility at any point during the conflict.

The utility of a strong clan I at the end of the first period, after clan I chooses to kill and clan J retaliates is[5] :

$$U_I = U^S(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1)) = \beta_1^S$$

In the second period, if clan I decides to continue the conflict and clan J retaliates, clan I's honor increases to $\hat{h} + 2s$ and per capita output decreases to $f(\hat{n} - 2)/(\hat{n} - 2)$. The utility of a strong clan I at the end of the second period of retaliatory conflict is:

$$U_I = U^S(\hat{h} + 2s, f(\hat{n} - 2)/(\hat{n} - 2)) = \beta_2^S.$$

For a strong clan,

$$U^S(\hat{h} + 2s, f(\hat{n} - 2)/(\hat{n} - 2)) > U^S(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1)) > U^S(\hat{h}, f(\hat{n})/(\hat{n}))^6.$$

So, for a strong clan, the utility from retaliatory conflict is always positive, and (if marginally) increasing with time, i.e. $0 < \beta_1^S < \beta_2^S < \beta_3^S < \cdots < \beta_t^S$.

The utility of a weak clan I at the end of the first period is:

$$U_I = U^W(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1)) = \beta_1^W$$, and at the end of the second period it is:

$$U_I = U^W(\hat{h} + 2s, f(\hat{n} - 2)/(\hat{n} - 2)) = \beta_2^W.$$

For a weak clan,

$$U^W(\hat{h} + 2s, f(\hat{n} - 2)/(\hat{n} - 2)) < U^W(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1)) < U^W(\hat{h}, f(\hat{n})/\hat{n}).$$

Similarly, for a weak clan, the utility from conflict is negative and decreasing in time, i.e. $0 > \beta_1^W > \beta_2^W > \beta_3^W > \cdots > \beta_t^W$.

Whenever clan J backs off the conflict at a given period T (which becomes the last period of the conflict) and does not retaliate, a clan I attains an increase in

---

[5]The symbols β, α, and δ denote particular values that the utility function takes, in order to facilitate comparison with the no-conflict utility at the beginning of the game. The superscript denotes the clan type and the subscript denotes the time period.

[6]Please refer to the discussion on "weak" and "strong" types above.

honor S_T^S if strong or S_T^W if weak sufficient to net them a positive utility of:

$$
U_I = \begin{cases} U^W(\hat{h} + S_T^W, f(\hat{n} - T - 1))/(\hat{n} - (T - 1)) = \alpha_T^W > 0 & \text{if clan } I \text{ is of type } W \\ U^S(\hat{h} + S_T^S, f(\hat{n} - T - 1))/(\hat{n} - (T - 1)) = \alpha_T^S > 0 & \text{if clan } I \text{ is of type } S \end{cases}
$$

So, S_T^S and S_T^W and increases in time to counterbalance the loss of life at the end of a conflict; the longer the conflict goes on, the higher is the honor bonus one obtains at the end of it if the opponent concedes. This could be treated as a prize for persevering and not backing off the conflict. It is further assumed that the honor bonus one receives at the end of the conflict is large enough to net the survivor a utility level equal to the one earned when the other clan backs off in the first stage, i.e. S_T^S and S_T^W is such that:

$$
U_I = \begin{cases} U^W(\hat{h} + S_T^W, f(\hat{n} - T - 1))/(\hat{n} - (t - 1)) = U^W(\hat{h} + s, f(\hat{n})/\hat{n}) & \text{if clan } I \text{ is of type } W \\ U^S(\hat{h} + S_T^S, f(\hat{n} - T - 1))/(\hat{n} - (t - 1)) = U^S(\hat{h} + s, f(\hat{n})/\hat{n}) & \text{if clan } I \text{ is of type } S \end{cases}
$$

or $\alpha_T^W = \alpha_1^W > 0$ and $\alpha_T^S = \alpha_1^S > 0$. It must be noted that, in the case of a weak type, only the last period payoff is positive. That is to say, at any period t before the last one the weak type nets $\beta_t^W < 0$.

Finally, if the initiator clan I concedes after period T of retaliatory conflict, their honor and number of clan members is the same as in the previous period, hence they net the same level of utility they netted in the previous period, and the game ends.

Payoffs for Clan J (Responding Group)

Similarly, the respondent clan J utility associated with retaliatory conflict in a period t will be:

$$U_J = U^S(\hat{h} + ts, f(\hat{n} - t)/(\hat{n} - t)) = \beta_t^S, \text{ where } 0 < \beta_1^S < \beta_2^S < \beta_3^S < \cdots < \beta_t^S \text{ if}$$

Clan J is a strong clan, and

$$U_J = U^W(\hat{h} + ts, f(\hat{n} - t)/(\hat{n} - t)) = \beta_t^W, \text{ where } 0 > \beta_1^W > \beta_2^W > \beta_3^W > \cdots > \beta_t^W \text{ if}$$

Clan J is a Weak clan.

If clan I does not initiate a conflict or concedes at the beginning of the first period, clan J's per capita output remains unchanged, but their honor stock increases to $\hat{h} + s$, reflecting the fact that the other party conceded and backed out of the conflict. If clan I concedes at the beginning of period T, clan J obtains an honor bonus of S_T^S if strong and S_T^W if weak. So, similar to the case of the initiator clan, respondent clan J utility associated with concession of the opponent at a given period T will be:

$$U_J = U^S(\hat{h} + S_T, f(\hat{n} - T - 1))/(\hat{n} - (T - 1)) = \alpha_T^S \text{ s.t. } \alpha_T^S = \alpha_1^S > 0 \text{ if clan J is a}$$

strong clan, and

$$U_J = U^W(\hat{h} + S_T, f(\hat{n} - T - 1))/(\hat{n} - (T - 1)) = \alpha_T^W \text{ s.t. } \alpha_T^W = \alpha_1^W > 0 \text{ if clan J is}$$

a weak clan.

Differently from the case of the initiator clan, however, whenever a respondent clan J concedes, they forfeit the right to retaliate after they have lost a clan member in that particular period. If clan J concedes in the first period, their honor is the same, but their number fall to $\hat{n} - 1$. Their period 1 utility becomes:

$U_J = U^S(\hat{h}, f(\hat{n}-1))/(\hat{n}-1)) = \delta_1^S < 0$ if clan J is a strong clan[7], and

$U_J = U^W(\hat{h}, f(\hat{n}-1))/(\hat{n}-1)) = \delta_1^W < 0$ if clan J is a weak clan

If clan J waits until period T to concede, in the last period they obtain[8]:

$U_J = U^S(\hat{h} + (T-1)s, f(\hat{n}-T)/(\hat{n}-T)) = \delta_T^S$ if clan J is a strong clan, and

$U_J = U^W(\hat{h} + (T-1)s, f(\hat{n}-T)/(\hat{n}-T)) = \delta_T^W$ if clan J is a weak clan.

4.4.2 Equilibrium

Constant Payoffs

To be able to formally characterize the equilibrium, this section makes two further assumptions. First, it is assumed that the number of clan members is replenished to $\hat{n}$ at the beginning of every period, i.e. there is a population growth of $1/\hat{n}$ per period. Second, the increase in honor s associated with retaliatory conflict is not permanent, but period-specific. The honor of a clan increases to $\hat{h} + s$ during a period of retaliatory conflict, but falls back to $\hat{h}$ at the beginning of the following period.

These assumptions essentially set a lower boundary on a clan's population and an upper boundary on its honor, thus preventing a clan from precipitating into a situation with an extremely high honor but nobody to enjoy it. Hence, while rendering the formal demonstration of the existence of an equilibrium easier, they do not necessarily impose unrealistic restrictions on the model.

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[7] A strong clan would find it optimal not concede, but the hypotethical strong clan payoff is added here for the sake of completeness.

[8] It must be noted that at every point t before the end of the conflict they obtain a payoff of β_t^W if weak or β_t^S if strong.

Under the assumptions above, during each period with retaliatory conflict an initiating clan (I) obtains[9]:

$U_I = U^S(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1)) = \beta^S > 0$ if clan I is a strong clan, and

$U_I = U^W(\hat{h} + s, f(\hat{n} - 1)/(\hat{n} - 1)) = \beta^W < 0$ if clan I is a weak clan.

If the other clan concedes, an initiating clan I obtains a one-time payoff of:

$U_I = U^S(\hat{h} + s, f(\hat{n})/(\hat{n})) = \alpha^S > 0$ if clan I is a strong clan, and

$U_I = U^W(\hat{h} + s, f(\hat{n})/(\hat{n})) = \alpha^W > 0$ if clan I is a weak clan.

If clan I concedes, clan I obtains a utility of 0 whether weak or strong.

Simlarly, a strong responding clan (J) obtains $\beta^S > 0$ during each period of retaliatory conflict, $\alpha^S > 0$ when the other clan concedes, and $\delta^S < 0$ if they concede themselves[10].

A weak responding clan (J) obtains $\beta^W < 0$ during each period of retaliatory conflict, $\alpha^W > 0$ when the other clan concedes, and $\delta^W < 0$ if they concede themselves.

Equilibrium: The Strategy

A strong clan nets a payoff of $\beta^S > 0$ at any period with retaliatory conflict and $\alpha^S > 0$ if the other clan concedes. It is clear that, whether they initiate or respond to a conflict, the dominant strategy for the strong types is to never concede, as the utility they obtain from conflict is strictly positive. As a result, conflicts between strong types will prove to be the ones with the highest duration, and in fact continue until the end of the game, or virtually infinitely. On the other hand, a weak clan

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[9]Under these assumptions, all payoffs equal period 1 payoffs from subsection 4.4.1, so the time subscript is dropped as redundant.

[10]Please refer to subsection 4.4.1 above.

engages in a conflict with the hope that the opponent backs off. They have a negative valuation of retaliatory conflict ($\beta^W < 0$) per period, so the earlier in the game the opponent backs off, the better. The longer the continuation of the conflict, the larger are the losses for the weak type.

In this form, the game is defined in terms very similar to Kreps and Wilson (1982) and Fudenberg and Kreps (1987). The solution and characterization of the equilibrium is also similar. Fudenberg and Kreps (1987) adopt a continuous time frame with time increasing in the interval from 0 to 1, which, in the context of this paper, provides a virtually infinite amount of interactions between clans while still making it possible to attain a closed form solution. For as long as the conflict goes on, a clan would get $t\beta^W$, where $0 < t < 1$. If and when, eventually, the opponent concedes, the surviving party realizes a one-time payoff of $\alpha^W > 0$.

Hence, the conflict between two weak clans will resemble a "game of chicken". In the equilibrium of the game, if neither clan backs off at the beginning of the conflict, both have a "concession rate" (Fudenberg and Kreps 1987) which means they will adopt a strategy to concede at a certain rate during the game for as long as the conflict goes on. In addition, the initial probability that the opponent is strong is p^* (the known distribution), but if the opponent has not conceded yet, each clan updates the probability they assign to the opponent being strong. The time-dependent posterior probability of the conflict-initiating opponent (clan I) being strong is labeled p_t^I and the posterior probability of the responding opponent (clan J) being strong as p_t^J.

The concession rate that a weak initiating clan (I) will adopt (or the probability

that it will concede at time t if it has not yet conceded) is defined as $\pi(p_t^I, p_t^J, t)$. Similarly, the concession rate of the respondent (J) in the hypothesized equilibrium of the game is defined as $\theta(p_t^I, p_t^J, t)$.

Following Fudenberg and Kreps (1987), the hypothesized equilibrium is a mixed strategy equilibrium where the weak clan mixes between conceding at the very beginning or waiting until a time t and then conceding. For the weak initiator clan (I) to mix, they must be indifferent between conceding at the very beginning (in which case the payoff is 0) or at time t. If they wait until time t to concede, there are potential losses and benefits. By that time, the respondent clan will not have conceded with probability close to one, in which case clan I gets $t\beta^W < 0$. There is a small chance, though, that opponent J will have conceded, $(1 - p_t^J)\theta t$, which is the probability that clan J is weak $(1 - p_t^J)$ multiplied by the probability that they will concede until time t, θt. In that case, clan I receives a net onetime benefit of $\alpha^W > 0$. To be indifferent between conceding at time 0 or at time t, clan I must have the same expected payoff from both cases, that is:

$$0 = t\beta^W + (1 - p_t^J)\theta t \alpha^W. \tag{4.1}$$

Similarly, for clan J (the respondent) to be indifferent between conceding at time 0 (in which case their payoff is $\delta^W < 0$) and waiting until time t, then conceding, it must be that:

$$\delta^W = t\beta^W + \delta^W + (1 - p_t^I)\pi t \alpha^W. \tag{4.2}$$

Simplifying both sides leads to:

$$0 = \beta^W + (1 - p_t^J)\theta\alpha^W \tag{4.3}$$

and

$$0 = \beta^W + (1 - p_t^I)\pi\alpha^W. \tag{4.4}$$

If the weak initiator I uses the concession strategy π, then p_t^I (the posterior probability assigned to him being strong) will change with time. In fact, p_t^I will increase with time; the more clan I stays in the game, the larger the probability assigned to them being strong. Applying Bayes' formula of conditional probabilities leads to:

$$\frac{dp_t^J}{dt} = p_t^J(1 - p_t^J)\theta \tag{4.5}$$

and

$$\frac{dp_t^I}{dt} = p_t^I(1 - p_t^I)\pi. \tag{4.6}$$

Substituting equation 4.6 into 4.4 and 4.5 into 4.3 and dividing 4.4 by 4.3, leads to $dp_t^J/p_t^J = dp_t^I/p_t^I$ which leads to $p_t^J = a \cdot p_t^I$ for some constant a.

In order to have a mixed-strategy equilibrium as described above it must be the case that $a = 1$ (Fudenberg and Kreps, 1987). A value of $a > 1$ would imply that p_t^I reaches the value of 1 when $p_t^J < 1$, which is incompatible with an equilibrium where clan I uses a concession strategy π. Instead, they could wait until $p_t^I = 1$, at which point clan J concedes and they net a positive value. Hence, in order to have a probability as described above, the posterior probabilities must evolve along

the $p_t^J = p_t^I$ line in the probability space. In equilibrium, the expected payoffs for a weak clan I (the initiator) and clan J are respectively 0 and δ^W.

4.4.3 Discussion

As presented above, the model used in this paper provides a platform to reconcile different definitions of blood feuds as well as different views regarding their replication dynamics.

First, it addresses questions that might arise with regard to the two definitions of feud described above, namely that of Middleton and Tait of feud as a conflict relationship that entails the obligation (or at least, desire) of both involved parties to terminate it when presented with the possibility; and the definition of feud as an "eternal conflict" that both Peters and Black-Michaud incline to accept.

The Middleton and Tait definition fails to address the fact that a number of feuds last for a very long time despite the unambiguous existence of possibilities of termination. In this model, that could be explained by the high marginal utility of honor of the strong types. That means that in any period in time there are a number of conflicts that last for an indefinitely long period.

The "eternal conflict" definition does not seem to offer a good explanation for the existence of many short-lived feuds. In addition, of all real world examples provided (Durham, 1909; Ginat, 1987) none entails one clan's engagement in more than one feud at a time. If one were to accept the "eternal conflict" definition, one could easily end up with a network of feuds pinning every clan in conflicting

relations with many others.

In sum, this model predicts that only a fraction of feuds would be infinitely long-lived, the rest would last only for a short period of time, reflecting the low marginal utility of honor (and conflict) for the weak types. This result is supported by a case brought by Durham (1909, p.61), where the household head clearly states that the number of deaths he thought were necessary to bring the conflict to an end was five. This clearly shows an implicit forward-looking calculation of the trade-off between increasing his clan's honor and loss of lives, and also shows that, in this particular case, this clan's valuation of conflict was not high enough to continue feuding for an infinitely long period.

To the credit of the "eternal conflict" hypothesis, however, there is evidence of "renewed conflict" provided to us by Durham (1909, p.199): "...The paying of blood-gelt does not stop a feud. In a recent case the feud had ceased for years. But when the son of a man who had ended it grew to be fifteen years old, and was now head of the family, he declared that as the family honor had been sold when he was an infant, he was not bound by the oath, so went forth with his gun and shot a man of the other house. And the feud began again." The model used in this paper does not capture the dynamics of the change in the valuation of honor over generations. However, once such a change occurs and a feud is restarted, then the course of that feud is bound to be the same as predicted by the model. Assuming long-term concavity of the utility function in honor and introducing a relativistic honor concept would be a good first step. That would mean that the lower a clan's honor falls below that of the population average (as a result of recent conflict inactivity),

the more attractive engaging in a feud becomes. One way to do that would be to revive an old conflict. Not accounting for changes in honor over time is a significant limitation of the model.

The model also does not account for different clan sizes, while it is, in fact, likely for clan size to be correlated with clan type. That is particularly easy to see if one refers to the time-varying payoff structure in Section 4.4.1. As a conflict goes on, a larger clan would have a higher conflict tolerance, as they would have more members to spare. That would mean that a larger clan would have a higher ex-ante conflict inclination. The introduction of both features is beyond the scope of this paper and is left for further research.

Second, this model bridges the roles of honor and collective responsibility in causing and perpetuating feuds. This paper argues that both concepts are inseparable for a proper analysis. Without the concept of honor blood feuds would not be initiated at all, as a clan's high valuation of honor (which is a result of the total scarcity conditions described by Black-Michaud) is the only aspect that could possibly counterbalance the loss of life. On the other side, in a society with a high valuation of honor, but without collective responsibility and its abovementioned characteristics one also would not witness blood feuds. If anything, one would see occasional duels (and duel killings) to avenge honor infringements, but these would not precipitate inter-clan feuds as everyone's honor would be only his own and there would be no point in engaging in violence upon another clan member's death. This is illustrated by the fact that, in societies with a high valuation of honor, feuds such as Hattfield-McCoy are special cases that arise only under conditions of collective

responsibility. And when collective responsibility is not a prevailing feature feuds are few and far between rather than a commanding historical reality.

4.5 Collective Responsibility and Blood Feuds as Endogenous Institutions: A Tale of Two Regions

The previous sections illustrate how "collective responsibility" has a primary role in perpetuating blood feuds. In its absence an offence could certainly lead to violence, but not to blood feuds, as seeking revenge would be up to the individual rather than a duty of the clan. In addition, the pre-specified collective production function is the backbone of collective responsibility; once output becomes a function of individual effort rather than clan belongingness, individuals drift away from the clan and are unwilling to share responsibility for other clan members' actions. Ginat (1987) mentions a case where a member of a diyya group that has a job as a teacher in the Israeli public sector asks to be declared an outsider and excused from all responsibilities and rights that apply to him as a member of the diyya group. Under normal conditions this would be the worst possible sanction that the clan could take against a deviant member, but in this case the prospect of a steady income stream away from the clan makes membership and the collective responsibility that comes with it too costly. Hence, it can be argued that developments that would induce the individuals to shift from a collectivistic mode of production to an individualistic

one would contribute in the demise of collective responsibility and the blood feud as an institution.

The best illustration of this argument is provided by the divergence in institutional evolution paths, including the survival of blood feuds, between mountainous South-Western Albania (the area called Himara and Laberia) and Northern Albania after a relative change in the respective degrees of openness to outside markets. Both regions proved uncontrollable and ungovernable for the Ottoman Empire and were granted substantial autonomy. Both had adopted very similar norms (Kanuns), to the point that scholars hint at the existence of a common Albanian customary law. They both were societies with similar economic and political conditions and both displayed a high occurrence of blood feuds (Elezi, 2006). Yet, even though blood feuds in South-Western Albania continued to survive well into the 20th century, they did so at a lower rate and were gradually phased out (*ibid.*) to the point that the government had no difficulty in permanently eradicating them after 1944. The difference in South-Western Albania was that the region bordered the Adriatic Sea on its Western side. This gave them access to the European labor market (Zamputi et al., 1962) of the time for mercenaries, and they proved to be a valuable addition to the forces of various European princes (*ibid.*). From the same source one can deduce that this was a significant source of employment during the period from the 16th to the 18th century. Pappas (*mimeo*) states that "the hiring and maintenance of stradioti troops was continued in Naples until the early 18th century. Most of these troops were later recruited from Epirus and Southern Albania..." and Brunnbauer (2004) extends that time period until the early 19th century.

Access to an outside labor market provided mountainous South-Western Albania with an alternative source of income which did not require the collectivistic mode of production (mercenaries were basically government employees). That triggered a transition from a collectivistic mode of production to an individualistic one and this development undermined the very core of the institutional network that supported blood feuds. This is supported by Elezi (2006) where, in an analysis of the diverging paths in the institutional evolution in the two regions, he states that the large patriarchal family in the Laberi region (South-Western Albania) started to disintegrate by the 18th century and was replaced by smaller-size units, typically containing 10-20 individuals as opposed to the much larger units in Northern Albania, which could reach up to 100 individuals. Elezi also states that the emergence of capitalistic relations in South-Western Albania occurred at a much earlier time than in Northern Albania and, from his analysis, one can deduce that it predates the disintegration of the large patriarchal family. In addition, he views the relationships with Italy and Greece as an important catalyst of the institutional changes in South-Western Albania.

A formal treatment of the conditions under which a society can escape a blood-feud equilibrium driven by collective responsibility and settle on a institutional path where individuals engage in market activity and are able to shoulder the protection cost is beyond the scope of this paper. It is, however, a direction into which further research could naturally expand. The new payoff structure, in order to be long-lasting, would need to provide incentives to the society to renegotiate and redesign new institutional arrangements.

There are a few studies at which one can look to test the result of the hypothesis that the presence and viability of a market economy leads to a weakening of the system of collective responsibility and, as a result, to lower violence levels. One of the most relevant is Villareal (2003), an empirical study that examines modern rural violence in Mexico, specifically in agrarian regions with collective responsibility. The findings of the study are in line with the argument from previous sections that in the absence of proper government control, collective responsibility can contribute to a reduction in violence.

Surprisingly, when it comes to the effects of marketization, the study tests the hypothesis and reaches the exact opposite conclusion, i.e. that marketization contributes to an increase in violence. However, closer inspection shows that this result does not necessarily contradict the argument above. Marketization, or "the introduction of capitalist forms of agricultural production" in their study comes in the form of the introduction of cash crops such as coffee, and not in the form of an alternative individualistic mode of production that can potentially outperform the collective responsibility system. In fact, parallel to the conclusions of the model presented earlier, the introduction of cash crops (whose production can exhibit economies of scale) would only increase the payoffs associated with being a clan member, hence increasing clan dependence and contributing to an increase in violence. This could be classified as "collectivistic" rather than "individualistic" marketization. Illegal activities would typically fit in the former category and, as pointed out by De Souza Mello Bicalho and Hoeffle (2005), would contribute to an increase in violence.

4.6 Conclusion

This paper seeks to narrate how and why a community can adopt a certain set of rules and explain how this set of rules and arrangements tends to perpetuate itself. It is important to realize that, while delivering in the short run in terms of providing a set of rules for the community, regulating violence and preventing the society from falling into a spiral of anarchy, these institutions might well outlive their use, locking a region into an individually and socially inefficient equilibrium.

This paper is based on anthropological evidence from communities in which, excepting economic welfare, honor, as the only marker of social differentiation, is greatly important to utility. It is this relative importance that stems from conditions of total scarcity that, together with the institution of collective responsibility and the absence of a third party to help resolve disputes causes the community to settle into a socially inefficient development path. In these communities, extracting revenge by killing people and engaging in a blood feud is not, as one might be tempted to think, just a way to extract justice in absence of a judiciary system. It is, in fact, a way to send the signal that one's clan (group) is ready to protect their right to exist without actually having to engage in a conflict over the means and sources of survival. The desire to send this signal and the inability of clans to read into other clans' readiness to fight causes them to exchange more "signals" (killings) than they would have had they been fully informed about that readiness.

In such cases the access of all agents in a society to alternative economic activities, in which output is a function of individual effort rather than clan belongingness,

could be crucial in changing the valuations and payoffs and breaking the socially inefficient path dependence.

Chapter 5

Conclusion

5.1 Aspirations and Life Satisfaction in Transition: How Wanting More Increases Happiness

A number of studies, notably Easterlin (1974, 2003b) have found that in developed countries life satisfaction in the long run is essentially unresponsive to increases in income. The explanation provided stressed the constantly adapting nature of aspirations to changes in income as the main reason for the lack of increase in life satisfaction. Social comparison and adaptation have a positive effect on aspirations, whose increase has a negative effect on life satisfaction, thereby canceling out any initial increase in satisfaction due to the increase in income (Easterlin, 2003b). These results, however, have been challenged by a number of recent studies that show that life satisfaction is positively correlated to income accross individuals, countries and

time periods. This paper adds to the latter group and shows that in transition Russia income does have a positive effect on satisfaction, especially when the income level is still relatively low. The data from the Russian Panel show that life satisfaction hits a flat portion during the late phase of transition, suggesting that the effect of social comparison and adaptation might materialize after individuals have been exposed to income fluctuations for a sufficiently long period.

Evaluating the aspiration formation process is one of the purposes of this paper and a closer analysis of panel data from the beginning of this decade in Russia shows that the effect of adaptation on income aspirations is weak and the main factor behind the increases in aspirations is social comparison. The effects of proximity-based reference group income and market-based reference group income are of comparable magnitude, suggesting that the income of individuals one is in constant interaction with is as important to one's aspirations formation process as is the income of individuals with similar job market characteristics. In addition, the effects of the two reference group income measures vary across age groups. Both reference group income measures have a significant effect on the aspirations of young and middle-aged individuals, but among older individuals aspirations are affected only by proximity-based reference group income.

In a departure from results of previous studies (Stutzer, 2004), this paper finds that aspirations have a positive effect on life satisfaction. This can be explained by the income expectations embedded in aspirations; increases in aspirations may reflect not only higher needs and consumption standards, but also a higher expected income. Hirschman and Rothschild (1973) argue that in a developing country a

higher income of relevant others can act a positive signal about one's own expected income and have a positive effect on life satisfaction. The aspiration-centered analysis in this paper supports that argument. Individuals use the income of relevant others to form their aspirations, which come to contain income expectations. The higher income expectations embedded in aspirations cause the latter to have a positive effect on life satisfaction.

5.2 Wealth and Happiness of Nations: The Resource Curse from a New Angle

This paper attempts to bridge the natural resources literature and the life satisfaction literature. It does so by evaluating the effect of different types of accumulated wealth on average life satisfaction across countries. The results show that while both produced and natural capital have a positive effect on life satisfaction, the effect of the latter is stronger and remains significant even after accounting for the quality of formal institutions and the existence of informal safety nets. Democratic institutions and informal safety nets retain their positive effect on life satisfaction. However, when natural wealth is further disaggregated into diffuse resources and subsoil resources, the latter have no significant effect on life satisfaction. Most of the positive effect that natural capital has is due to diffuse resources like cropland, pastureland or forestry. Hence, echoing results from the vast literature on natural resources, this paper finds that the same type of resource endowment that is likely

to contribute to higher growth rates and more democratic institutions is also likely to contribute to a higher life satisfaction. Beyond the direct wealth effect, this could be due to the diffuse resources' contribution to a more broad-based and equitable development, as well as their generating a higher level of positive externalities.

5.3 Blood Feuds: The Economics of a Dismal Institution

This paper seeks to narrate how and why a community can adopt a certain set of rules and explain how this set of rules and arrangements tends to perpetuate itself. It is important to realize that, while delivering in the short run in terms of providing a set of rules for the community, regulating violence and preventing the society from falling into a spiral of anarchy, these institutions might well outlive their use, locking a region into an individually and socially inefficient equilibrium.

This paper is based on anthropological evidence from communities in which, excepting economic welfare, honor, as the only marker of social differentiation, is greatly important to utility. It is this relative importance that stems from conditions of total scarcity that, together with the institution of collective responsibility and the absence of a third party to help resolve disputes causes the community to settle into a socially inefficient development path. In these communities, extracting revenge by killing people and engaging in a blood feud is not, as one might be tempted to think, just a way to extract justice in absence of a judiciary system. It is, in fact,

a way to send the signal that one's clan (group) is ready to protect their right to exist without actually having to engage in a conflict over the means and sources of survival. The desire to send this signal and the inability of clans to read into other clans' readiness to fight causes them to exchange more "signals" (killings) than they would have had they been fully informed about that readiness.

In such cases the access of all agents in a society to alternative economic activities, in which output is a function of individual effort rather than clan belongingness, could be crucial in changing the valuations and payoffs and breaking the socially inefficient path dependence.

Appendix A

Aspirations and Life Satisfaction in Transition: How Wanting More Increases Happiness

A.1 Econometric Model and Estimation

Both dependent variables, life satisfaction and satisfaction with economic conditions, are ordered response variables ranging from one to five (as described below). The data is in panel format where individuals are followed over at least two consecutive periods. To describe the estimation method this appendix begins with a

simple ordered probit model for a single cross section, and subsequently expand the model for panel data. Throughout the appendix it is assumed that the data are cross-sectionally independent and identically distributed. Assumptions on independence over time will follow. This appendix focuses on life satisfaction as the response variable, but the same assumptions hold as regards satisfaction with economic conditions.

For a single cross section the simplified ordered probit model would look as follows:

$$LS_i^* = X_i'\beta + u_i, \quad u_i|X_i \sim N(0,1)$$

where LS_i^* is latent life satisfaction, X_i is a column vector of observable individual characteristics, such as income, aspirations, age, education and employment status, and u_i denotes the unobserved disturbance terms, which are assumed to be be distributed independently of X_i. Latent life satisfaction LS_i^* is captured by LS_i, an ordered variable that takes integer values from 1 to 5, and LS_i is related to LS_i^* through the threshold model below,[1] where a higher value indicates a higher satisfaction level.

---

[1]In this specification, the thresholds (λ_j) pertaining to the relationship between the latent dependent variable and the observed satisfaction index are not individual-specific and are treated as parameters to be estimated along with the β.

$$
LS_i = \begin{cases} 1 & \text{if} \quad LS_i^* \in (-\infty, \lambda_1] \\[2mm] 2 & \text{if} \quad LS_i^* \in (\lambda_1, \lambda_2] \\[2mm] 3 & \text{if} \quad LS_i^* \in (\lambda_2, \lambda_3] \\[2mm] 4 & \text{if} \quad LS_i^* \in (\lambda_3, \lambda_4] \\[2mm] 5 & \text{if} \quad LS_i^* \in (\lambda_4, \infty) \end{cases}
$$

Given the normal distribution of u_i, the conditional response probabilities can be computed as:

$$
\begin{aligned}
P(LS_i = 1 | X_i) &= P(LS_i^* \leq \lambda_1 | X_i) = P(X_i \beta + u_i \leq \lambda_1 | X_i) \\[2mm]
&= \Phi(\lambda_1 - X_i \beta) \\[2mm]
P(LS_i = 2 | X_i) &= P(\lambda_1 < LS_i^* \leq \lambda_2 | X_i) \\[2mm]
&= \Phi(\lambda_2 - X_i \beta) - \Phi(\lambda_1 - X_i \beta) \\[2mm]
&\vdots \\[2mm]
P(LS_i = 5 | X_i) &= P(LS_i^* > \lambda_4 | X_i) \\[2mm]
&= 1 - \Phi(\lambda_4 - X_i \beta),
\end{aligned}
$$

where $\Phi(\cdot)$ denotes the c.d.f. of the standard normal distribution.

As it stands, β and $\lambda_1, \ldots, \lambda_4$ and can be estimated by maximum likelihood. The log-likehood function for each individual i is:

$$\begin{aligned}
\log L_i(\lambda, \beta) \;=\;\; & \mathbf{1}[LS_i = 1] \log[\Phi(\lambda_1 - X_i'\beta)] + \\
& + \mathbf{1}[LS_i = 2] \log[\Phi(\lambda_2 - X_i'\beta) - \Phi(\lambda_1 - X_i'\beta)] + \dots \\
& \dots + \mathbf{1}[LS_i = 5] \log[1 - \Phi(\lambda_4 - X_i'\beta)]
\end{aligned}$$

This function can be routinely estimated (Wooldridge, 2002, p.505).

The model is next expanded to a panel of N cross-sections and T time periods. It is assumed that the observations are i.i.d. in the cross-sectional dimension. To account for possible unobserved heterogeneity time-invariant individual effects are included into the model. With the individual effects c_i the latent variable model is:

$$LS_{it}^* = X_{it}'\beta + c_i + u_{it}, \quad u_{it}|X_i, c_i \sim N(0, 1) \tag{A.1}$$

where $X_i = (X_{i1} \dots X_{iT})$. It is assumed that

$$X_{it} \text{ is strictly exogeneous conditional on } c_i$$

and that

$$u_{i1}, \dots, u_{iT} \text{ are independent conditional on } (X_i, c_i).$$

Treating the c_i as parameters to be estimated alongside β in the spirit of fixed effects analysis would lead to the incidental parameters problem (Wooldridge, 2002,

p. 484). With T fixed and $N \to \infty$ estimating the c_i alongside β leads to inconsistent estimates of both. On the other hand, the traditional random effects assumption of $c_i | X_i \sim N(0, \sigma_c)$ can be too strong. It seems prudent to allow the c_i to be correlated with X_i as it is plausible for the unobserved effects to be correlated with covariates such as income and education. Following Mundlak (1978) and Chamberlain (1980), the correlation is specified as:

$$c_i = \bar{X}_i' \gamma + \alpha_i$$

where $\bar{X}_i$ is the average of X_{it} over time and $\alpha_i | X_i \sim N(0, \sigma_\alpha)$. The latent response model can then be rewritten as:

$$LS_{it}^* = X_{it}'\beta + \bar{X}_i'\gamma + \alpha_i + u_{it} \tag{A.2}$$

which is an ordered probit version of Chamberlain's random effects probit model. It is assumed that α_i and $u_i = (u_{i1}...u_{iT})$ are independent conditional on X_i, $\alpha_i | X_i \sim N(0, \sigma_\alpha)$ and $u_i | X_i \sim N(0, I_T)$.

The joint distribution of $(LS_{i1}, \ldots, LS_{iT_i})^2$ conditional on X_i (integrating over the unobservable α_i) is (Wooldridge, 2002, p. 485; Boes and Winkelmann, 2006):

---

[2]Due to panel attrition, some individuals are present for all three years of 2000-2002 period and some for only two of them. Hence the notation T_i for the total time periods an individual was present in the panel, where $T_i \in \{2, 3\}$.

$$f(LS_{i1}, \cdots, LS_{iT_i} | X_i, \beta, \gamma) =$$

$$\int_{-\infty}^{\infty} \prod_{t=1}^{T_i} \prod_{j=1}^{J} P(LS_{it} = j \mid X_{it}, \bar{X}_i, \beta, \gamma, \alpha_i)^{\mathbf{1}(LS_{it}=j)} \frac{1}{\sigma_\alpha} \phi(\frac{\alpha_i}{\sigma_\alpha}) d\alpha_i \quad \text{(A.3)}$$

The log-likelihood function for each individual i is:

$$\log L_i(\lambda, \beta, \gamma, \alpha) = \sum_{t=1}^{T_i} \Big(\mathbf{1}[LS_{it} = 1] \log[\Phi(\lambda_1 - X'_{it}\beta - \bar{X}'_i\gamma - \alpha_i)] +$$

$$+ \mathbf{1}[LS_{it} = 2] \log[\Phi(\lambda_2 - X'_{it}\beta - \bar{X}'_i\gamma - \alpha_i) - \Phi(\lambda_1 - X'_{it}\beta - \bar{X}'_i\gamma - \alpha_i)]$$

$$\ldots + \mathbf{1}[LS_{it} = 5] \log[1 - \Phi(\lambda_4 - X'_{it}\beta - \bar{X}'_i\gamma - \alpha_i)] \Big)$$

Equation A.3 is amenable to Gauss-Hermite quadrature for numerical approximation (Boes and Winkelmann, 2006). After that the parameters can be estimated using `reoprob` (Frechette, 2001), an existing STATA command that yields maximum likelihood estimators for random effects ordered probit models. The `reoprob` estimators share the general properties of maximum likelihood estimators, i.e. they are consistent, asymptotically efficient and asymptotically normal. `Reoprob` uses the analytic first derivatives method and approximates the likelihood function for each unit using Gauss-Hermite quadrature (Frechette, 2001).

A Likelihood Ratio test is performed to compare models A.2 and A.1. The latter model is rejected in favor of the former; that is, the model performs better after the inclusion of individual averages of X_{it} over time. Hence, the model A.2 is

used to estimate the effects of income, aspirations and other variables in Section 5.

Appendix B

Wealth and Happiness of Nations: The Resource Curse from a New Angle

B.1 Figures and Tables
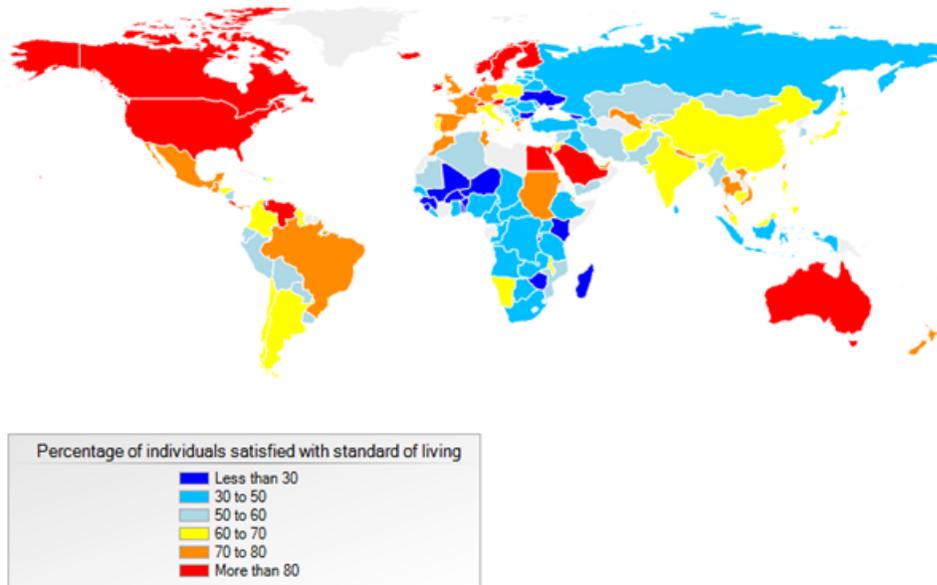
Figure B.1: Satisfaction with Standard of Living
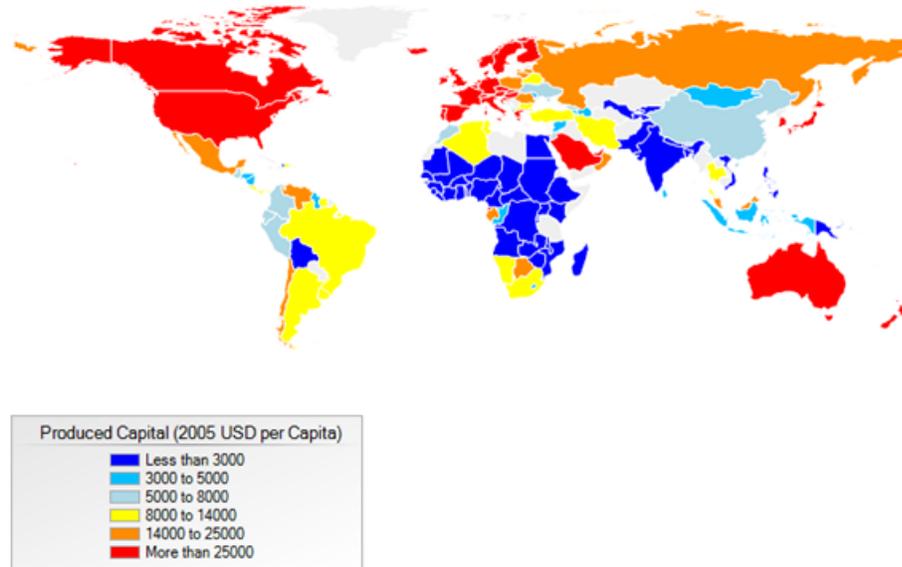
Figure B.2: Produced Capital per Capita

Table B.1: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max	Unit
Real GDP per capita	142	10341.58	11540.71	153.1648	88292.58	Thousand USD
Growth of real GDP per capita	141	1.730413	7.219746	-64.36023	88.74834	Percentage
Population	138	4.21E+07	1.40E+08	216500	1.30E+09	Thousand USD
Total wealth per capita	138	138893.1	206426.6	1777.81	930001.9	Thousand USD
Intangible capital per capita	138	93593.89	161596.4	-34381.11	766527.7	Thousand USD
Produced capital per capita	138	25071.67	40135.58	0	213425.5	Thousand USD
Natural capital per capita	138	15119.87	29683.8	0	313782.1	Thousand USD
Crop per capita	138	2885.573	2653.087	0	24155.7	Thousand USD
Pasture land per capita	138	2046.571	3780.632	0	38730	Thousand USD
Forest - timber per capita	138	798.3363	1749.819	0	21506	Thousand USD
Forest - non-timber per capita	138	748.4222	1473.291	0	12327.17	Thousand USD
Protected areas per capita	138	1400.625	2802.722	0	22366	Thousand USD
Oil per capita	138	5407.694	25253.03	0	298581	Thousand USD
Natural gas per capita	138	1446.076	5352.633	0	58738.1	Thousand USD
Hard coal per capita	138	64.77328	335.5504	0	4088.39	Thousand USD
Soft coal per capita	138	20.92729	121.6639	0	1718.684	Thousand USD
Minerals per capita	138	300.8394	1457.216	0	18776.34	Thousand USD
Land, crop and forestry wealthper capita	138	6478.903	6206.225	0	51347	Thousand USD
Oil, gas, coal and mineral wealth per capita	138	7240.31	28367.36	0	312557.8	Thousand USD
Satisfaction with life today	149	5.449036	1.105753	3	8	1 to 10
Satisfaction with life 5 years from now	149	6.736038	0.8523345	4.4	8.5	1 to 10
Satisfied with personal health	148	77.6918	10.45286	46	96	Percentage
Satisfied with standard of living	148	58.13745	19.70804	9	93	Percentage
Donated money	148	30.31148	18.85294	4	83	Percentage
Religion important part of daily life	148	71.2396	25.61603	14	100	Percentage

Table B.2: Summary Statistics (Cont'd)

Variable	Obs.	Mean	Std. Dev.	Min	Max	Unit
Count on to help	148	78.9604	13.3017	29	98	Percentage
Confidence in government	141	49.06138	19.78659	16	94	Percentage
Freedom in your life	148	65.78231	16.53331	24	96	Percentage
Confidence in judicial system	144	47.67423	17.8051	15	86	Percentage
Corruption in government	141	66.13804	20.23936	4	96	Percentage
Satisfied with quality of healthcare	148	56.61423	18.94254	17	93	Percentage
Satisfied with quality of roads	149	51.39995	18.65653	7	95	Percentage
Population 0-14 years	189	33.95761	10.27614	13.43	51.35	Percentage
Population 15-64 years	189	59.63177	6.822705	46.18	79.31	Percentage
Population 65 years and above	189	6.410869	4.299729	1	20.76	Percentage
Life expectancy at birth	188	64.99299	10.64074	23.64	82.51	Years
Child mortality rate	180	76.3227	70.71342	2.5	317.7	Per Thousand
Government stability	134	7.508975	2.306503	1	12	0 to 12
Socioeconomic conditions	134	5.738274	2.143631	0	11	0 to 11
External conflict	134	6.906433	2.400268	0	12	0 to 12
Internal conflict	134	8.720152	2.716753	0	12	0 to 12
External conflict	134	9.682009	2.264037	0	12	0 to 12
Corruption	134	3.158985	1.388091	0	6.17	0 to 6.17
Military in politics	134	3.762486	1.832548	0	6.17	0 to 6.17
Religion in politics	134	4.566379	1.380159	0	6	0 to 6
Law and order	134	3.671985	1.527683	0	6	0 to 6
Ethnic tensions	134	3.950912	1.477313	0	6	0 to 6
Democratic accountability	134	3.671681	1.626549	0	6	0 to 6
Bureaucracy quality	134	2.169522	1.20419	0	4	0 to 4

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