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Resource-related Income Shocks and Conflict

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INTRODUCTION

Afghanistan is among the most conflict-ridden countries in the world. Since 2002, over 100,000 people have died because of the conflict, including civilians, pro-government forces as well as insurgents.[1] Afghanistan is also a prototypical example of a weak state, which cannot impose its monopoly of violence. Furthermore, the country is characterised by a weak labour market with insufficient formal employment opportunities, resulting in widespread poverty. One of the few booming sectors in such an environment is the production of an illegal product. In Afghanistan, estimates suggest that up to 1/7th of the workforce depends on the production of opium. Opium is processed into heroin and trafficked to end customers mostly in European and US markets. In terms of weight in the economy, this means that opium production is more important for Afghanistan than the automobile sector for Germany (Mansfield and Fishstein 2016).

The aim of our paper, Gehring, Langlotz and Kienberger (2018) is, firstly, to better understand the root causes of the Afghan conflict and, secondly, to understand more about resource-related income shocks in general. The so-called resource curse, i.e. the empirical observation that many countries with large resource endowments have developed poorly, can be partly explained by the higher degree of conflict that is related to resources or resource abundance. Many studies in economics and political science have emphasized the relation between conflict and the discovery of resources and price changes that affect the profitability of resource (Bazzi and Blattman 2014, Brückner and Ciccone 2010, Berman and Couttenier 2015, Miguel et al. 2004, Morelli and Rohner 2015, Berman et al. 2017). So far this line of research has not arrived at a consensus yet. This can partially be explained by the fact that older studies mostly used aggregate data at the national level and could not derive causal estimates. Studies at a more micro-level, however, also yield highly heterogeneous results, depending on the type of resources and on the country.

The mechanisms and channels behind a potential resource-conflict-curse are still poorly understood. A first systematic distinction was made by Dube and Vargas (2013), who found that in Colombia higher prices for particularly labour-intensive resources reduced conflict, whereas higher prices for more capital-intensive resources increased conflict. These findings are relevant for Afghanistan as well, as the main alternative crop to opium is wheat, which requires much less labour (360 vs. 64 person-days/hectare). Accordingly, as the price of wheat relative to opium increases, producers switch to wheat production, which results in less demand for labour. Consequently, unemployment increases and household income most likely decreases.

In Afghanistan, joining pro-government forces, including the Western coalition, or a rebel group such as the Taliban represent some of the few alternatives to wheat or opium production. In fact, most anecdotal evidence suggests that it is even relatively more lucrative to join the Taliban than to work for the government, as the Taliban is reported to pay a wage of about 10 US dollars a day. If fewer, or less attractive, outside options exist in an area, the opportunity costs of supporting the Taliban decrease and we expect conflict to become more prevalent.

A second important mechanism, which we highlight, is the role of competition between different groups that fight for control over lucrative (and contested) terrain. Districts in Afghanistan can broadly be classified as having either a low or a high suitability for producing opium. Highly suitable districts are more profitable, the more so the higher the prices that can be achieved on the world market. A prominent theory of conflict is the so-called contest or rapacity effect, postulating that groups fight for profitable resources and that more resources or higher prices intensify the contest. We argue and test the hypothesis that the importance of this channel depends on the degree of group competition in a district (or country). For example, if an area is controlled by one strong group (or cartel), there is less competition and, therefore, this should play less of a role.

Our results show that, in Afghanistan, conflict actually decreases when opium is more profitable and opium revenues are higher. This effect is stronger in areas that are more suitable for production. At first sight, this is surprising and seems at odds with prior results (Angrist & Kugler 2008; Mejia & Restrepo 2015) on cocaine-related price shocks that fuel conflict in Colombia. For this reason, we collect data at the district and household level to examine the underlying channels of this relationship. We first show that higher opium profitability strongly benefits households' living conditions measured by a variety of indicators. Secondly, we use various specifications and verify that, on average, there is little competition between groups regarding profitable districts in Afghanistan. This contrasts with the Colombian context, in which intensive fighting between cartels and groups is much more common.

The next section provides background information on Afghanistan, Section 3 broadly describes the data and the identification strategy of our analysis, Section 4 discusses the main results as well as the channels, and Section 5 offers some conclusions.

[1] Based on the Uppsala Conflict Data Program (UCDP) data set.

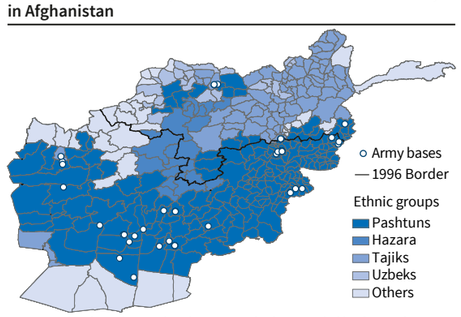
BACKGROUND TO THE CONFLICT

After 2001, about 94% of the conflicts in Afghanistan were fights between the Afghan government and the Taliban (so-called state-based violence, based on the UCDP conflict data set). Less than 4% of all cases are classified as one-sided violence with the Taliban as the perpetrator and civilians as the victims. In the first years of the military intervention, the Western coalition and the official Afghan government forces were largely successful in fighting against the Taliban and reducing their influence. This was partly achieved by financing Afghan warlords and local militia groups, who then joined the fight against the Taliban. Since around 2006, the Taliban have become stronger and have expanded their influence again. Some observers and reports suggest that revenues from taxing opium farmers contribute to the financing of the Taliban activities.

Afghanistan is a very diverse country in terms of ethnicity. While the Taliban is originally a Pashtun group, today they also include members from other ethnic groups. However, Pashtuns are probably still the most represented ethnicity within the Taliban and the presence of Pashtuns in a district makes it easier to re-establish their presence. There are, of course, other important ethnic groups. The Northern areas, for instance, comprise Turkmen and Tajik groups that formed the so-called Northern alliance, occupying territory that was not controlled by the Taliban even before 2001. We will use data on Pashtun homelands, as well as on the territory controlled by the Northern alliance, to show whether the effect of opium profitability differs between districts that are more or less likely to be controlled by the Taliban. Furthermore, we will compare more or less ethnically fractionalized districts to see whether opium leads to more conflicts in districts where different ethnic groups could compete for valuable rents associated with the production of opium. Figure 1 illustrates the 398 Afghan districts and the corresponding distribution of the major ethnic groups, major foreign military bases and the approximate reach of Taliban influence prior to the foreign intervention. The black border (1996 Border) splits the country into the region in the north, which was under control of the Northern alliance, and the southern region, which was under Taliban control in 1996. This information is based on Dorronsoro (2005).

Figure 1

Ethnic Groups, Military Bases and Former Taliban Territory in Afghanistan



Note: 1996 border indicates that the area north of it was ruled by the Northern alliance prior to 2001 and the area south of the border was under Taliban control.
Source: Gehring, Langlotz and Kienberger (2018). © ifo Institute

DATA AND IDENTIFICATION

Our analysis is at the district-year level (ADM2). There are 398 districts, which belong to 34 provinces (ADM1). We use data from the UCDP Georeferenced Event Dataset (GED) as the primary source to measure conflict. This dataset includes geocoded information based on media reports on the "best estimate of total fatalities resulting from an event" (Sundberg and Melander 2013; Croicu and Sundberg 2015). To proxy for the incidence and intensity of conflict we use (i) the log number of battle-related deaths (BRD), and (ii) different binary variables that take the value one if a certain threshold in the number of casualties is crossed (5, 25, 50, and 100 BRDs).

We then combine those data with information on how suitable different districts are for growing opium. This index combines data on land cover, water availability, climatic suitability, and suitability of soils, and was gathered using satellite imagery and other sources (Kienberger et al. 2016). To measure the suitability for wheat, which is the main alternative crop available for farmers throughout Afghanistan, we use a comparable index provided by the Food and Agriculture Organization of the United Nations (FAO).

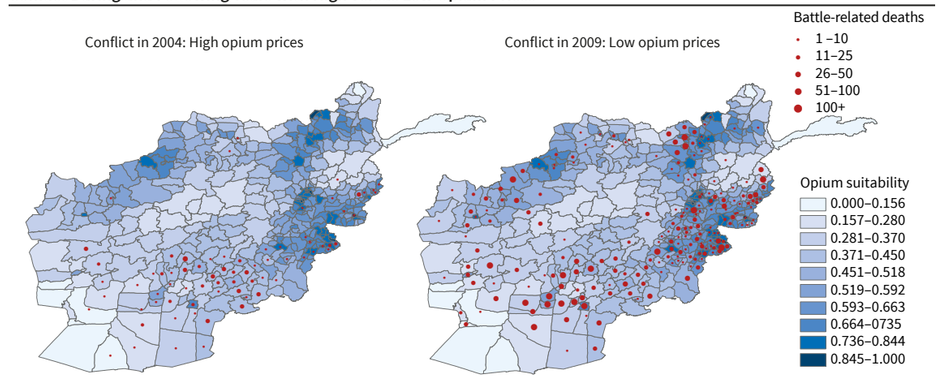
In general, the gross prices for opium are higher than for wheat, but the former also requires more labour and fertilizer. Consequently, which of the two crops is more profitable depends on the relative suitability of a district and on the prices of the two goods in a given year. On the one hand, as wheat becomes more attractive relative to opium, marginal producers that are able to produce both crops, switch to wheat production. As this reduces the demand for labour, the production switch may be accompanied by a reduction in income for many households and a higher likelihood of conflict due to reduced opportunity costs. On the other hand, if violent competition between groups over profitable districts occurs, we would expect higher levels of conflict in those districts in years with higher opium prices.

Figure 2 provides a first suggestion that the former effect seems to dominate. The figures compare the intensity of conflicts in 2004 (left) and in 2009 (right). It is worth noting that world market prices for heroin were high in 2003 and 2004, and much lower in 2008 and 2009.[2] It becomes immediately apparent that, overall, there is much more conflict in the year associated with lower prices, and that these conflicts are also more intense. Exploiting only this difference between

[2] The prices are sourced from the European Monitoring Center for Drugs and Drug Addiction (EMCDDA).

Figure 2

Conflict During and Following Years with High versus Low Opium Prices



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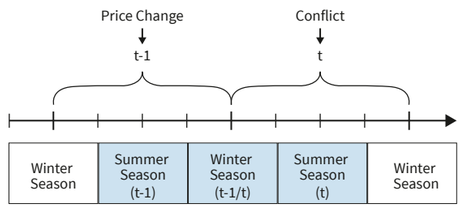
years is, of course, problematic in terms of identifying a causal relationship. Instead, we exploit the fact that changes in prices affect districts with a high suitability more than those with a low suitability. This is evident from the fact that the increases in conflict are higher in the areas of the North-West, North-East and East, where opium suitability is also higher.

Of course, this remains a visual correlation and not a systematic analysis. To approach the question more systematically, we have to consider the right timing between price changes and potential changes in conflict in a first step, as illustrated in Figure 3.

There are two main growing seasons for opium in Afghanistan: the winter season starting in fall and the summer season starting around March (Mansfield 2016). Market price changes can plausibly influence opium cultivation and revenues in the same and the following year. Prices clearly matter as, for instance, Caulkins et al. (2010, p.9) writes that: "the largest driver of changes in hectares under poppy cultivation is not eradication or enforcement risk, but rather last year's opium prices." Conceptually, analysing the effect of prices and revenues on conflict in the same given year gives rise to concerns about reverse causality, which is why our main specification considers the effect of price changes in a given year on revenues and conflict in the following year. Our results remain, however, very similar if we consider the plausible specification with contemporaneous values.

Figure 3

Price Changes in Year t Affect Production and Revenues in t-1/t and Conflict in Year t



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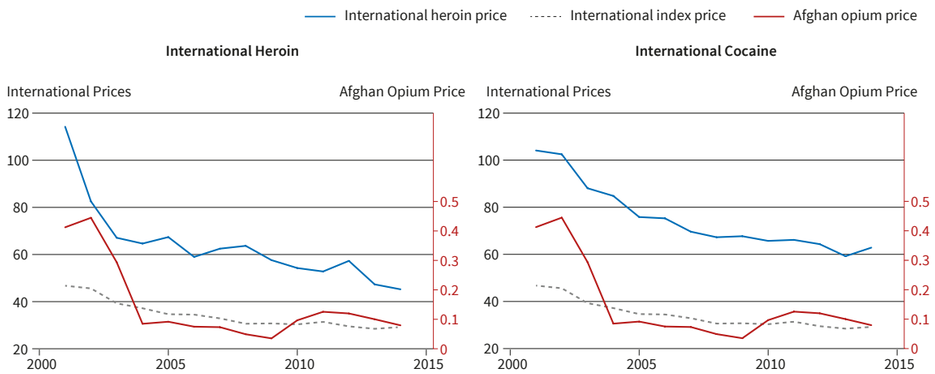
Our main variable of interest, opium profitability, is computed by combining information about the suitability of the district with the drug prices of the previous year. Figure 4 shows the evolution of prices over our sample period between 2002 and 2014. Two things are important to note: firstly, the international heroin price actually affects the local price in Afghanistan that the farmers receive. In our paper, we also show that international price changes directly affect cultivation and revenues at the district level, and have a stronger effect on districts with a higher suitability. Secondly, we also plot the prices for cocaine and an index of amphetamines, cocaine and ecstasy prices. What we can see is that all prices follow a similar trend, which suggests that prices are driven by changes in common demand factors to a larger extent than by supply-side shocks for individual drugs. This is reassuring because Afghanistan, which as the largest producer of opium is estimated to contribute more than 70% to world production, can influence the world market price in a way that could bias our estimations.

Although changes in overall supply would be unproblematic in our econometric model, there could be problematic changes related to unobserved variables that vary at the district-year level. To rule out that this affects our estimations, we pursue different strategies. For the sake of brevity, we mention only two such strategies here. Firstly, as a robustness test, we demean prices to rule out that the downward trend causes a spurious correlation. Secondly, we exploit the fact that drugs can be grouped in two major categories: "uppers" and "downers". Upper drugs such as cocaine act as stimulants, while downer drugs such as heroin act as depressants. A high share of users combine both types of drugs, making the upper drugs a complement to heroin. One infamous example is so-called speedballing, a dangerous but common practice of combin-

Figure 4

Variation in International and Local Prices over Time



Source: Gehring, Langlotz and Kienberger (2018). © ifo Institute

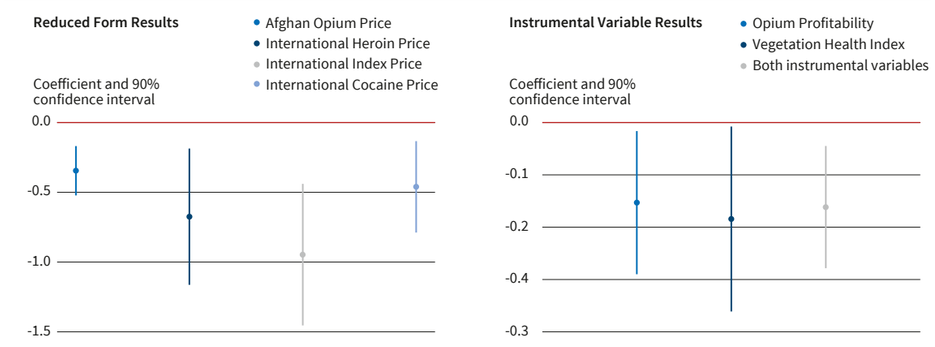
ing cocaine and heroin use, which, for instance, turned out to be deadly for actor Philip Seymour Hoffman. The complementing use of the two drugs translates into a negative cross-price elasticity between the two types of drugs (in other words, the increase in the price of one decreases the consumption of the other). This allows us to exploit the fact that any omitted variable bias in our estimates would point in opposite directions for the two drugs. All details and proofs are provided in the paper and appendix but, in a nutshell, this means that if the coefficient using heroin prices is upward biased, the coefficient using the complement is downward biased.

RESULTS

Our regression results support the initial visual observation as illustrated in Figure 2. We find that a higher profitability of opium causes a decrease in conflict incidence and intensities. Figure 5 plots the main coefficients from our paper. The graph on the left shows the results of the reduced form where we regress the logarithm of battle-related deaths on opium profitability, measured by four different prices. The graph on the right plots the estimates from the instrumental variable regressions using two different IVs for opium revenues. Firstly, we use opium profitability to instrument opium revenues, secondly the Vegetation Health Index, which is a proxy for droughts, and third both instruments at the same time. When interpreting the results of the graph on the left, it is important to note that they depend on the suitability of a district for opium production. A 10% increase in the international heroin price translates into 7% less battle-related deaths in perfectly suitable districts (and a smaller, but still sizeable reduction in less suitable districts). To account for potential concerns about whether international price changes actually affect people in Afghanistan and potential concerns about biased estimates, we show that the results hold when using local prices and when using the prices of cocaine or an index of complement drugs (the average of amphetamines, cocaine, and ecstasy). All coefficients are negative, which would not

Figure 5

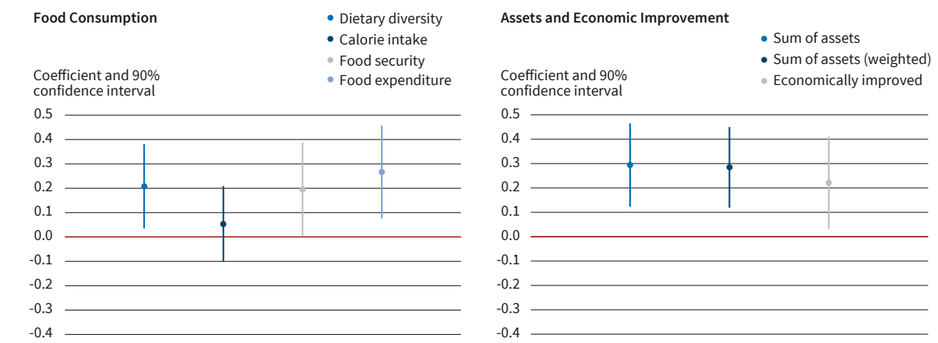
Effect of Opium Profitability and Revenues in Year t-1 on (log) of Battle-Related Deaths



Note: Left graph shows reduced form estimates of opium profitability measured by four different prices. Right graph plots instrumental variable (IV) estimates when using the international heroin price to construct opium profitability. The graph presents IV results for two different IVs, opium profitability and the Vegetation Health Index (VHI).
Source: Gehring, Langlotz and Kienberger (2018). © ifo Institute

Figure 6

Effect of Opium Profitability in Year t-1 on Standard of Living Indicators in Year t



Source: Gehring, Langlotz and Kienberger (2018). © ifo Institute

be the case if the true effect were not negative too. The paper also shows a wide range of further robustness tests, for instance, that the result is not driven by any particular province nor by border districts.

As a second step, we now consider estimations of opium cultivation and revenues in a particular district and year in the right-hand side graph in Figure 5. Of course, those numbers do not only contain a certain measurement error, but using them directly would also yield a biased estimate. Therefore, we use different instrumental variables to induce exogenous variation in the measure. Besides using the international price changes combined with the suitability, we also exploit exogenous weather shocks that affect production and changes in demand induced by the prescription of legal opioids in the US in a robustness test too. All instruments yield comparable local average treatment effects, which are all negative and comparable in size. The results based on instrumental variables are useful to better assess the size of the conflict-reducing effect. The three estimates suggest that, on average, a 10% increase in opium revenues leads to a decrease of around 2% in the number of battle-related deaths.

Relating these results to the literature on conflict, the Afghan experience suggests that an opportunity cost channel dominates both potential contest effects or the use of opium taxation by the insurgents to finance attacks. One central question is whether opportunity costs only matter at higher levels, for instance for large landlords or district Taliban leaders, or whether households on average actually benefit from higher opium profits.

To shed light on this, we use the Afghan National Risk and Vulnerability Assessment (NRVA) survey waves conducted in 2005, 2007/08 and 2011/12. These include between 21,000 and 31,000 households per wave, covering 341 to 388 of the 398 districts in Afghanistan. We harmonize the data from the three different waves to construct indicators based on food consumption and expenditures, as well as household assets and a self-reported measure on the household's economic situation.

Figure 6 clearly shows that households on average also benefit from higher opium profits. We see both a more diverse consumption of food, higher food security as well as overall higher expenditure on food. People in more suitable areas are also able to acquire more assets and feel that their economic situation has generally improved when heroin prices have been higher.

MECHANISMS AND CHANNELS

Our second main hypothesis is that the degree of violent competition between groups moderates the effect of changes in resource prices on conflict. We propose that the absence of such group competition in large areas of Afghanistan can help to explain the contrasting findings to those observed in Colombia. In that case, higher coca prices seem to be related to higher conflict. To test this hypothesis, we geo-reference further micro-level data and use them in two ways.

Firstly, if competition between producers (between cartels or rival groups) were to exist, we would expect that in districts that specialize not only in raw production, but also in intermediate value-chain processes (such as processing, trading or trafficking), opium rents would be higher leading to more fighting. In line with the contest theory, the conflict-decreasing effect of positive income shocks should thus be relatively smaller in these districts. By contrast, if there were no or little violent group competition, higher profits would increase the opportunity cost of fighting even more in those districts that can extract a larger share of the value-added. To be able to test this formally, we require proxies for the potential share of value-added per district.

To this end, we geo-reference data on whether a district contains a heroin or morphine lab, an opium market (major or sub-market) or whether it is crossed by potential drug trafficking routes. The data is from the United Nations Office for Drugs and Crime (UNODC). Profit margins are higher further up the production chain, markets create additional jobs and revenue, and

trafficking routes make it possible to raise income through some form of taxation or road charges. Regressions using all these different measures show that the conflict-reducing effect is even stronger in districts that capture a higher share of value-added. This is the first evidence that there is indeed on average little violent competition between groups in Afghanistan.

Secondly, we distinguish between districts where the Taliban are more likely to enjoy a monopoly of violence, those where the government is strong, and those where the Taliban and the government are more likely to fight for control. Given that the Taliban have an interest in an undisturbed opium production process, we expect a stronger conflict-reducing effect in suitable areas that are under the control of the Taliban. In areas where the government has a sufficiently strong presence, it is more likely to engage in drug eradication measures. This, in turn, may make it more likely that farmers will provide support to the Taliban in exchange for the protection of their fields. In contested areas, we expect a smaller or even a conflict-increasing effect. Our results show an even larger reduction in conflict in areas that are more likely to be controlled by the Taliban. This supports qualitative evidence that the group has long given up its negative stance towards the crop and profits from taxing opium revenues. It suggests that the role of the group is that of a stationary rather than a roving bandit.

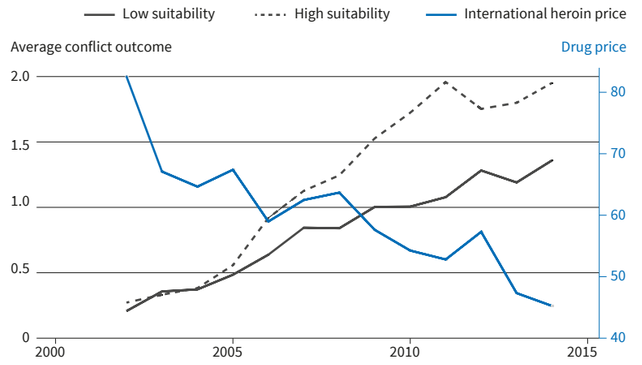
The evidence regarding government presence is mixed. Generally, the distance to Kabul, or to the five other largest cities, as a proxy for the strength and influence of the government, seems to have no influence. The only area within which we find evidence that the government actively engages in measures against drug production is an area of about 75km, or about two hours driving distance around Kabul. Within that area, higher drug prices and opium profitability are not associated with significantly less, but with somehow higher conflict intensity and incidence.

In our final test that competition between groups about suitable districts is not a crucial factor in the Afghan conflict after 2001, we consider the role of ethnic groups. Using data from the Geo-referencing of Ethnic Groups (GREG) dataset (Weidmann et al. 2010), which relies on the Soviet "Atlas Narodov Mira" from 1964, we compute the number of ethnic groups and an alternative measure indicating whether a district features more than one ethnic group. In case of violent group competition, we would expect no or a smaller conflict-reducing effect in districts with more than one group. However, there is again no evidence and no significant differences according to the number of ethnic groups.

Accordingly, we conclude that higher profits from opium cause fewer instances of and less intensive conflict in Afghan districts. The two main reasons for this are: firstly, there is little between-group competition about valuable districts and; secondly, opium requires more labour than the main alternative crop wheat, and through that channel households benefit too. We also show that the reliance of households on revenues from the opium sector seems to increase after about 2005/2006 (see Figure 7). Before that time, the foreign coalition funded local warlords and militia groups to help in the fight against the Taliban. In an attempt to democratize Afghanistan and reduce the influence of those groups and their leaders, funding was cut drastically and hundreds of thousands of men lost their jobs and sources of income after around 2005 (Giustozzi 2009). Due to the complexity of the conflict, it is not possible to explain the re-emergence of the Taliban through this policy change, but it seems at least to have backfired by increasing the reliance of Afghans on opium revenues.

Figure 7

Variation of Conflict Across High and Low Suitability Districts over Time



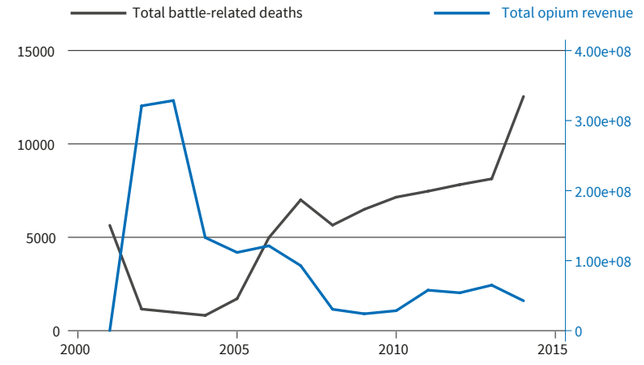
Source: Gehring, Langlotz and Kienberger (2018). © ifo Institute

AGGREGATION AND SPILL-OVERS

One apparent concern about our results is that we consider opium revenues and conflict in the same district. Based on the observation that the Taliban are active in taxing opium production and trafficking, it is also plausible that the money they raise could be pooled at the central level. The Taliban have a so-called central financing committee, but estimates of the share of revenues that is actually pooled and the share that local leaders keep within their districts differ drastically. Instead of conducting complex spatial econometric computations that acquire many assumptions, we take two far simpler approaches, which demonstrate that there do not seem to be strong spillovers of conflict. Firstly, we aggregate all our data at the provincial level, and show that there is also a negative relationship at this level. Secondly, Figure 8 shows the trends in opium revenues and in conflict, aggregated at the national level over our period of observation. It is clearly visible that also at the national level higher revenues are associated with less conflict, and lower revenues with higher conflict.

Figure 8

Variation in Total Opium Revenue and Total Battle-Related Deaths



Source: Gehring, Langlotz and Kienberger (2018). © ifo Institute

CONCLUSION

Our paper, Gehring, Langlotz and Kienberger (2018), provides important new insights into the role of opium for the conflict in Afghanistan, but also into the general relationship between resource-related income shocks and conflict. We demonstrate that, in Afghanistan, higher opium profits lead to significantly less conflict in a given district. In particular, 10% higher revenues are associated with a decrease in battle-related deaths of about 2%. This conflict-reducing effect is at least partly explained by the higher labour intensity of opium compared to alternative crops, and the lack of viable alternatives. This is due to a generally weak job market, but was probably amplified by the cuts to the funding of militia groups by the foreign military coalition. Using household-level survey data, we are able to show that higher revenues actually reach households on average by reducing food insecurity and improving their economic situation. This is in line with increased opportunity costs of fighting, resulting in less conflict.

We further provide evidence that differences in intergroup competition about lucrative territories determine the size and direction of the effect. Moreover, if the government is able to enforce laws regarding opium, higher prices are less likely to reduce conflict. Accounting for competition and local monopolies of violence is an important factor that needs to be considered when studying the impact of resource-related price changes. Further research is required to better understand this relationship in other contexts. Nevertheless, there are many countries around the world that share at least some important features with Afghanistan, such as weak central governments, high ethnic fractionalization, weak labour markets, and high unemployment. Accordingly, we should try to transfer insights from the Afghan case to other contexts where they can be useful as well. Heroin consumption is obviously not without its problems. However, without providing viable alternatives to farmers, the eradication of opium in producing countries leads to unintended consequences.

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