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Inflated Expectations and Natural Resource Booms: Evidence from Kazakhstan

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Inflated Expectations and Natural Resource Booms: Evidence from Kazakhstan*

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Abstract:

We use the exogenous variation in oil prices to study the negative effect of income aspirations on households' satisfaction with income. To evaluate the effect we use data on reported satisfaction with income from Kazakhstan's Household Budget Survey - a quarterly, unbalanced panel of households covering the period 2001-2005. Our results suggest that a 20% increase in the oil price decreased households' satisfaction with income by half a standard deviation within a year. We argue that the drop in satisfaction is due to peoples' inflated expectations. This result highlights the importance of managing expectations in a rapidly changing economic environment.

Keywords: Resource Boom, Conflict, Aspirations, Income Satisfaction

JEL classification: Q33, Q34, I31, D03

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1 Introduction

Maybe the most famous phrase of the US Declaration of Independence ends with "Life, Liberty and the pursuit of Happiness". It requires that everybody has the right to strive for happiness but does not guarantee that everybody can achieve it. The oil boom in the resource rich region of Kazakhstan at the beginning of the 21st century increased local labour demand and average household income.¹ This relaxed constraints to strive for happiness suggesting that locals should since be happier with their monetary income. Unfortunately, this does not appear to be the case as the boom was also accompanied by recurrent local conflicts; most recently the deadly riots in Zhanaozen in December 2011.² We argue that locals remained dissatisfied with the increase in income because it fell short of their expectations (Ross, 2007).³

Linking expectations to conflicts, Gurr (1970) suggests that "[m]en are quick to [...] raise expectations beyond their social means and quick to anger when those means prove inadequate". He concludes that the potential for collective movements varies strongly with unfulfilled aspirations. This result relates to a large literature on natural resource abundance and conflicts which remains inconclusive (Collier and Hoeffler, 2004; Humphreys, 2005; Brunnschweiler and Bulte, 2008; Frankel, 2010). The link between natural resources, aspirations and conflicts suggests that an important channel might be neither greed nor grievances but rather unmet aspirations.

¹See Toews (2014) for a discussion of the distributional effects of the oil and gas boom in Kazakhstan.

²See Table I for further examples.

³Similar phenomena have already been observed in the past. When documenting the French Revolution, the philosopher Alexis de Tocqueville argued that it had not been triggered by the miserable conditions of the poor but by the swiftly rising expectations of the French people (Tocqueville, 1986).

In this paper we explore whether exogenous fluctuations in the oil price negatively affect households' satisfaction with income. We base our analysis on the assumption that income aspirations formed by households located in the oil rich districts of Kazakhstan are a function of the publicly observable oil price; the price of the essentially only locally produced tradable good in the region. Based on this assumption, we argue that the increase in the oil price inflated expectations regarding future income and thus decreased income satisfaction of households located in the oil rich districts of Kazakhstan. To our knowledge, this is the first paper to use a quasi natural experiment to provide evidence on how natural resource booms affect people's satisfaction with income. Our results suggest that the oil boom in the oil rich districts of Kazakhstan between 2001 and 2005 negatively affected households' satisfaction with income. In particular, a 20% increase in the oil price decreased their satisfaction with income by half a standard deviation within a year. We argue that this is mainly due to inflated expectations.

To study the effect of the oil price boom on satisfaction with income we use the Household Budget Survey of Kazakhstan - a quarterly, unbalanced panel of households covering the period 2001-2005. Of particular interest to the study is that the survey contains information on how satisfied households are with their household income. Satisfaction with household income is reported on the quarterly basis by the household head on a scale from 1-5. For identification we exploit two sources of variation. Spatially, we merge households' locations with locations of major oil and gas fields. Over time we use oil price fluctuations to treat households located in the district of a major oil and gas field using households located outside these districts as controls.

Our results highlight the importance of managing peoples' expectations in a rapidly changing economic environment. Managing expectations could imply the creation of a narrative which is communicated to the population (Collier, 2013). Such a narrative should contain the idea that an increase in commodity prices or the discovery of natural resources will not have any immediate positive effect on the local economic development. Instead, time has to pass for economic adjustments to take place and positive effects to be observed.⁴ The results are very important as we expect more developing countries to join the group of resource extracting economies (Ross, 2012). The extraction of natural resources could have a positive impact on the local labour market. However, impacts on the local economy will surely require time. In the meantime, people's expectations will have to be managed in order to avoid increasing dissatisfaction and, more importantly, conflicts.

There appears to be agreement that people are unable or unwilling to make absolute judgements (Frey, 2008; Dellavigna, 2009). Instead, individuals form aspirations, or equivalently, reference points and use these to assess individual satisfaction with income. In what follows we will build on the happiness literature using aspirations to refer to the formation of reference points - the term famously used in behavioral economics to refer to rationally formed expectations about outcomes (Kahneman and Tversky, 1979; Köszegi and Rabin, 2006). Thus, satisfaction with income in period t , $s_t = g(y_t, a_t)$, is a positive function of income $\partial g / \partial y_t > 0$ but is *negatively* affected by aspirations $\partial g / \partial a_t < 0$. Since the documentation of the Easterlin Paradox⁵ many authors have focused on the identification of the channels determining aspiration levels. Three channels have been identified as being particularly impor-

⁴Such a narrative is also consistent with the foundation of a sovereign wealth fund and the implicit intergenerational distribution of resource wealth which benefits future generations.

⁵The Easterlin Paradox refers to a surprisingly small correlation between reported subjective-well being and national income across countries (Easterlin, 1974; Oswald, 1997).

tant in determining the level of aspirations: past income, relative current income and expected future income: $a_t = f(\sum_{k=1}^K y_{t-k}\gamma_k, \sum_{j=1}^J y_j\omega_j, E_{t-x}[y_t])$. The first term is some weighted average of income y over the last K periods. This term captures the idea that an initially positive effect of an increase in income over the last K periods on satisfaction with income vanishes in the long run due to adjusting aspirations (Easterlin, 2001). The second term is some weighted average of the income of the J "relevant others"⁶. This term captures the idea that it is important how much an individual is capable of affording in comparison with the relevant others (Veblen, 1899; Duesenberry, 1949; Easterlin, 1995; Luttmer, 2005; Ferrer-i Carbonell, 2005). Hence, an increase in average current income of the relevant others affects an individual's satisfaction with income negatively. The last term reflects expectations of current income y_t which were formed x periods ago. This term captures the idea that people may remain dissatisfied with an increase in income if it falls short of their expectations (Ross, 2007; Mas, 2006; McBride, 2010). In recent years several authors have provided evidence that expectations matter in determining the level of satisfaction with income. See in particular Mas (2006) for a field experiment and McBride (2010) for a laboratory experiment.⁷ Here we are emphasizing the last channel as being particularly important during resource booms. Excessive expectations occur particularly often in rapidly changing economic environments as these are easily and quickly adjusted (Ray, 2006).

The remainder of the paper is structured as follows. Section 2 provides some background information on the oil boom and the conflicts in Kazakhstan. A simple

⁶Relevant others refers to the fact that individuals usually choose whom they compare themselves with. Typically, they do not choose members of the Royal Family or celebrities. Instead, the relevant others tend to be family members, neighbours or colleagues (Frey, 2008).

⁷See also Rizzo and Zeckhauser (2003); Crawford and Meng (2011); Abeler, Falk, Goette, and Huffman (2011); Gill and Prowse (2012) for empirical work on reference dependent preferences.

theoretical framework is presented in section 3. In section 4 a description of the data is provided. The econometric analysis is presented in section 5. In section 6 some alternative hypotheses are discussed before we conclude.

2 Oil Boom and Conflicts

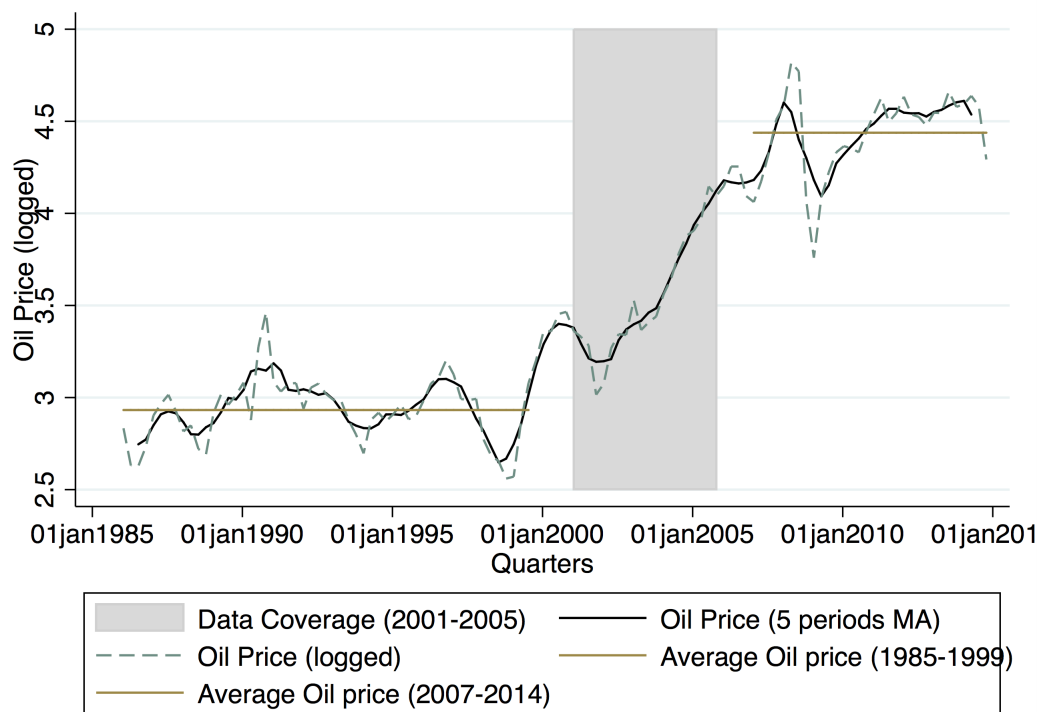
Since the dissolution of the Soviet Union in 1991 until 1999 economic growth in Kazakhstan has been dominantly negative or marginally positive (1-2%). The poor economic performance is usually attributed to the transition from a planned to a market economy (Pomfret, 2005). Additionally the exogenous development of commodity prices did not allow the resource rich country to benefit from its natural resource abundance. This changed in 1999. As shown in Figure I, the oil price started to increase from 12 US\$ per barrel at the beginning of 1999 and had roughly tripled by the end of 2003 and quintupled by the end of 2005. The increase stimulated the development of new oil and gas fields and, eventually, production. A high oil price is particularly important for oil and gas companies in Kazakhstan due to high transport costs driven by its geographic location⁸ and the harsh climate conditions making the extraction of oil and gas particularly costly. Overall, the volume of oil and gas produced in the oil rich districts of Kazakhstan doubled (from 30000 to 60000 thousand tonnes) between 1999 and 2005 (SARK, 2011).

GDP per capita in Kazakhstan increased from 1130 US\$ per capita in 1999 up to over 9136 US\$ in 2010. This increase in GDP per capita was mainly driven by the oil and gas rich Oblasts⁹ (henceforth Oil Rich Provinces or ORP), the only provinces

⁸Kazakhstan is the largest landlocked country.

⁹First level of local government.

Figure I: Quarterly Oil Price per Barrel in US\$ (Cushing, OK WTI Spot Price FOB) (EIA, 2012)



(except the capitals) to experience a more than tenfold increase in GDP per capita (SARK, 2011). ORPs are concentrated in the western part of Kazakhstan in the north east of the Caspian Sea.

The recent economic development suggests that the regional population might have benefited from the oil boom. But, at the same time, ORPs experienced severe labour conflicts in the last decades (see Table I). Most notably, the conflict at Tengiz with massive strikes and affrays in 2004-2005, and the recent deadly riots in Zhanaozen in December 2011 in which the local population was involved. The recurrent violent conflicts reveal some dissatisfaction. Table I is not an exhaustive enumeration, but

Table I: Conflicts across major oil and gas producers

Consortium	Proximate cause of (violent) conflict	Form of Conflict
Tengizchevroil LLP	2004-2005: Low wages; Bad work conditions; Foreigners are treated better.	Large-scale strikes and affrays.
Petrokazakhstan	2005-2007: Unpaid bonuses; Foreigners are treated better.	Peaceful protest.
Kazmunaygas JSC and Karazhanbas-munay	2010-2011: Unpaid bonuses; Low wages; Bad work conditions.	Large-scale strikes, Deadly riots.
Karachaganak Pet. Oper. B.V.	2001: Low wages; Bad work conditions. 2007: Low wages; Foreigners are treated better and get higher wages.	Peaceful protest.
Mangistaumunaygas	2006: Low Wages.	Strikes, Riots.
CNPC - Actobmu-naygas JSC	2005: Low Wages; Foreigner are treated better. 2011: Low Wages.	Peaceful protest.

Sources : Yessenova (2008), Shubin (2005) and online newspapers.

serves rather as an illustration that conflicts occurred across provinces and consortia¹⁰ (public and private companies). The second column of Table I suggests that the main reasons for conflicts appear to be low wages and unpaid bonuses, indicating some dissatisfaction with income. However, anecdotal evidence and data from the Statistical Agency of the Republic of Kazakhstan (SARK) suggests that workers in the oil rich region are among the best paid in the whole country.

It is important to emphasize that we are not focusing our analysis on those directly employed in the oil and gas sector. Our focus is on the identification of effects of oil price fluctuations on income satisfaction of households located in proximity to oil and gas fields. Households which might feel entitled to benefit from an increase in the oil price. Before the seminal work of Sachs and Warner (1995), it appeared to be common knowledge that an increase in the price of a natural resource increases the owner's wealth. Economic reasoning suggests that the abundance of an otherwise scarce factor of production should generate profits to the owner. Thus, locals'

¹⁰Consortium: a partnership of more than one individual, firm or government (or any combination of these) with the mission to achieve a common goal by participating in a common activity and pooling resources.

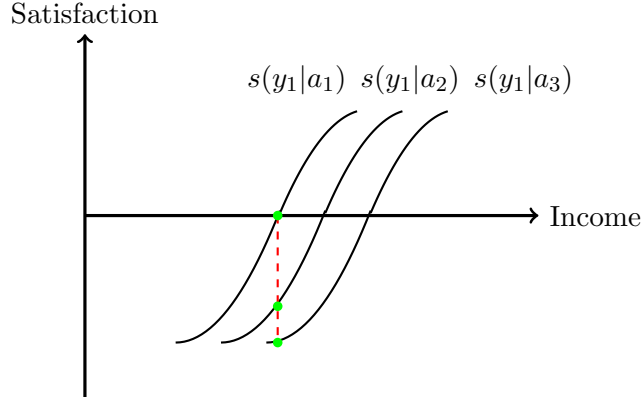
claims regarding the ownership of natural resource wealth may trigger collective expectations of higher income and conflicts if expectations are not fulfilled.

3 Theoretical Framework

Standard economic theory suggests that the satisfaction a household derives from income, $s(y_t)$, should increase if income increases over time $t=\{1, 2\}$ ($s(y_2) > s(y_1)$ if $y_2 > y_1$). Aspirations (a_t) might preclude a household deriving more satisfaction from an increased level of income. If households assess their satisfaction with income conditional on the level of aspirations, they might remain dissatisfied if the increase in aspirations exceeds the increase in income ($s(y_2|a_2) < s(y_1|a_1)$ if $y_2 > y_1$ but $a_2 \gg a_1$). As discussed above, previous studies have suggested that past income, relative income and expectations regarding future income seem to be very important in determining the level of aspirations: $a_t = f(\sum_{k=1}^K y_{t-k}\gamma_k, \sum_{j=1}^J y_j\omega_j, E_{t-x}[y_t])$. The first term is some weighted average of income y over the last K periods capturing the effect of past income on aspirations. The second term is some weighted average of the income of the J relevant others. This captures the idea that it is important how much an individual is capable of affording in comparison with the relevant others. The last term reflects expectations of current income y_t formed x periods ago. Now assume that expectations are a function of the publicly observable oil price (p_t): the price of the essentially only locally produced tradable good in the oil rich districts of Kazakhstan. If we are willing to make this assumption, the exogenous increase in the oil price will raise expectations and trigger a shift in aspirations ($a_2(p_2) > a_1(p_1)$ if $p_2 > p_1$).¹¹

¹¹ Anecdotal evidence suggests that this appears to be the case in Kazakhstan (Shubin, 2005): The workers "logically consider that in conditions in which the cost of oil all over the world has reached record levels, and Petrokazakhstan Oil Products last year processed 30,5 million barrels of

Figure II: Income Satisfaction



Notes: Fixing income in the short run and allowing aspirations to be a positive function of the oil price $a_x(p_x)$, satisfaction with income will decrease if the the oil price increases.

Aspirations might in particular pose problems in a quickly changing economic environment, e.g. a resource boom. Aspirations are quite quickly adjusted on the household level. On the other hand, it takes some time until the increased revenues from the oil and gas sector trickle down to the local population via linkages to the local economy. This implies that the increase in the oil price in period t affects aspirations in period t , but the income realized is only affected in a subsequent period x ($s(y_t(p_{t-x})|a_t(p_t))$). Thus, during an oil price boom the local population might remain dissatisfied for the duration of the boom, $t=\{1, \dots, T\}$, if increasing expectations continually precede the increase in income realized ($\int_{t=1}^T s(y_t(p_{t-x})|a_t(p_t))dt$). This idea is depicted in Figure II. Hereby, it is assumed that household income is not affected in the short run (y_1) but that aspirations are (a_t). As a result of the continuous dissatisfaction, collectivization and conflicts are more likely to occur (Tocqueville, 1986; Gurr, 1970; Ray, 2006).

oil [...] it is possible to pay people better”.

The hypothesis to test in the subsequent empirical analysis is:

An increase in the oil price negatively affects households' satisfaction with income.

4 Data

The data employed in the analysis is from the Household Budget Survey of Kazakhstan (2001-2005). The survey was created by the SARK in cooperation with the World Bank (World Bank, 2004). Since it has been conducted on a quarterly basis. IMF (2003) positively evaluated the survey in 2003. The questionnaire contains detailed information on total household income and expenditure. Of particular interest to the study is that the questionnaire contains questions regarding satisfaction with household income (assessed on a scale from 1 to 5) and the minimum household income necessary not to feel poor as reported by the household head.

The data used is a stratified multi stage¹² cluster sample consisting of 12000 households in each round, representing 0.3 percent of the total number of households (IMF, 2003; World Bank, 2004). Our focus on the oil rich districts of Kazakhstan reduces our sample to 1800 households. The household sample has been selected from a household register which is based on the 1999 population census. The survey is considered to be representative at the province level.

Officially, the data set is categorized as a repeated cross section but it is a perfectly

¹²In the first stage, each province (except Almaty and Astana) has been divided into 4 strata (large cities, medium, small towns, and rural settlements). In the second stage, primary sampling units (with at least 150 households) have been chosen. Within each primary sampling unit, households were sampled with sampling probability proportional to the size of the household, and thirty households were listed (10 additional households were listed as replacements).

balanced panel within one year. Approximately 25% of the households are replaced by new households annually. Thus, some households are surveyed for only one year whereas other households remained in the survey for more than 4 years. The introduced rotation still allows us to construct an unbalanced panel across years by identifying households who remain in the sample. The household ID does not change as long as the household remains part of the survey. Once a household is dropped from the survey the ID is assigned to another household which is newly added to the survey. Thus, we used household characteristics which are unlikely to change to identify the panel dimension of the household. In particular, we used household ID, dwelling type, size of the dwelling, the year the house was built, the sex, date of birth and ethnicity of the household head.

Some information has been missing on the reported level of income necessary not to feel poor. To resolve this problem, 120 values have been imputed by using the arithmetic mean of the available observations and 4 observations were dropped. 70 observations were missing on reported satisfaction with income. These values have been imputed by taking arithmetic means of the values which were available for the same household within the same year. Our results are robust to dropping these observations. 52 observations are lost when log-transforming real total household income.

Using weights neither affects the consistent estimation of the coefficients nor does it offer any significant efficiency gains. Thus, we prefer to use the unweighted specification (Solon, Haider, and Wooldridge, 2013) . Weighted means for the variables employed and weighted regression results of our main specification are presented in Tables IV - V .

Main variables are presented in Tables IV - V. The data on provincial inflation has been taken from the SARK (2011).¹³ The geometric mean of yearly inflation is used to calculate real values (discounted to the first quarter of 2001). The exchange rate at the end of the year 2000 was 144.5 Tenge/US\$, such that quarterly average real household income in the sample is slightly above 600 US\$ in the oil rich districts and slightly below 380US\$ in the oil poor districts.

For the spatial identification of the resource rich districts we use data on huge oil and gas discoveries.¹⁴ This data set contains information on the location of the major oil and gas fields in Kazakhstan. We spatially link the location of the oil and gas fields to the location of households on the district level. Unfortunately, the SARK was not willing to share the precise location of households. Information on the major oil and gas fields is provided in Tables VI and Figure III.

The data for the oil price was taken from EIA (2012) (see Figure I). The oil price is reported on a monthly basis in US\$ per barrel for West Texas Intermediate (Spot Price FOB). The quarterly oil price is calculated by taking the arithmetic mean of the monthly oil prices. The oil price has been transformed into logged values and then first differenced for the empirical analysis.

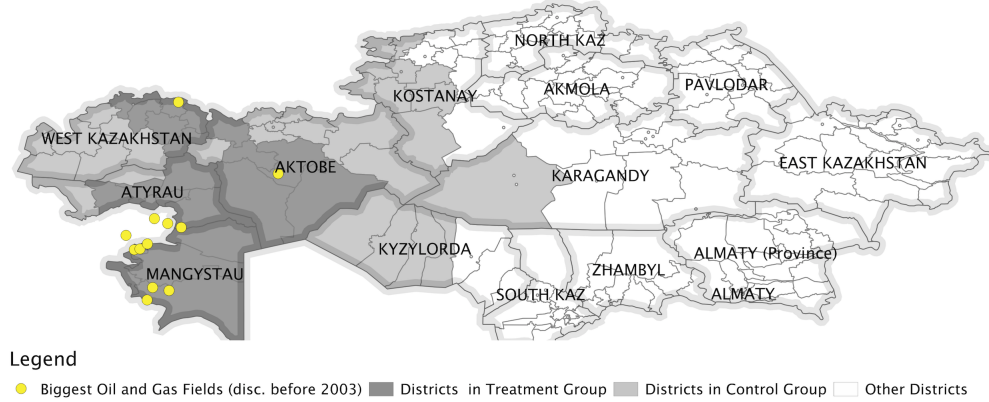
¹³The SARK uses the Household Budget Survey employed in the subsequent empirical analysis to calculate provincial and national yearly inflation (IMF, 2003).

¹⁴The data are from Global Energy Systems, Uppsala University.

5 Identification, Estimation and Discussion

5.1 Identification and Estimation Strategy

Figure III: Treatment and Control Group in Kazakhstan



Notes: The locations of the biggest oil fields have been used to identify treatment and control groups. Districts within 150km of the biggest oil or gas fields are considered as treated. Remaining districts within a distance of 750km of an oil or gas field are used as a control.

The identification strategy employed is basically a difference-in-differences. To identify the effects of the oil boom on household satisfaction with income and household income, two sources of variations are used. First, variation in the oil price: Using the oil price as the treatment has two important advantages in comparison to oil production or revenues. The oil price may be considered to be exogenous to a small open economy. Moreover, the oil price appears to be more likely to affect the formation of locals' aspirations since the increase in oil prices is usually easily observed, as opposed to production and revenues of oil companies. Second, the geographical distribution of oil fields across districts. Following our identification we focus on the districts located within a radius of 600km of a major oil or gas field in Kazakhstan. We exclude the remaining districts from the empirical analysis due to the large heterogeneity across provinces introduced by differences in climate, population density,

ethnic diversity and economic structure.¹⁵ The data sample of the ORPs consists of 27 Rayons¹⁶ (henceforth district). Districts are defined as being oil rich if a major oil or gas field is located within a district. The locations of the major oil fields can be found in Table VI and Figure III. In our preferred specification households are considered as treated if they are located within a radius of 100km of a major discovery.

Our analysis is not based on a perfectly controlled experiment and households have the possibility to migrate and select into treatment: migrate into the oil rich districts. Thus, the rotation of households introduces contamination, which is an obvious problem in our analysis. Luckily we have the possibility to identify households across years. Thus, we will focus only on households which remained within the sample for the complete period of time. Household fixed effects are employed to account for constant unobservables. Quarter fixed effects are included to account for shocks which affect oil poor and oil rich districts simultaneously. The implicit identification strategy in the difference-in-differences framework is that, in the absence of an oil boom, the development of the outcome variable would be similar in oil rich and oil poor districts and the coefficient of the treatment variable would remain insignificant. Hence, the similarity of trends in both areas in the absence of an oil boom is a necessary condition for the validity of the identification strategy. The identification strategy would be invalidated in case of other unobserved time-varying factors correlated with the oil price and differently affecting the oil rich and the oil poor districts. To account for province and district specific time varying

¹⁵One could argue that fixed effects could be used to account for these differences. However, fixed effects do not account for different trends which might result from differences in initial conditions and thus violate our identification strategy. We have repeated our analysis using the rest of Kazakhstan as a control group and our results do not differ significantly.

¹⁶Second level of local government.

unobservables, non-linear district specific trends and province-time fixed effects are employed in the empirical analysis.

The use of self-reported satisfaction in the empirical analysis raises the question of the validity and reliability of the results. This problem has been extensively studied in the literature, with the general conclusion that such measures contain a substantial amount of valid variation (Diener, 1984; Kahneman and Krueger, 2006; Di Tella and MacCulloch, 2006).

Finally, prior work on satisfaction identifies the presence of significant individual effects due to fixed personality traits (Frijters, Haisken-DeNew, and Shields, 2004). Usually, personal traits are captured using FE estimations. Using FE in a linear probability model implies a cardinalisation of the reported satisfaction. Treating the responses ordinally would require the use of an ordered probit/logit model. But using FE in an ordered logit/probit framework yields inconsistent estimates due to the incidental parameter problem (Nexman and Scott, 1984). The results of a parametric ordered probit estimation without FE imply assumptions which are barely justifiable. In such a context it is assumed that the error term is normally distributed and that there are no household specific unobservables in the error which are correlated with the explanatory variables. This is unlikely to be the case. On the other hand, in the case of an FE estimation, household specific unobservables can be accounted for and the error term is only assumed to be uncorrelated with the explanatory variables, but a cardinalisation of the dependent variable is assumed. In order to solve this problem, I rely on the work of Ferrer-I-Carbonel and Frijters (2004). They conclude that the FE method is the best approach to analyze happiness data. They argue that linear probability model results and ordered probit/logit

results are largely consistent with each other, whereas in linear models it is easier to control for fixed effects and interpret the results.

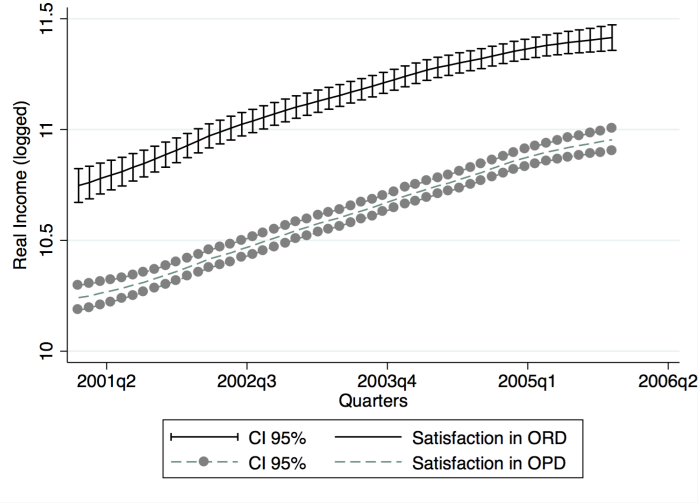
To formally compare the development satisfaction with income over time between households which are based in the treatment and the control region we first estimate the following the specification:

$$s_{hdt} = \sum_{k=2}^{20} \xi_k \gamma_k D_{100} + D_{100} + x'_{h,d,t} \zeta + i'_{h,d,t} \xi + \gamma_t + \varepsilon_{hdt} \quad (1)$$

$s_{h,d,t}$ is a household's satisfaction with income as reported by the household head for household h , in district d and period t , measured on a scale from 1="not satisfied at all" to 5="fully satisfied"; D_{100} is a dummy which is equal to 1 if the household is based within 100km of a major oil and gas discovery in the oil rich districts; $x_{h,d,t}$ is a vector of household specific characteristics controlling for observables¹⁷: education, and sector of occupation (public, private, agriculture) of the household head, household size, household size squared, availability of electricity and water in the household; $i_{h,d,t}$ is a vector of income related controls including logged real household income, logged district specific non-self average household income and logged minimum income necessary not to feel poor as reported by the household head. The main purpose of these controls is to account for the alternative channels affecting satisfaction with household income (household income, past income, contemporaneous relative income); γ_t is the time fixed effect and $\varepsilon_{h,d,t}$ is the household specific error. Assuming that errors may be correlated over time within a household and across households from the same district, we cluster on the district level (Angrist and Pischke, 2009).

¹⁷Household specific controls have not always been available at the quarterly level. Thus, control variables have been used at the yearly level. This does not appear to be a serious drawback as most of the variation takes place on the yearly level.

Figure IV: Total real household income in Tenge



Notes: OPD: oil poor districts; ORD: oil rich districts.

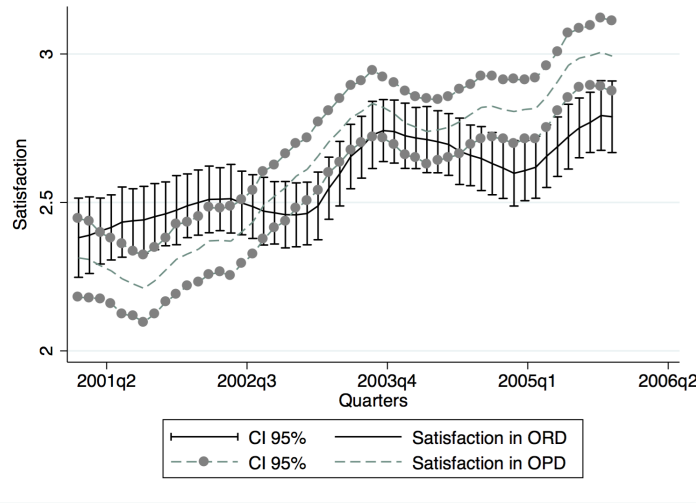
To formally link the growth in the oil price to the development of satisfaction with income across regions and time we estimate the following distributed lags model whereby OP_{t-k} is the lagged quarterly oil price in US\$ and α_h is the household fixed effect:

$$s_{h,d,t} = \sum_{k=0}^4 \omega_k \Delta \ln(OP_{t-k}) D_d + x'_{h,d,t} \zeta + i'_{h,d,t} \xi + \alpha_h + \gamma_t + \epsilon_{h,d,t} \quad (2)$$

5.2 Discussion

In Figure IV the development of real household income is presented. Real household income logged appears to increase similarly fast in treatment and control group. The development of household satisfaction with income over our sample period is presented in Figure V. Most importantly, satisfaction in ORDs is higher in the beginning of our sample, but is significantly lower in the end. According to the previous

Figure V: Households' satisfaction with monetary income within the last three months (reported by household head).

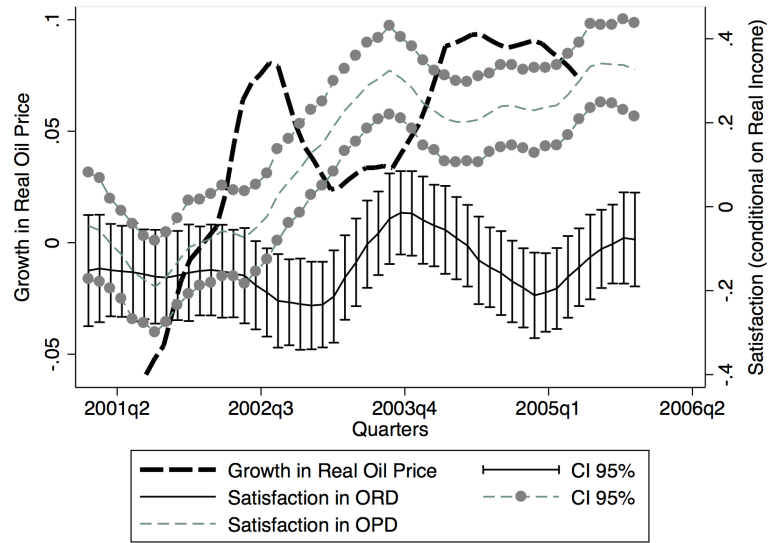


Notes: OPD: oil poor districts; ORD: oil rich districts.

discussion, this suggests that the treated group experienced either a decrease in income or an increase in aspirations. Thus, in Figure VI we present the development of satisfaction with income in the treated and the control group after controlling for real quarterly household income and real quarterly household income squared. It is easy to see that satisfactions with income after controlling for real household income correlates negatively with the growth in the oil price in the treatment group but not the control group. This captures our main argument: growth in the oil price is negatively affecting aspirations with income.

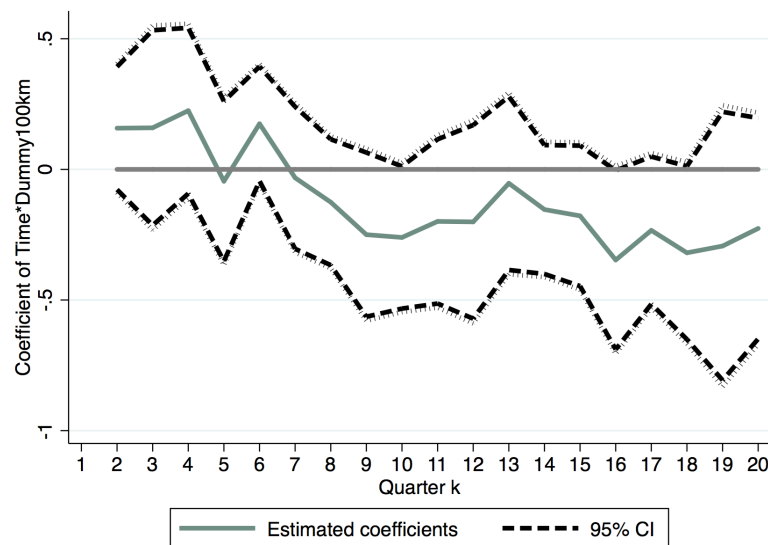
In Figure VII the results of estimating specification 1 are presented. Consistent with the development of satisfaction with income in Figure V and Figure VI our results suggest that satisfaction with income decreased on average between the households in the treatment group relative to the control group.

Figure VI: Households' satisfaction with monetary income within the last three months after controlling for household income.



Notes: OPD: oil poor districts; ORD: oil rich districts.

Figure VII: Households' satisfaction with monetary income within the last three months. Results of estimating specification 1



Our main results from estimating specification 2 are presented in Tables VII and VIII. In the first column of Table VII the most parsimonious specification is presented. In columns 2 and 3 household specific controls and income-related controls are added, respectively. In the first column of Table VIII we control for all household specific and income-related observables and additionally control for district-time fixed effects. Finally, in columns 2 and 3 of Table VIII we control for district specific trends and district specific trends squared, respectively.

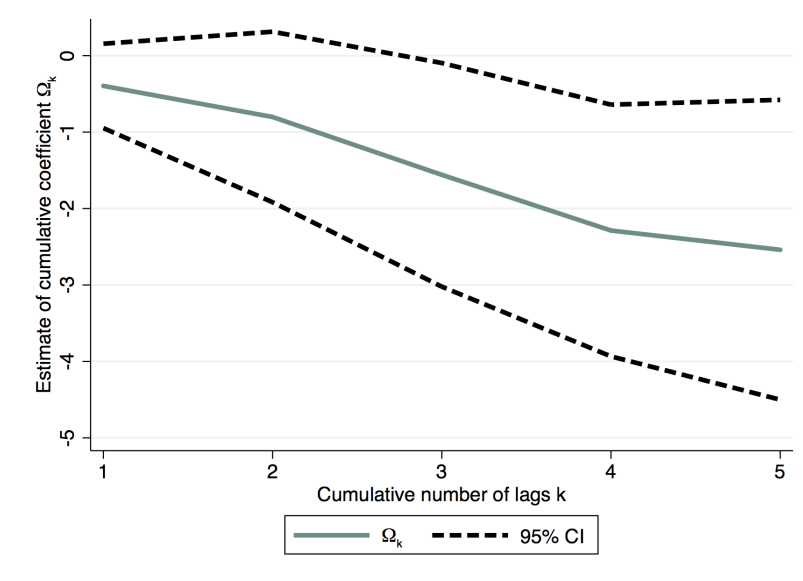
Our main result is presented in Figure VIII graphically. Here we represent the cumulative effect ($\Omega_K = \sum_k^K \omega_k$) of oil price growth on satisfaction with income for the specification in which we control for all household specific and income related observables (Column 3 of Table VII). The results suggest that satisfaction with income significantly decreases within a year after the oil price increased. In particular, a 20% increase in the oil price decreased households' satisfaction with income by half a standard deviation within a year.

6 Alternative explanations

Financial Flows Abroad:

Enormous net revenues have been generated by the oil sector in Kazakhstan. Net export revenues increased from 2 billion US\$ in 2000 to 35 billion US\$ in 2008. These revenues flowed partly abroad to serve FDI. This might have fuelled locals' dissatisfaction. But the government's share of these massive revenues stagnated around 50% between 2000 and 2008. Moreover, as Esanov and Kuralbayeva (2008) point out, since the beginning of the oil boom the government has successfully undertaken a targeted approach in renegotiating previous arrangements to increase

Figure VIII: Estimated cumulative effect of oil price changes on satisfaction with income $\Omega_K = \sum_k^K \omega_k$.



government's take of oil revenues and to reduce the outflow of capital.

Financial flows to central and provincial governments:

The government has put a great emphasize on intergenerational transfers of the oil and gas revenues. For this purpose the National Fund of the Republic of Kaza-

Table II: Difference-in-Differences $(\bar{x}_{2005,ORP} - \bar{x}_{2001/2,ORP}) - (\bar{x}_{2005,OPP} - \bar{x}_{2001/2,OPP})$ for self-reported health condition and the level of education.

Variables	$\bar{x}_{2005,ORP}$	$\bar{x}_{2001/2,ORP}$	ORP ⁺ Differ- ence	$\bar{x}_{2005,OPP}$	$\bar{x}_{2001/2,OPP}$	OPP ⁺⁺ Differ- ence	Diff-in- Diff
Health	2.3	2.38 (2002)	-0.08	2.55	2.61 (2002)	-0.06	-0.02
Education	5.14	4.82 (2001)	0.32	5.09	4.77 (2001)	0.32	0

*** p<0.01, ** p<0.05, * p<0.1. Standard Errors are clustered on the district level. +Oil and Gas Rich Provinces, ++Oil and Gas Poor Provinces. The complete sample of 12000 households is used for this analysis.

khstan was founded in 2001.¹⁸ Between 2001 and 2008, on average, over 70% of the government's share was saved (Esanov and Kuralbayeva, 2008). Also, the ability of subnational governments to capture rents improved over time. Provincial budget per capita was not only higher initially in ORPs in 1999 but also increased by a faster rate. As a result of the relaxed budget constraints, the officially reported level of social expenditures was higher in ORPs (MFRK, 2011). Thus, reported monetary flows to provincial and central governments seem to have changed in favour of the local population. On the other hand, the dissatisfaction might originate from the fact that monetary transfers received by local governments disappeared into the pockets of public officials (Caselli and Michaels, 2013). Subregional governments are mainly responsible for education and healthcare (World Bank, 2005). Above 50% of local government expenditure goes into healthcare and education. The results of a naive difference-in-differences (with the first /second ¹⁹ and the last year of the sample) for self-reported health condition and the level of education are presented in Table II. The data on education represents the average level of education on a scale from 1 (no education) -8 (received a university degree). The data on health represents a self-reported condition of health on a scale from 1 (very good) - 5 (very poor). The information on education and health is taken from the Household Budget Survey of Kazakhstan. The results in Table II suggest that self-reported health and the level of education is better in ORPs. This suggests that even though revenues may have disappeared into the pockets of public officials, health and education, the main targets of provincial expenditure, are unlikely to be the subject of locals' concern. Moreover, we control for non-linear trends on the provincial level in our empirical analysis above. This should account for any time varying unobservables on this level.

¹⁸The main goal of the Fund is to save a portion of the revenues for future generations and to reduce the negative impact of volatile oil and gas prices on the economy.

¹⁹Data on self-reported health condition was not available for 2001.

Employment in the Oil and Gas sector and Migrant Workers:

In the oil rich districts approximately every 5th to every 10th worker of the active labour force is directly employed in the oil and gas sector (Toews, 2014). The number of those employed in sectors linked to the oil and gas sector is arguably much larger. However, despite the employment of the local labour force in the oil and gas sector, the presence of migrants in the oil rich districts - which is not captured by the Household Budget Survey and is thus not captured by the relative income indicator (district specific average household income) - is omitted from the empirical analysis. But Table I suggests that the presence of migrants, with their higher income and their better treatment, is a potentially important source of dissatisfaction in the oil rich districts. However, as presented in Figure VIII, the negative effect on satisfaction is observed in particular after 2-3 quarters. Such an effect on satisfaction appears inconsistent with the presence of migrants causing dissatisfaction in the oil rich districts. In particular, the increase of the oil price is very unlikely to affect migration, wages, and employment within 2 to 3 quarters. On the other hand, the presence of migrants could be an additional channel in determining individual satisfaction in the long run. Unfortunately, we are not able to test this hypothesis due to a lack of data on the proportion of migrants on the district level. But reported dissatisfaction with migrants appears to be consistent with an argument made by Gurr (1970). He suggests that, once individuals are dissatisfied due to inflated expectations, they become rather rigid in adjusting their expectations downwards and often quick to blame someone else instead, for example, migrants.

Local Inflation

A resource boom is often accompanied by increasing inflation driven by the presence

Table III: Difference-in-Differences $(\bar{x}_{2005,ORD} - \bar{x}_{2001,ORD}) - (\bar{x}_{2005,OPD} - \bar{x}_{2001,OPD})$ for minimum level of income necessary not to feel poor as reported by the household head.

Variables	$\bar{x}_{2005,ORD}$	$\bar{x}_{2001,ORD}$	ORD ⁺ Differ- ence	$\bar{x}_{2005,OPD}$	$\bar{x}_{2001,OPD}$	OPD ⁺⁺ Differ- ence	Diff-in- Diff
Minimum Income (logged)	12.35	11.75	0.6	11.98	11.38	0.6	0

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard Errors are clustered on the district level. + oil rich districts, ++oil poor districts.

of the spending effect (Cordon and Neary, 1982). The basic idea of the spending effect is that the additional money from the windfalls is inter alia spent on non-tradable goods creating an upward pressure on local prices. As households in our survey also report how much money they need not to feel poor, we can use this question to test for how households are affected by the resource boom driven increase in local inflation. As reported in Table III, the results from the simple Difference-in-Differences analysis indicate that no effect can be observed on the amount of money necessary not to feel poor when comparing oil poor and oil rich districts.

7 Conclusion

To our knowledge, this paper is the first attempt to use a natural experiment in combination with data on satisfaction with income to provide evidence on the importance of expectations in determining satisfaction. To do this we exploit the exogenous increase in oil prices and our results show that the oil boom in the oil rich districts of Kazakhstan between 2001 and 2005 had a negative effect on household satisfaction with income in the short run. In particular, a 20% increase in the oil price decreased households' satisfaction with income by half a standard deviation

within a year. We argue that this is mainly due to inflated expectations and the upward shift in aspirations. Locals expected to observe an increase in income which did not materialize.

This study has an important policy implication. Our results highlight the relevance of managing expectations in a rapidly changing economic environment. We expect more developing countries to join the group of resource extracting economies (Ross, 2012). These resource discoveries in developing countries are likely to affect the level of development in those countries positively. But, whatever the effect will be, economic adjustments will require time until effects can be observed on the local level. In the meantime, people's expectations will have to be managed in order to avoid increasing dissatisfaction and conflicts.

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8 Appendix

Table IV: Unweighted means, standard deviations and weighted means of the main variables.

Variables	Description	Mean (ORD ⁺)	SD (ORD)	Weighted Mean (ORD)	Weighted Mean (OPD ⁺⁺)	SD (ORD)	Weighted Mean (OPD)
Sample Size	Number of Household observations (Cross-section *Time periods)	12276	12276	12276	24140	24140	24140
Real Household Income	Aggregation of quarterly household income from different income sources in Tenge.	89767	76830	88713	54438	50301	53936
Satisfaction with In-come	Household satisfaction on a scale from 1-5: Household are asked: Please advise how satisfied you are with your income within the last three months.	2.68	0.9	2.7	2.57	0.91	2.56
Minimum Income	Households have been asked: "Given the current prices what monthly income should a family have with the same number of people as yours not to feel poor?" Reported in Tenge.	203152	147666	199624	140367	94386	138939
District Specific Income	Non-self mean of real household income on the district level in Tenge.	89767	30491	88636	54447	18697	54029
Household Size	Total number of people in a household.	4.74	2.26	4.83	3.96	1.98	3.98
Age	Age of household head.	49	13.5	48	50	13.6	50

Notes: + oil rich districts, ++oil poor districts.

Table V: Unweighted and weighted means of the main dummy variables (Cont. Table IV).

Variables	Description	Mean (ORD ⁺)	Weighted Mean (ORD)	Mean (OPD ⁺⁺)	Weighted Mean (OPD)
Dummy Rural Settlement	Dummy is equal to one if the household is located in a rural settlement.	0.29	0.31	0.39	0.42
Dummy city	Dummy is equal to one if the household is located in a large city.	0.47	0.42	0.46	0.42
Dummy for female	Dummy is equal to one if the household head is a female.	0.39	0.38	0.44	0.43
Ethnically Kazakh	Dummy is equal to one if the household head reports to be an ethnic Kazakh.	0.8	0.82	0.66	0.66
High Education	Dummy is equal to one if the household head reports to have graduated.	0.13	0.13	0.2	0.19
Middle Education	Dummy is equal to one if the household head reports to have received a vocational training .	0.47	0.46	0.37	0.37
Lower Education	Dummy is equal to one if household head reports to have a general basic education or general secondary education.	0.34	0.36	0.37	0.38
Employment in the agricultural sector	Dummy equal to one if the household head reports to be employed on a farm or to work on her own farm.	0.04	0.05	0.1	0.1
Employment in the private sector	Dummy equal to one if the household head reports to be employed at a firm, to work for an individual, to work at her own enterprise, to be a member of a production cooperative or to be self employed.	0.26	0.26	0.26	0.25
Employment in the public sector	Dummy equal to one if the household head reports to be employed at a public organization/enterprise.	0.35	0.36	0.28	0.28

Notes: + oil rich districts, ++oil poor districts.

Table VI: Major Oil and Gas Fields in Kazakhstan (Source: WorldMap)

Name	Location	Year of Discovery	Type and Size
Karachaganak	Onshore	1979	Gas Supergiant
Rakushechnoye	Onshore	2001	Gas Giant
Tengiz	Onshore	1980	Oil Supergiant
Zhanazhol	Onshore	1978	Oil Giant
Kashagan	Offshore	2000	Oil Supergiant
Karazhanbas	Onshore	1974	Oil Giant
Bozashchy Severnyy	Onshore	1975	Oil Giant
Uzen	Onshore	1961	Oil Giant
Zhetybay	Onshore	1961	Oil Giant
Kalamkas	Offshore	1976	Oil Giant
Kalamkas-More	Offshore	2002	Oil Giant
Aktote	Onshore	2003	Oil Giant

Table VII: Dependent variable: Satisfaction with Household Income

	basic	hh controls	income controls
	(1)	(2)	(3)
ω_0	-.378 (0.307)	-.371 (0.296)	-.317 (0.279)
ω_1	-.419 (0.337)	-.418 (0.327)	-.356 (0.316)
ω_2	-.676 (0.248)***	-.675 (0.246)***	-.689 (0.245)***
ω_3	-.731 (0.165)***	-.719 (0.16)***	-.682 (0.134)***
ω_4	-.264 (0.267)	-.259 (0.265)	-.217 (0.217)
Obs.	4160	4160	4155
HH FE	Y	Y	Y
HH controls	N	Y	Y
Income controls	N	N	Y
R^2	0.097	0.099	0.156
F statistic	416.561	15.857	65.08

Notes: Standard errors adjusted for clustering at the district level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Household fixed effects, time fixed effects, household size and household size squared are included in every regression. The full set of household characteristics includes education and employment (agricultural, public, private) of the household head and the availability of electricity and water in the household. The full set of income controls includes real logged household income, district specific non-self average household income (logged), minimum household income necessary not to feel poor as reported by the household head (logged).

Table VIII: Dependent variable: Satisfaction with Household Income

	timeregion	trend	trend2
	(1)	(2)	(3)
ω_0	-.093 (0.372)	-.173 (0.193)	-.114 (0.18)
ω_1	-.018 (0.303)	-.130 (0.252)	-.111 (0.243)
ω_2	-1.007 (0.237)***	-.551 (0.227)**	-.539 (0.221)**
ω_3	-.574 (0.172)***	-.534 (0.154)***	-.550 (0.151)***
ω_4	-.070 (0.253)	-.114 (0.171)	-.173 (0.143)
Obs.	4160	4160	4160
Province Time FE	Y	Y	Y
District Trend	N	Y	Y
District Trend ²	N	N	Y
R^2	0.209	0.212	0.239
F statistic	20.753	17.147	8.85

Notes: Standard errors adjusted for clustering at the district level: *** p<0.01, ** p<0.05, * p<0.1. Household fixed effects, time fixed effects, household size and household size squared are included in every regression. The full set of household characteristics includes education and employment (agricultural, public, private) of the household head and the availability of electricity and water in the household. The full set of income controls includes real logged household income, district specific non-self average household income (logged), minimum household income necessary not to feel poor as reported by the household head (logged).