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Inflated Expectations and Commodity Prices: Evidence from Kazakhstan*

Victoire Girard[†] Alma Kudebayeva[‡] Gerhard Toews[§]

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Abstract

We document that an oil price boom triggers dissatisfaction with one's income, and confirm that this is not driven by changes in real economic conditions. Unique data from Kazakhstan allows us to exploit time, sectoral and spatial variation to identify the impact of the recent oil boom on reported satisfaction with income. Oil related households – whose heads are employed in the private sector of the oil rich districts – report a decrease in satisfaction with their income during the boom compared to other households (whose heads work in other sectors and/or districts). The estimated drop in satisfaction is statistically and economically significant: doubling the price of oil decreases satisfaction with income by one-tenth of a standard deviation in satisfaction. We discuss different interpretations of this drop in satisfaction. The most plausible explanation of our findings is that the changes people observe during the boom seem to fall short of their aspirations. Our results call for devoting more attention to the dynamic of satisfaction, not only during resource busts, but also during resource booms.

Keywords: Expectations, Labor Conflict, Oil boom, Resource Curse, Satisfaction

JEL-codes: J52, N55, Q33, Q34

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1 Introduction

How are individual perceptions affected by fluctuations in commodity prices and, thus, resource wealth? Recent literature developments document the consequences of resource wealth at the local level. We now know that resources could foster local economic wealth (Aragón and Rud, 2013; Bazillier and Girard, 2020; Cust and Poelhekke, 2015) while also attracting corrupted individuals to power (Asher and Novosad, 2018) and triggering local conflicts (Berman et al., 2017; Rigterink, 2020). However, to the best of our knowledge, we know very little about the impact of resource booms on individuals' perceptions. Since perceptions and behavioural biases end up driving actions, understanding whether and how resources affect perceptions is key in understanding the local impact of natural resources (Collier, 2017).

We investigate how perceptions react to a distinctive feature of natural resources: the fact that their ownership is contestable. As opposed to goods and services which have to be produced, natural resources extraction poses subtle ownership questions. At least three groups may claim ownership of resources and, thus, potential rents associated with these resources (Collier, 2017). First, those who directly participate in the extraction of the resource: workers and firms in the resource extractive sector. Secondly, those who consider themselves entitled to claim ownership of the land above the reserves: locals and land owners. Thirdly, people located within the same national borders as the resource: nationals. Since all of these actors can in principle make a case for ownership, there is a risk that some actors may end up frustrated if reality does not keep up with their expectations.

In this chapter we show how a commodity price boom affects households' perceptions with their income, dependent on whether they belong to the groups of workers, locals, and nationals. To do this, we use the recent resource boom in Kazakhstan as a case study. Our treated group comprises the private sector workers of the oil rich districts of Kazakhstan, who are closest to the oil sector (by nature of their activity and place of residence). We refer to these workers as *oil-related household heads* henceforth. The differential evolutions in satisfaction of household heads employed in other sectors and households located in other districts – in other words, households who are more remote from oil and gas extraction than the oil-related households – provide us with plausible counterfactuals. We then exploit plausibly exogenous fluctuations in the price of oil to show how these fluctuations affect satisfaction with household income.

Kazakhstan provides an ideal case study for two reasons. First, the Kazakh government collected original and high quality survey data. The government closely monitored citizen's satisfaction with income throughout most of the 2000s using a representative household panel survey. Using this data allows us to link variation in the price of oil to variations in

satisfaction with income – conditional on income. We thus capture the changing perceptions of individuals regarding their income. Secondly, Kazakhstan is a small open resource rich economy, with clearly identifiable resource rich districts, whose economic activity nearly exclusively depends on the extraction of oil and gas (Pomfret, 2006). The former implies that we can consider changes in the price of oil as exogenous, providing us with our identifying time variation. The latter provides us with a sectoral and spatial variation that allows us to consider the group of private sector workers in the oil rich districts as either directly or indirectly involved in the extraction of oil and gas (Toews and Vezina, 2017). Note that in case this assumption is wrong, we would expect an attenuation bias of our results.

Relying on our triple-difference specification and exploiting the three dimensions of our data, we show that there is a quick strong negative impact of the increase in the price of oil on satisfaction of oil-related household heads with their income. In our preferred specification, doubling the price of oil decreases satisfaction by one-tenth of a standard deviation. This result is robust to different definitions of the control group. Moreover, introducing district-time fixed effects allows us to rule out that our results are driven by local inflation (Corden and Neary, 1982; Aragón and Rud, 2013), migration (Moretti, 2010; Beine, Coulombe and Vermeulen, 2014), or local public spending (Caselli and Michaels, 2013). Furthermore, allowing for sector-time fixed effects allows us to account for sector specific transformations which may be fueled by Dutch Disease mechanisms (Stefanski, 2016; Cust, Harding and Vezina, 2019). Finally, we also show that our results are driven by the contemporaneous price of oil rather than its leads or lags. The instantaneous reaction of satisfaction to oil price fluctuations is important for two reasons. First, from a policy perspective, satisfaction with income is likely to evolve more rapidly than economic conditions. Secondly, from an empirical perspective, we can disregard alternative confounding factors, such as a re-composition of the workers pool or another sector specific adjustment to the oil price boom as these adjustments will typically take time to be implemented and should thus show up in the data with a lag.

By ruling out alternative explanations, we provide evidence that “while a rise in the region’s income may be good, a disproportionate rise in expected incomes may pose problems. People are dissatisfied with their income - no matter how large it is - if it falls short of their aspirations” (Ross, 2007). Moreover, if such a discrepancy between expectations and reality occurs simultaneously in a large group of people, it has the potential to create fertile ground for populist movements and even violent conflicts. In fact, in Kazakhstan, the rising dissatisfaction in the private sector of the oil rich districts seems to have culminated in the Zhanaozen conflict in 2011, during which more than 10 people were killed and more than 100 were injured. Each country is unique and may face different labor dynamics. Unfortunately, the experience of Kazakhstan seems far from atypical. Towards the end of this chapter we compare a self collected conflict data set for Kazakhstan to a global data set on labor conflicts

in the extractive industry. We show that the recent increase in the price of oil increased the number of conflicts, not only in Kazakhstan, but also in the rest of the world.

This chapter relates to two ideas in the resource curse literature. First, our results add to the literature on the economic and political consequences of information about future resource wealth. Arezki, Ramey and Sheng (2017) show that giant oil and gas discoveries have real economic consequences long before production starts, because they change people's expectations and, thus, their actions. This is in line with our results suggesting that workers' aspirations change very quickly, potentially before any changes in fundamentals are observed. In line with the idea of inflated expectations, Cust and Mensah (2020) show that the same giant discoveries appear to have a significant positive effect on people's expectations about the future of their respective countries, which translates into different migration and fertility decisions. Finally, Cust and Mihalyi (2017) show that these giant discoveries have a negative effect on short-run economic performance, measured in GDP growth, when compared with counterfactual forecast growth estimates published by the IMF, suggesting that the IMF is not immune to the expectation altering effect of giant discoveries.

Moreover, these results are important because, as Venables (2016) suggests, just the prospect of resource wealth might unleash political forces. For instance, new information on the value of a particular commodity may quickly create fertile ground for conflicts and populist movements (Funke, Schularick and Trebesch, 2016; Christensen, 2019). We add to this discussion by showing that changes in commodity prices may quickly translate into changes in people's perceptions, group level dissatisfaction and potentially conflicts (Collier and Hoeffler, 2004; Berman et al., 2017; Rigterink, 2020). Most of this literature implicitly assume that conflicting groups are already organised and motivated by greed, grievances or some combination of the two.¹ We, on the other hand, suggest that quickly changing aspirations can be easily exploited to engage different groups, here delimited by their work and place of residence, into violent conflicts.

In the next section of the chapter we provide some background information on the specific case of Kazakhstan. In section 3 we discuss data, identification strategy and the results. In section 4 we discuss alternative mechanisms of the identified effect and provide some concluding thoughts in Section 5.

¹An exception is Berman, Couttenier and Girard (2020) who document how natural resource wealth may trigger a change in a sub national group identity (an ethnic identity).

2 Background

Oil Rich Economy: Kazakhstan's economy heavily depends on oil. From the dissolution of the Soviet Union until 1999, Kazakhstan's economic growth has been either negative or close to zero. This was partly driven by low commodity prices which remained low throughout the 90s and did not allow the country to benefit from its natural resource abundance (Pomfret, 2006). This changed in 1999, when the oil price slowly started increasing from an all time low of 12 US\$ per barrel to an all time high of more than 100US\$ 10 years later. Beyond the generation of resource rents due to high commodity prices and fixed costs of extraction in the short run, forward looking multinational companies expanded investments, made huge discoveries², and eventually expanded production. Driven by this oil boom, GDP per capita increased from 1130 US\$ per capita in 1999 up to over 9136 US\$ in 2010 (SARK, 2011). The increase in GDP was directly fueled by the oil and gas rich districts, predominantly those located in the Atyrau and Mangystau region, in the western part of Kazakhstan at the shore of the Caspian sea. In 2010, value added in the oil and gas sector accounted for 11.5 percent of Kazakhstan's GDP. At the same time, more than half (57%) of Kazakhstan's exports consisted of oil and gas (SARK, 2011).

Small Open Economy: The yearly production of Kazakhstan adds up to approximately 2 percent of global oil production. Thus, while oil is central to the Kazakh economy, the country is at the very bottom of the top 20 global producers and has in that time period not been part of an international organisation effectively contributing to the control of the oil price. This allows us to treat Kazakhstan as a small open economy with regards to the price of oil (Pomfret, 2006).

International Oil Companies: The known offshore reserves located below the Kazakh part of the Caspian sea and the onshore reserves in the adjacent oil and gas rich districts, marked as treated in Figure 1, add up to approximately 40 billion barrels of oil. As presented in column 2 of Table 1, the biggest oil and gas projects are dominated by international oil companies (IOC) (Munayshy Public Foundation, 2005). Most of the biggest international oil companies have been involved in the extraction of oil and gas in Kazakhstan including BG Group, BP, Chevron, ConocoPhilips, ENI-Agip, ExxonMobile, RoyalDutch Shell and Total. And only 25% of the oil and gas sector was kept under the control of the government. To a large extent this is because the extraction of oil and gas in Kazakhstan is particularly difficult due to severe climate conditions and geological challenges. Thus, the Kazakh government

²Most notably Kashagan, which is located in the northern part of the Caspian sea and is considered to be one of the biggest oil field outside the Middle East.

Figure 1: Kazakhstan



The names indicate the name of the respective regions (or Oblast in Russian) which are spatially separated by the dark lines. The region of South Kazakhstan was renamed into Turkistan in 2018.

had to rely on the expertise of IOCs (Kaiser and Pulsipher, 2007).³

Local Labor Market: Due to a combination of geology, climate and an idiosyncratic history, the local labor markets in the oil rich districts are extremely isolated and highly dependent on the extraction of oil and gas, providing us with an ideal case study for our research question.

The oil sector is not very labor intensive and the share of the population involved directly in the oil and gas sector is typically small across countries (Ross, 2012). Moreover, it is usually difficult to link oil and gas extraction to a specific location and an exact economic activity. The former is because one particular asset may affect different regions simultaneously via different channels. For instance, an onshore asset located in region A at the border of region B may pay taxes to the government of region A but employ mainly individuals from region B. The latter is because of the creation of back- and forward linkages to the IOCs, especially in the presence of local content requirements regarding the inclusion of small businesses and locals in the production process (Aragón and Rud, 2013; Bazillier and Girard, 2020). For instance, should the construction of a new harbour or the extension of a pipeline for the purpose of oil exports be considered to be part of the production process? Or similarly, should the construction of roads and railroads connecting the port to the oil well considered to be part of the production process? And finally, should the creation of houses, hotels and restaurants which facilitate the influx of oil workers somehow being taken into account?

³For instance, Kashagan is considered to be the most expensive projects in the world due to the difficult climate conditions.

Table 1: Cumulative Production of main oil and gas projects 2001-2005 (in 1000 tonnes)

Name	Major Owner	Cum. Prod.	Share (in %)	Region	District	Webpage
Kazakhstan	-	265000	100%	Aktobe, Atyrau, Kyzylorda, Mangystau, West-Kazakhstan	-	-
Tengiz -Chevroil	Chevron, ExxonMobil, KazMunayGas, LukArco	65500	25%	Atyrau, Mangystau	Zhylyoyskiy (Atyrau), Beyneusky (Mangystau)	www.tengizchevroil.com
EmbaMunay Gas	KazMunay-Gas	13000	5%	Atyrau	Kzylkoginsky, Isatayisky, Makhambetskiy, Makatskiy, Zhylyoyskiy, Atyrau (city)	www.kmg.kz
UzenMunay Gas	KazMunay-Gas	27000	10%	Mangystau	Manghystauskiy, Karakhiyanskiy, Zhanozen (city)	www.kmg.kz
Mangystau-MunayGas	Central Asia Petroleum Ltd. (until 2009)	25000	9%	Mangystau	Manghystauskiy, Karakhiyanskiy, Tupkaragansky, Zhanozen (city), Aktau (city)	www.mmg.kz
Karazhan -basmunai	Canada's Nations Energy Ltd. (until 2006)	10000	4%	Mangystau	Tupkaragansky, Manghystauskiy	www.kbm.kz
Karasha -ganak	BP Group, ENI	36000	13%	West-Kazakhstan	Burlinski	www.kpo.kz
Actobe -munaigas	CNPC	24000	9%	Actobe	Temirskiy, Mugalzhariskiy, Baiganinskiy	www.cnpc.ch
Kazakhoil Actobe	KazMunay Gas, LukOil	3500	1%	Actobe	Temirskiy, Mugalzhariskiy, Baiganinskiy	www.koa.kz
Petro -Kazakhstan	Petro -Kazakhstan (until 2005)	23000	9%	Kyzylorda	Syrdarinskiy	www.petro-kazakhstan.kz
Petroleum -Turgai	LukOil, Hurricane Kumkol Munai	13000	5%	Kyzylorda	Syrdarinskiy	www.turgai.kz
KasGer -munai	JSC Yuzhneftegas, Feba Oil AG, Erbdol Erdgras Gommern	8500	3%	Kyzylorda	Syrdarinskiy	www.kazger-munay.kz

These questions are almost impossible to answer in most cases. But, several features of the oil rich districts in Kazakhstan, which are discussed in the next few paragraphs, allow us to define the group of oil-related workers, which may be considered to be strongly associated with the oil sector in terms of the location of the household and the activity of the household head.

First, oil and gas basins are only located in the western part of Kazakhstan such that the rest of the country can easily be considered to be oil poor. Moreover, and more importantly, this region of Kazakhstan would have remained completely uninhabited in the absence of oil and gas. This is because of the harsh climate conditions which make settling difficult and a vegetation which essentially makes agriculture impossible. Historically, this area has been populated by nomadic tribes which were neither interested in the creation of settlements nor were they getting involved in agriculture. In fact, the western part of Kazakhstan is considered to be the area which has been occupied by the Oghuz Turks and the creators of the Seljuk Empire in approximately 1000AD. Most interestingly in this context, the eventually created Seljuk Empire stretching from Turkey to China and from Oman to Uzbekistan did not seem to incorporate the part of Kazakhstan which hosts nowadays all the oil rich districts and where the Oghuz Turks originated from. This strongly indicates how little the land was worth, even in the eyes of local nomadic tribes. Following the departure of the Oghuz Turks, this part of Kazakhstan remained nomads' land until the beginning of the 19th century.

Throughout the 19th century, the Russian Empire expanded southward with the aim of reaching the former silk road towns in contemporary Uzbekistan, and by doing so conquered western Kazakhstan (Hopkirk, 1992). Initially this area remained unpopulated until the end of the 19th century, when the region received more attention due to the discovery of oil and the desire to extract, process, transport and eventually export it. In fact, most cities in western Kazakhstan were created or expanded greatly around the late 19th century or throughout the 20th century due to the discovery of oil.⁴ If the city existed already before the 19th century, the discovery of fossil fuels significantly transformed and reoriented these economic agglomerations towards the oil and gas sector. Most prominently, Atyrau, the capital of Atyrau Region, initially was created as a Russian fort in 1640 on the European side of the Ural river. The discovery of oil and gas in the region, however, pushed the population of the city from less than 10 thousand in 1887 to a population of close to 80 thousand in 1959 and even moved the center of the city to the Asian side of the Ural river, closer to oil extraction.⁵ In a nutshell, the Russian Empire conquered the area occupied by small nomadic tribes and populated western Kazakhstan following the discovery of oil since the late 19th century.

⁴For example, Zhanozen in Mangystau, Kulsary in Atyrau or Karauilkeldy in Aktobe.

⁵While most cities of the Soviet Union shrank due to the World Wars and the Russian Revolution.

Nowadays, the western part of Kazakhstan remains sparsely populated and economically dependent on the extraction of fossil fuels. With a geographical area comparable to contemporary Germany, which has a population of over 80 million people, in 2008 western Kazakhstan had officially a population of one million, of whom a bit less than half, 471 thousand, have been recorded to be employed.

The labour market features of Mangystau allow us to illustrate the dependence of western Kazakhstan on fossil fuel extraction by providing some basic statistics. Mangystau is considered to be the centre of the oil rich area in Kazakhstan and the only region in which every district is defined as being oil rich, thus defined as being treated in our analysis.⁶ Based on the official statistics from Mangystau, approximately 20% of the population is directly involved in the extraction of oil and gas, while roughly 50% are occupied in construction, real estate management, hotels, restaurants, trade, transportation and the distribution of energy and water. These are sectors which we typically think about as being closely linked, being fueled by and being even necessary for the existence of the effective extraction of oil and gas (Toews and Vezina, 2017). Finally, roughly 25% of the workers are employed in the public sector (education, health, local administration and other public services). The remaining 5% of the workers are occupied in agriculture, fishing, non-resource manufacturing, and finance from which we abstract. To sum up, most of the private sector activities in the settlements of Mangystau are highly specialised into facilitating extraction, processing and transportation of oil and gas, such that, in principle, individuals may identify with the production process and, thus, claim some ownership. Thus, we argue that these cities may be thought of as being very isolated mining towns, which are economically completely dependent on a single tradable good they are selling to the rest of the world, such that all individuals employed in the private sector may, in principle, claim some ownership rights due to their involvement in the production process.

Before we conclude this section, note that any violation of our assumption works against our results. Indeed, in case some household heads employed in the private sector of the oil rich districts actually do not feel related to the oil and gas, we expect that their satisfaction with income remains unaffected by the oil price and, thus, should display the same relation to the oil price as the satisfaction of household heads employed in other sectors and/or districts, implying an attenuation bias of our results.

⁶Unfortunately, we only have access to the aggregate statistics on sectoral decomposition of employment at the region level, and not on the district level. Hence, we cannot perform the decomposition for every oil rich district. Since Mangystau is the only region in which all districts are treated, we assume that the labor market of Mangystau is representative for other oil rich districts.

Table 2: **Descriptive Statistics**

variable	mean	p50	sd	max	min
Satisfaction (1-5)	2.65	2.75	0.74	5.00	1.00
ln(income)	11.58	11.63	0.83	15.89	5.99
Private Sector (1=0)	0.29	0.00	0.45	1.00	0.00
Public Sector (1=0)	0.33	0.00	0.47	1.00	0.00
Secondary Education (1=0)	0.68	1.00	0.47	1.00	0.00
Tertiary Education (1=0)	0.18	0.00	0.38	1.00	0.00
Family Members	2.76	2.00	1.35	15.00	0.00
Number of observations = 93,739					

3 Empirics

To answer our research question, we combine detailed household survey data with information on the location of oil extraction in Kazakhstan and oil price fluctuations.

Oil data: We define oil rich districts as districts hosting at least one of the major oil projects as listed in Table 1 and as indicated in the map in Figure 1.⁷ The real price of oil comes from BP statistical review. The timing of the last oil price boom which began around 2004 means that we observe in our sample a *before period* in 2001-2004 with *low* oil prices, and an *after period* in 2005-2008 with *high* oil prices.⁸

Household Data: At the core of our analysis is the information contained in the Kazakhstan Household Budget Survey (KHBS henceforth) from 2001 to 2009. The KHBS is nationally representative annual household survey collecting information on 12,000 households. The sample has been selected from a household register which is based on the 1999 population census. In the first stage of the sampling, within each region (except Almaty and Astana), areas have 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 selected within each strata. Within each primary sampling unit households were sampled with sampling probability proportional to the size of the

⁷Note that some of the projects span over district borders.

⁸Our results are not sensitive to the exact division of our sample into periods.

households and thirty households were listed.⁹ The questionnaires contain four modules: (i) daily expenditures on food and necessities of households; (ii) quarterly expenditures on clothes, durables, utilities, education, healthcare, transportation, other expenditures and incomes of household members; (iii) housing conditions, livestock, equipment and machinery, education, and employment; and (iv) household composition and size. The surveys were conducted quarterly with a rotating sample during 2001-2009 where 25 percent of households surveyed were replaced randomly in each year.¹⁰ In Table 2 we present some basic descriptive statistics for the main variables in our analysis.

Descriptives: An original feature of the questionnaire is that it contains a question regarding satisfaction with household income. The household head is asked: “Please tell us how satisfied you are with the monetary income of your family within the last three months?” with answers ranking from 1 to 5. It is important to note that households’ satisfaction with their income tends to be higher in oil rich districts on average throughout the period, and that households satisfaction increased over time for the oil rich and the oil poor districts. Thus, the results we are documenting are capturing the relative drop in satisfaction conditional on individual and year fixed effects.

In particular, while all individuals in our sample are Kazakh nationals and, thus, may claim some share of the rents, we are interested in checking whether individuals active in the private sector of the oil rich districts end up displaying a differential reaction to the oil price evolution. Our interpretation of such a differential evolution is that it takes its roots in differential claims towards the oil rents. In the event of differential claims, we expect satisfaction with income of oil-related households to be more sensitive to the price of oil and the availability of rents than in other households.

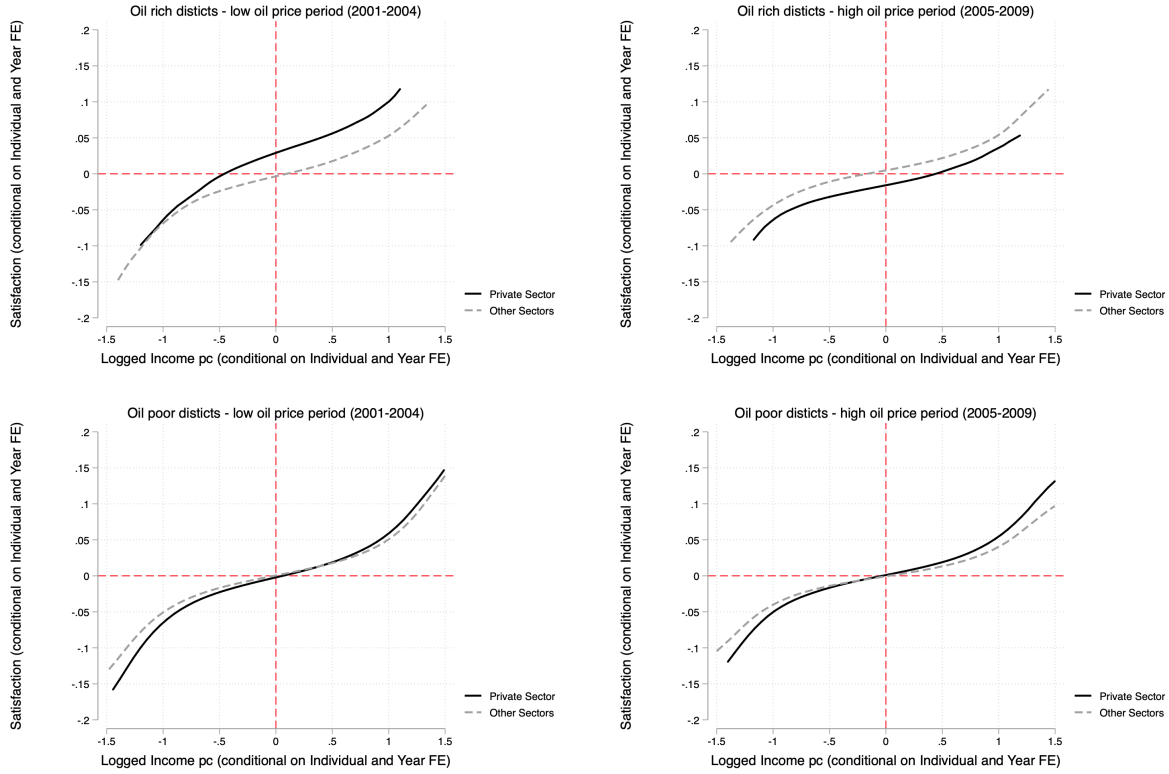
Figure 2 shows how individuals’ satisfaction with the same level of income reacts to a change in the oil price by grouping individuals in eight groups based on three dimensions: private versus non-private sector, oil rich versus oil poor districts (see Figure 1) and a period of high (2005-2009) and low (2001-2004) oil prices. The results plotted in Figure 2 are conditional on individual and time fixed effects. Individual fixed effects account for variation across individuals and time fixed effects account for changes in the interpretation of satisfaction questions across years.

First, in all panels of Figure 2 the relationship between satisfaction with income and income is upwards sloping. This upward slope has been already documented and is quite intuitive (Frey, 2008): reported satisfaction with household income increases with income.

⁹10 additional households were listed for replacements.

¹⁰Between 2006 and 2008 the survey methodology changed, and only 3000 households were surveyed and then annual information for 12000 households was constructed from the quarterly surveys. Thus, we will not exploit the quarterly variation in our analysis.

Figure 2: Satisfaction with income



Note: The Figures above present the relationship between logged household income per family member and the reported satisfaction with this income by the head of the household on a scale from 1 to 5. All results are conditional on individual household fixed effect and year fixed effects. We exclude the top and bottom 1% of the residual values in all the Figures for a better representation of the results. The local smoother is employed using the Epanechnikov Kernel with a bandwidth of 0.6 for all Figures. Note that the period of high oil prices is captured by the subsample since and including 2005, while the subsample of low oil prices stretches between 2001 and 2004.

We can then focus on oil poor districts, that appear in the bottom panel. In oil poor districts, the relation between satisfaction and income is virtually the same across sectors (private sector versus other sectors). This relation is also virtually the same during periods of low (years 2001 to 2004) or high oil prices (years 2005 to 2009), comparing the left and right bottom panels.

The conclusion is different if we turn to oil rich districts in the top panel of Figure 2. The relationship between satisfaction with income and income is still upward sloping, but it is only for individuals employed *outside* the private sector that the relation remains the same in periods of high and low oil prices. Individuals employed in the private sector appear to be sensitive to the price of oil. Comparing how these oil-related individuals evaluate their satisfaction with income across periods, we see that they tend to appreciate the same

level of income level *more* than other workers do during period of low oil prices (top left panel), but they tend to appreciate the same level of income *less* during period of high oil prices (in the top right panel, the level of satisfaction of private sector workers is below the level of satisfaction of the other households for any given level of income). These results are consistent with the existence of a reference point relative to which satisfaction with income is determined (Kahneman and Tversky, 1980; Mas, 2006). The exact position of the reference point is determined by a complex interaction of past, current and future experiences to which the price of the single most important good in the oil rich districts is likely to contribute (Frey, 2008).

Identification In order to evaluate this relationship more formally, we estimate the following specification:

$$(1) \ y_{isdt} = \alpha \times \ln(Oilprice_t) \times OilDistrict_d \times Private_s + \beta' X_{it} + FE_i + FE_{st} + FE_{dt} + FE_{sd} + \varepsilon_{idt}^s$$

Where y_{isdt} indicates how satisfied household head i is with her income, knowing she works in sector s in district d , in period t . We rely on a triple-difference specification to identify α , linking satisfaction with income to the logged price of oil, which is interacted with dummies indicating an household head's sector of employment and whether an individual is located in the oil rich district or not. Doing so allows us to control for any respondent and household time-invariant characteristics through the household fixed effects FE_i (including individual biases in perceptions). It also allows us to control for any shock in a given year to a given sector such as an employment boom in the public sector through sector-year fixed effects FE_{ts} . These second order fixed effects for sectors and years absorb and account for the first order effects at the sector and year level (such as different level of work penibility or changes in the oil price). The district-time fixed effects FE_{dt} additionally account for local factors such as local inflation or migration, and also account for any long lasting district specificity such as historical or geographic differences. We can also account for fixed effects at the sector-district level FE_{st} , which are identified because some household heads switch sector of employment during the period of observation. This fixed effect allows us to account for inherently different histories of how these sectors emerged in the different districts and their difference in specialisation. We also control for household income since we are interested in evaluating the shift illustrated in Figure 2. Most other controls on the household level barely matter, due to the large number of fixed effects employed in our model.

Results Table 3 outlines that the change in the oil price decreases satisfaction with income in the group of oil-related households, consistent with the graphical results in Figure 2.

Conditional on changes in real income, a 20% increase in the price of oil decreases satisfaction with income by 0.03 points (in our preferred specification, column 3 of panel 1 in Table 3). This result survives a battery of alternative specifications, with respect to the coding of the dependent variable, inclusion of standard controls, or the definitions of the treated and control groups.

The negative reaction of oil-related households to the oil boom remains unaffected by the controls. In the first column of every panel we present the results without any controls. In column 2 we control for household income. By controlling for income we make sure that households' satisfaction with their income does not merely reflect variations in their income. Controlling for income between columns 1 and 2 of Table 3 leaves the coefficient of interest unchanged. In the third column, our preferred specification, we control additionally for the number of household members, education, and sector of employment of the household head. Again the coefficient remains unaffected. In column 4 we change the functional form of the dependent variable by transforming reported satisfaction into a dummy, whereby 1 indicates that reported satisfaction is above or equal to 3.¹¹

We also acknowledge that households may change their occupation over time. Although 80% of the household do not switch during the period for which we observe them, the households which change occupation may have specific characteristics. They may for example be recent migrants who came in unemployed and got a job in the oil sector, or historic employees of the oil sector who got laid off to be replaced by a recent migrant. We thus omit households who change work status in column 5 and results increase in magnitude. Thus, if anything, keeping sectoral switchers in our analysis biases our results towards zero.

Finally, our control groups may be imperfect since there may be contamination. However, we can see that results are robust to a variation in our control group in the three panels of Table 3. In our preferred specification we keep the whole sample and present the results for the whole sample in panel A. In panel B we compare individuals employed in the private sector only to public sector workers and in panel C we compare individuals employed in the private sector to those who identified themselves as being employed by neither private nor public sector and to whom we refer to as unemployed, while they could, in principle, be employed informally. Overall, our results do not appear to be sensitive to any of these choices.

¹¹The dummy takes value 1 if the ordinal satisfaction variable takes value 3 or more; besides making economic sense this cutoff maximizes the variance as 51% of the sample answers lie below 3 and 49% answer 3 or more.

Table 3: Satisfaction with Income

	(1)	(2)	(3)	(4)	(5)
Dep Var: satisfaction with household income as reported by head of household					
Dep Var coding:	raw	raw	raw	dummy	raw
Sample includes:	all	all	all	all	permanent
<i>Panel A: full sample</i>					
OilPrice \times OilDistrict \times Private	-0.245 ^a (0.064)	-0.207 ^a (0.053)	-0.140 ^a (0.050)	-0.206 ^a (0.055)	-0.434 ^a (0.062)
Observations	81778	81762	81761	81761	40949
R^2	0.707	0.724	0.634	0.725	0.737
<i>Panel B: private sector workers versus public sector workers</i>					
OilPrice \times OilDistrict \times Private	-0.335 ^a (0.115)	-0.299 ^a (0.104)	-0.293 ^a (0.105)	-0.196 ^b (0.080)	-0.620 ^a (0.056)
Observations	38319	38315	38314	38314	21686
R^2	0.718	0.735	0.736	0.653	0.754
<i>Panel C: private sector workers versus unemployed</i>					
OilPrice \times OilDistrict \times Private	-0.262 ^a (0.046)	-0.203 ^a (0.053)	-0.210 ^a (0.052)	-0.130 ^b (0.059)	-0.299 ^b (0.117)
Observations	40711	40705	40705	40705	27348
R^2	0.715	0.731	0.732	0.644	0.731
Controls	none	income	full	full	full

Note: All columns include household and year \times district and year \times sector fixed effects. Household level controls, included from column 3 onwards, include the number of households members, and the household head's education and employment situation. Robust standard errors are clustered at the district level. ^c p<0.1, ^b p<0.05, ^a p<0.01.

Table 4: Satisfaction with Income (leads and lags)

	(1)	(2)	(3)
Dep. Var: Are you satisfied with your income?			
OilPrice _{t-1} × OilDistrict × Private	-0.151 ^b (0.072)		0.112 (0.125)
OilPrice _t × OilDistrict × Private			-0.228 ^a (0.059)
OilPrice _{t+1} × OilDistrict × Private		-0.212 ^a (0.073)	-0.111 (0.113)
Observations	81761	81761	81761
R ²	0.724	0.725	0.725

Note: All columns include household and year×district and year×sector fixed effects and household level controls (income, include the number of households members, and the household head's education and employment sector). Robust standard errors are clustered at the district level. ^c p<0.1, ^b p<0.05, ^a p<0.01.

4 Discussion

Beyond identifying a sizeable effect of the oil price on workers' satisfaction with income in oil rich districts, what could be the cause of this shift in satisfaction? In what follows, we discuss and rule out some typical channels before presenting the interpretation that appears to be the most consistent with the pattern of results.

First, in line with Collier (2017), we might be concerned that nationals may be unsatisfied if they observe that the rents from resources benefit agents abroad rather than nationally. However, as Esanov and Kuralbayeva (2010) point out, since the beginning of the oil boom the government has successfully undertaken a targeted approach in renegotiating previous arrangements to increase government's take of oil revenues and to reduce the outflow of capital. More technically, this channel should impact all nationals of Kazakhstan and, thus, is accounted for in our triple-diff specification due to region-time and sector-time fixed effects.

Secondly, as documented by Caselli and Michaels (2013), an increase in local government expenditure may not necessarily be reflected in an increased quality of healthcare, education and infrastructure and may increase dissatisfaction on the local level. Alternatively, local inflation may be associated with resource booms, as has been famously argued by Corden and Neary (1982) and recently empirically documented (Aragón and Rud, 2013; Harding, Stefanski and Toews, 2016). However, while both of these are indeed valid concerns, we argue that these channels should be captured by our empirical specification which exploits within region variation over time by comparing satisfaction with income of private sector

and non-private sector employees. These two groups should be equally effected by inefficient public spending and local inflation.

Thirdly, national changes in taxation on the sectoral level or unsatisfactory sector level dynamics, for example the deterioration of the manufacturing sector, may affect individuals satisfaction with income (Stefanski, 2016; Cust, Harding and Vezina, 2019). However, as before, our triple-difference specification captures this by allowing us to account for sector-time fixed effects.

Finally, we might also be concerned about an influx of migrants which may be triggered by local resource booms (Beine, Coulombe and Vermeulen, 2014; Allcott and Keniston, 2017). As long as this migration remains a regional concern it should be captured by the district-time fixed effect. However, there still remains a possibility that one of the mentioned concerns might be more likely to affect private sector employees in the oil rich district. If oil-related households are more affected by that change, such as a migrant influx within their enterprise, we cannot rule out this mechanism as an alternative explanation for the drop in satisfaction with income. To address such district-sector and time-specific omitted variables concerns, we proceed to an additional exercise in which we exploit the exact timing of oil price changes.

We present in Table 4 the relation between the timing of oil price changes and satisfaction. The results suggest that the exact timing of oil price changes appears to be quite important. We document that the negative variation in satisfaction is actually related to the contemporaneous change in the price of oil, while satisfaction with income remains unrelated to leads and lags in the oil price. This suggests that our results can only be discredited if we can think of an omitted variable which changes on the sector-region level as quickly as the price of oil, while simultaneously affecting satisfaction with income. Both sector level taxation and migration are highly unlikely to respond within a year to changes in the price of oil, since both state and companies need typically more than a year to respond to changes in the price of oil (Toews and Naumov, 2015).

Thus, we argue that the main interpretation consistent with our results is that commodity price booms inflate expectations about one's income and frustrations, if the formed expectations are not met (Ross, 2012; Venables, 2016; Collier, 2017). This interpretation bridges our household level results and Christensen (2019) suggestion, based on aggregated data, that discrepancies in perceptions are a driving force of conflictual responses to mining investments in Africa. This interpretation in terms of unmet expectations appears to us to be the most plausible driver varying on the district-sector level and affecting satisfaction with income in the same period as changes in the oil price, after accounting for the alternative mechanisms discussed in the empirical section.

5 Concluding thoughts

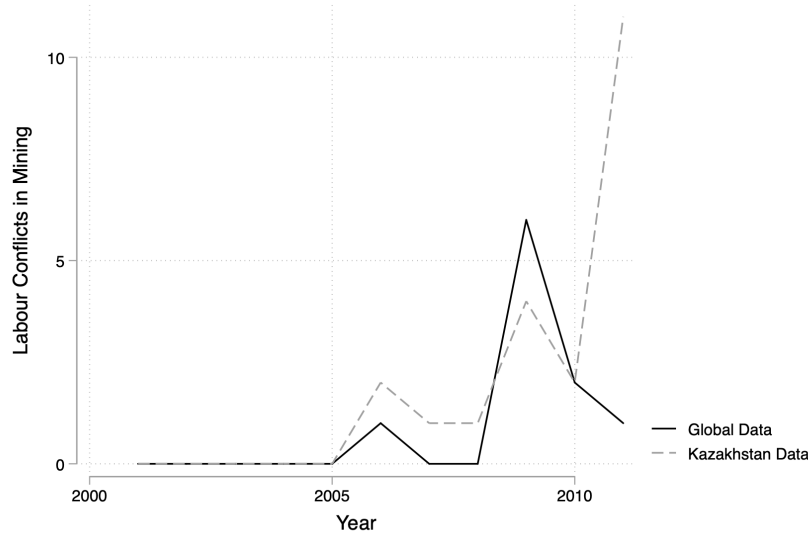
In this chapter we document how variations in commodity prices affect satisfaction with their income for households, depending on their proximity to the oil extraction. To do this, we take advantage of sector, location and time variations. We document that conditional on individual and time fixed effects, individuals who are located in oil poor districts and individuals who are employed outside the private sector in the oil rich districts appear to be unaffected by changes in the price of oil. The picture changes if we turn to oil-related household heads who are individuals employed in the private sector of the an oil rich district. Oil-related households experience a significant drop in satisfaction, which closely follows variations in the price of oil. Thus, we provide robust empirical evidence aligned with the idea that satisfaction with income is reported relative to a reference point: good news can trigger inflated expectations by shifting the reference point, which under certain circumstances may exceed changes observed in reality and, thus, lead to a drop in satisfaction.

These results are in line with the news shock literature (Arezki, Ramey and Sheng, 2017; Cust and Mihalyi, 2017; Cust and Mensah, 2020). Since oil production is fixed in the short run and marginal cost of production is close to zero, workers in the private sector have close to perfect information about the profitability of the companies they are employed by in the short run. Our interpretation of the results is that observing the change in the oil price increases worker’s aspirations to benefit from the oil boom and, thus, instantaneously decreases satisfaction with income.

The fact that oil-related household heads are the only ones to express dissatisfaction may help to understand what happened on December 2011 when 17 people were killed during a labor conflict in Zhanaozen, a booming oil town in the west of Kazakhstan’s desert. This would prove to be the climax of a surge in labor conflicts in the 2000’s accompanying the increase in the price of oil. From 0 labor conflicts between 2002 and 2006, the year 2011 alone witnessed 18 conflicts (see Figure 3). The intensity of these conflicts has also increased. Besides the 17 killed, 100 people were wounded in Zhanaozen in 2011. This was the most violent labor conflict ever recorded in Kazakhstan.

The observation that dissatisfaction and labor conflicts do not happen only during busts but also during booms echoes recent development in the labor conflicts literature. The traditional economic theory on labour conflicts suggests that workers go on strike due to asymmetric information (Cahuc, Carcillo and Zylberberg, 2014). Since the oil price is public knowledge, such an interpretation is hard to match with a pattern of increasing conflicts as the oil price rises. Rather, our results bring evidence consistent with the argument made by Brunnschweiler, Jennings and MacKenzie (2014) on fairness concerns in labor conflicts with

Figure 3: Labor conflicts evolution



data from the UK.¹²

These results are all the more important to keep in mind since Kazakhstan was not the only country hit by labor conflicts in its extraction sector during the 2000's. The global number of labor conflicts in the resource sector actually follows a strikingly similar pattern as the development of conflicts in Kazakhstan. In Figure 3 we plot the conflicts in Kazakhstan and the number of worldwide conflicts.¹³ The similarity in the pattern of both conflict series is all the more striking since conflict data is notoriously scarce and, in this specific case, these two data sets differ in the sample they cover and in the method in which the data was collected.

¹²The authors present a model in which fairness concerns play a role in the setting of wages in a negotiation between an employer and a union.

¹³The data on labor conflicts contains information on date, location, sector and type of event. To collect the data, keyword searches have been used in major Kazakh newspapers. The search relies on 11 different media sources, most of which are Kazakhstani: Argumenty i fakty Kazakhstan, Ekspert Kazakhstan, express-k.kz, Ferghana.ru, Interfaks Kazakhstan, ITAR-TASS, Izvestiya Kazakhstan, Kazakhstanskaya Pravda, megapolis.kz, newslime.kz, RFE/RL. The 7 keywords used are the Russian equivalent for: strike, lockout, hunger strike, rally, demonstration, trade union, and picket. The searches for each keyword were conducted with their truncated versions in order to get all articles dealing with either strike or strikers or strikes, etc. The coding was conducted with a focus on relations between organized labor and employers. The final data records 52 conflicts, 27 of which took place in an oil rich districts. The initial data was collected by Indra Overland for the period 2006-2011. We extended the data to include the period between 2001 and 2005 following the same methodology using the maximum number of available sources. Worldwide labor conflict information comes from the GDELT data from Google algorithms and include a variety of countries. We plot a subset of conflicts selected along two criterias from the GDELT data: 1) these conflicts oppose civilians to a multinational compagny and 2) the multinational company at stake is active in extractives.

References

- Allcott, Hunt and Daniel Keniston. 2017. “Dutch disease or agglomeration? The local economic effects of natural resource booms in modern America.” *The Review of Economic Studies* 85(2):695–731.
- Aragón, Fernando M and Juan Pablo Rud. 2013. “Natural resources and local communities: evidence from a Peruvian gold mine.” *American Economic Journal: Economic Policy* 5(2):1–25.
- Arezki, Rabah, Valerie A. Ramey and Liugang Sheng. 2017. “News Shocks in Open Economies: Evidence from Giant Oil Discoveries.” *The Quarterly Journal of Economics* 132(1):103–155.
URL: <https://ideas.repec.org/a/oup/qjecon/v132y2017i1p103-155..html>
- Asher, Sam and Paul Novosad. 2018. “Rent-seeking and criminal politicians: Evidence from mining booms.” *Working Paper* .
- Bazillier, Remi and Victoire Girard. 2020. “The gold digger and the machine. Evidence on the distributive effect of the artisanal and industrial gold rushes in Burkina Faso.” *Journal of Development Economics* 143:102411.
URL: <http://www.sciencedirect.com/science/article/pii/S0304387819300586>
- Beine, Michel, Serge Coulombe and Wessel N Vermeulen. 2014. “Dutch disease and the mitigation effect of migration: evidence from Canadian provinces.” *The Economic Journal* 125(589):1574–1615.
- Berman, Nicolas, Mathieu Couttenier, Dominic Rohner and Mathias Thoenig. 2017. “This Mine Is Mine! How Minerals Fuel Conflicts in Africa.” *American Economic Review* 107(6):1564–1610.
URL: <https://ideas.repec.org/a/aea/aecrev/v107y2017i6p1564-1610.html>
- Berman, Nicolas, Mathieu Couttenier and Victoire Girard. 2020. “Mineral resources and ethnic identity.” *mimeo* .
- Brunnschweiler, Christa N., Colin Jennings and Ian A. MacKenzie. 2014. “A study of expressive choice and strikes.” *European Journal of Political Economy* 34:111 – 125.
URL: <http://www.sciencedirect.com/science/article/pii/S0176268014000056>
- Cahuc, Pierre, Stéphane Carcillo and André Zylberberg. 2014. *Labor economics*. MIT press.
- Caselli, Francesco and Guy Michaels. 2013. “Do oil windfalls improve living standards? Evidence from Brazil.” *American Economic Journal: Applied Economics* 5(1):208–38.

- Christensen, Darin. 2019. "Concession Stands: How Mining Investments Incite Protest in Africa." *International Organization* 73(1):65101.
- Collier, Paul. 2017. "The institutional and psychological foundations of natural resource policies." *The Journal of Development Studies* 53(2):217–228.
- Collier, Paul and Anke Hoeffler. 2004. "Greed and grievance in civil war." *Oxford economic papers* 56(4):563–595.
- Corden, W Max and J Peter Neary. 1982. "Booming sector and de-industrialisation in a small open economy." *The economic journal* 92(368):825–848.
- Cust, James and David Mihalyi. 2017. *Evidence for a presource curse? oil discoveries, elevated expectations, and growth disappointments*. The World Bank.
- Cust, James and Steven Poelhekke. 2015. "The local economic impacts of natural resource extraction." *Annu. Rev. Resour. Econ.* 7(1):251–268.
- Cust, James, Torfinn Harding and Pierre-Louis Vezina. 2019. "Dutch disease resistance: Evidence from Indonesian firms." *Journal of the Association of Environmental and Resource Economists* 6(6):1205–1237.
- Cust, Jim and Justice Tei Mensah. 2020. "Natural Resource Discoveries, Citizen Expectations and Decisions." *mimeo* .
- Esanov, Akram and Karlygash Kuralbayeva. 2010. Riccardian Curse of the Resource Boom: The case of Kazakhstan 2000-2008. Technical report Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford.
- Frey, Bruno S. 2008. *Happiness: A revolution in economics*. MIT press.
- Funke, Manuel, Moritz Schularick and Christoph Trebesch. 2016. "Going to extremes: Politics after financial crises, 1870-2014." *European Economic Review* 88(Supplement C):227 – 260. SI: The Post-Crisis Slump.
URL: <http://www.sciencedirect.com/science/article/pii/S0014292116300587>
- Harding, Torfinn, Radoslaw Radek Stefanski and Gerhard Toews. 2016. "Boom goes the price: Giant resource discoveries and real exchange rate appreciation."
- Hopkirk, Peter. 1992. *The Great Game: The Struggle for Empire in Central*. New York: Kondasana International.
- Kahneman, Daniel and Amos Tversky. 1980. "Prospect theory." *Econometrica* 12.

- Kaiser, Mark J and Allan G Pulsipher. 2007. "A review of the oil and gas sector in Kazakhstan." *Energy policy* 35(2):1300–1314.
- Mas, Alexandre. 2006. "Pay, reference points, and police performance." *The Quarterly Journal of Economics* 121(3):783–821.
- Moretti, Enrico. 2010. Local labor markets. Technical report National Bureau of Economic Research.
- Munayshy Public Foundation. 2005. "Petroleum Encyclopedia of Kazakhstan."
- Pomfret, R. 2006. *The Central Asian Economies Since Independence*. Princeton University Press.
- Rigterink, Anouk S. 2020. "Diamonds, rebel's and farmer's best friend: Impact of variation in the price of a lootable, labour-intensive natural resource on the intensity of violent conflict." *Journal of Conflict Resolution* 64(1):90–126.
- Ross, M. L. 2007. How Mineral-Rich States can reduce Inequality. In *Escaping the Resource Curse*, ed. Macartan Humphreys, Jeffrey D. Sachs and Joseph E. Stiglitz. Columbia University Press.
- Ross, M. L. 2012. *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations*. Princeton University Press.
- SARK. 2011. "Statistical Agency of the Republic of Kazakhstan."
<http://www.stat.kz/Pages/default.aspx>.
URL: <http://www.stat.kz/Pages/default.aspx>
- Stefanski, Radoslaw Lucjan. 2016. "Government size, misallocation and the resource curse." *Commodity Prices and Macroeconomic Policy*.
- Toews, Gerhard and Alexander Naumov. 2015. "The relationship between oil price and costs in the oil industry." *The Energy Journal* 36:237–254.
- Toews, Gerhard and Pierre-Louis Vezina. 2017. Resource discoveries and FDI bonanzas; An illustration from Mozambique. OxCarre Working Papers 199 Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford.
URL: <https://ideas.repec.org/p/oxf/oxcrwp/199.html>
- Venables, Anthony J. 2016. "Using Natural Resources for Development: Why Has It Proven So Difficult?" *Journal of Economic Perspectives* 30(1):161–84.
URL: <http://www.aeaweb.org/articles?id=10.1257/jep.30.1.161>