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Export Incentives and Artisanal Gold Exports:

Supplier Level Evidence from Ethiopia

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Abstract

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1 Introduction

In its second Growth and Transformation Plan (GTP II), the government of Ethiopia has placed due emphasis on enhancing the performance of the export sector. Apart from its potential role in creating well-paying employment opportunities, the sector is believed to generate adequate foreign currency earning that is highly needed for the country's industrialization process. In light of this, the Government, under the GTP II, has planned to expand the export base by strengthening the export performance of selected sectors, including the mining sector. Specifically, the share of mining export in GDP is projected to increase from 0.6 percent in 2014/15 to 1.7 percent at the end of the plan period (2020). In this regard, modern and artisanal production of gold is expected to increase from 9.054 thousand Kg to 25.37 thousand Kg, while foreign exchange earnings of gold export is projected to increase from 343.73 million USD to 2.011 billion USD during the plan period (FDRE, 2016).¹

Enhancing the performance of the gold export is crucial in meeting the targets set for the mining sector in general as gold is one of the major export commodity items in the mining sector. Gold export earnings contribute well above 90 percent to the foreign currency earnings of the mining sector. According to data from 2017, export earnings from gold ranks 4th and contributes to an average of 10 percent to the country's total export earnings since 2000.² Apart from playing a significant role in generating the necessary foreign currency for Ethiopia's development endeavors, the artisanal gold mining sector also contributes towards employment creation and supports the livelihood of millions of Ethiopians. According to information from the ministry of mining, the number of artisan mining jobs is estimated to be around 1.26 million and the sector supports the livelihood of over 7.5 million people in the country (EEITI, 2016).³

In recent years, however, Ethiopia's gold export and/or the amount that is supplied to the NBE for export is on a decline (see Figure A2). The observed dismal performance of the sector can mainly be attributed to the following three factors. i) the widening of the parallel market premium (see Figure A4) that potentially resulted in increased smuggling; ii) changes in the incentive scheme that was available to suppliers of gold to the NBE; and iii) downward trends in international gold prices (see Figure A5), which may also have negatively impacted the production and supply of gold to the national bank. Given all these potential explanations, it is important for policy makers to identify the main factors that discourage gold producers and push suppliers to the informal gold market. More importantly, we believe that it is important to evaluate whether or not the gold producers/suppliers are incentivized enough to supply gold to the NBE.

Given the aforementioned sizable contribution of gold exports to foreign currency earnings and the significant and yet deteriorating contribution of artisanal gold exports towards this, it is crucial to closely study the sector with the aim of identifying the chal-

¹Actual performance of the sector in 2017/18 is # kg, which is way below the target set for the year.

²As of 2011, 19 percent of Ethiopia's export earnings comes from the mining sector. Close to 100 percent of this is coming from exports of gold, of which about 65 percent comes from artisanal gold exports World Bank Group (2014).

³A well performing mining (artisanal gold) sector is also likely to stimulate other sectors in the locality. The artisanal mining sector in general is one source of revenue to the regional governments. Although not well exploited. According to the (EEITI, 2016), SNNP and Oromia collected royalties amounting to 13 million birr and 8 million birr, and it is only about 36 percent of the potential royalty payment that is collected by the regional governments.

lenges the sector is facing.⁴ More specifically, it is important to understand the incentive mechanisms that work and those that do not. This will help policy makers to devise interventions that will incentivize supply of gold to the NBE and remove bottlenecks in the system so as to increase exports. Apart from the incentive system, understanding the role of price of gold and exchange rate of the birr as well as the production process and marketing strategies of artisanal gold miners is important to design policies that can improve performance of the sector.

In light of this, the study has the following three main objectives: i) to evaluate the performance of the gold export sector in the country with the aim of identifying the main challenges the sector is facing; ii) assessing impacts of the incentive mechanisms the NBE avails to suppliers of gold and; iii) suggesting policy recommendations to improve the performance of the sector. To this end, we will:

- Investigate the impacts of the incentive mechanism/system of paying a 5 percent premium on the world price of gold and giving the highest price that prevails in a month on the supply of gold to the national bank. Effort will also be made to investigate which of these incentive mechanisms give greater benefit to gold suppliers and/or result in a stronger response in terms of increases in supply of gold to the bank;
- Investigate the response of artisan gold miners to movements in the official and parallel market exchange rates; or in the percentage difference between the two (the parallel market premium);
- Assess the potential impacts of movements in international gold price on supply of gold to the national bank;
- Assess the challenges faced by artisan miners using a qualitative survey from artisan miners . . .

The rest of the paper proceeds as follows: while [section 2](#) discusses the context and background, [section 2](#) presents methodology and data. In [section 4](#) we present qualitative analysis followed by the empirical results in [section 5](#). Finally, [section 6](#) gives a concluding remarks and policy recommendations.

2 Context: Artisanal gold mining in Ethiopia

2.1 The gold mining sector in Ethiopia: an overview

As in many other gold producing countries, the gold mining and supply chain in Ethiopia is segmented into two - the modern large mining industry and artisanal small scale gold mining sector. As a result of the increasing difficulty of earning livelihoods from the agricultural sector and increasing prices in minerals, the number of artisanal and small

⁴There is hardly any comprehensive/detailed study of the sector in Ethiopia. In a recent study by the Ethiopian Extractive Industry Transparency Initiative (EEITI), which was done with the objective of analyzing the artisan mining sector in Ethiopia and integrate artisan mining information into the Extractive Industry Transparency Initiative (EITI) reports and processes, is probably the only exception. As indicated in this study, “while the information in this document can be considered as a breakthrough for planning and strategic intervention, a more detailed quantitative study is suggested for an in-depth analysis and refinement of key parameters.” ([EEITI, 2016](#))

scale miners has increased globally. Specifically, the number has increased from 13 million in 1999 to 40 million in 2017 (IGF, 2017). Similarly in Ethiopia, the share of artisanal gold miners in the total gold exports has been increasing over time to reach a peak of 68 percent in 2012, before it declined to 48 percent in 2016 following the fall in the global price of gold after 2012. The fact that there has not been increases in exports from the modern gold mining industry either, implies that the decline is primarily due to a reduction in quantity of exports coming from artisanal gold miners.

Ethiopia has only one large gold mining firm, Midroc Legedembi Gold Mine, which produces about 5 tons of gold per year (EEITI, 2016). Since 2011, Midroc Gold, on average, contributes to 38 percent of Ethiopia's total gold exports.⁵ The remaining supply is accounted for by artisanal and small scale gold miners who supply non-monetary gold to the National Bank of Ethiopia for export. The inability of other modern miners (companies) to enter into the sector, due to security issues in the respective areas, has limited the country's capacity to exploit its potential in the sector Ministry of Mining (2017). In addition to this, Midroc Gold's production has been declining over time as it has now exhausted mining gold from the surface, which normally gives a lot of gold, and started mining gold going deep in the mining area (underground, sub-surface mining). Moreover, quite recently, since April 2018, the Ministry of Mines, Petroleum and Natural Gas has suspended Midroc Gold's mining license and its production in Oromia region has been suspended since then. Although several large scale gold mining companies have taken licenses, none of them have started any visible operation so far.

The above, coupled with the declining trend in the world price of gold as well as widening parallel market premium, have potentially contributed towards missing government's targets in increasing gold exports. In general, the contribution of the gold export sector in Ethiopia's foreign currency earnings has been declining since 2012. Despite lack of any major improvement in the export performance of the other sectors, the gold sector's rank in terms of generating export earnings has moved from the top # in ## to # in 2016. In absolute terms, the sector's export earnings has declined from # millions USD in ## to # millions USDs only in 2016.

2.2 The Legal Framework governing artisanal gold mining

In Ethiopia there is a separate legal framework that is used to govern the mining sector, and over the past couple of decades several proclamations and regulations have been issued (EEITI, 2016). The laws governing mining operations in Ethiopia include the Mining Operations Proclamation No. 678/2010 and its amendment Proclamation No. 816/2013 as well as the Mining Operations Regulations No. 182/1994 and its amendment Regulation No. 27/1998.⁶ Furthermore, the Mining Income Tax Proclamation No. 53/1993 and its amendment Mining Income Tax Proclamation No. 23/1996 as well as the Transaction of Precious Minerals Proclamation No. 651/2009 are relevant proclamations that govern mining operations in Ethiopia.

According to the Mining Operations Proclamation No. 816/2013, Ethiopia issues four different types of mining licenses, which include large scale, small scale, special small scale

⁵“There is also a small state-owned mining site/company called Adola, where alluvial gold has been mined for over half a century.” (EEITI, 2016). [Is this still active? How much does it produce? We need to check!]

⁶The Mining Operations Proclamation No. 678/2010 repealed the Mining Proclamation No. 52/1993.

and artisanal mining licenses.

And this proclamation defines artisanal mining as “a mining operation carried out by individuals or small and micro enterprises which is mostly of manual [in] nature and does not involve the engagement of employed workers”. Artisanal mining license is issued for a maximum of two years and it is also not renewable. Although one can question the merit of this procedure, the argument for it is to use artisanal mining operation as a stepping stone to a relatively more advanced mining operation like the special small scale and small scale mining operation.

The proclamation also defines special small scale mining operation as a mining operation carried out by individuals or micro and small scale enterprise that were holders of artisanal mining license and manage to raise enough capital to acquire modern equipments and machineries, but whose annual run-of-mine does not exceed 100,000 m^3 (for placer Operations) and 75,000 tons (for primary deposit mining). The special small scale mining license is valid for a maximum period of 10 years and it is renewable for up to five years.

Royalty and Income tax payments: While large scale mining operators are expected to pay royalty of 7 percent on the sales value of precious minerals, the royalty and income tax rate that is paid by artisanal and special small scale mining operators is left to be decided by the regional governments where the mining operation takes place (see Mining Operations Proclamation No. 678/2010 and No. 816/2013).

Artisanal and special small scale miners can take different legal forms, namely cooperatives, SMEs and Development groups as well as a significant number of informal artisanal miners. According to the (EEITI, 2016) study, which mostly focuses on artisanal mining of gold and opal, the informal group of the artisan miners constitutes the majority, about 94 percent, of the total number of artisanal small scale miners (EEITI, 2016). Although these illegal producers mostly sell their products to illegal traders, instead of selling their gold to the NBE, they do sometimes sell to licensed traders as well. Similarly, licensed miners also sell to illegal traders who will then smuggle the gold outside of the country or use it to buy illegal goods across the border to neighboring countries (see Ministry of Mining (2017)).

Accordingly, only 39 percent of the total production of gold is estimated to be marketed through the formal channel, purchased by the National Bank of Ethiopia for export. Whereas, the remaining significant share (61 percent) is estimated to be marketed through the informal channel and end up in the local markets, and some possibly exported through sales to tourists and foreign passengers (EEITI, 2016). There are also anecdotal evidence showing that some of the gold channel to the informal market is smuggled out of the country or used to buy illegal or contraband goods from neighboring countries. Given that the NBE offers a better price relative to what is prevailing in the international market for the commodity, one may wonder about who will be interested to buy gold at a price higher than what is being offered by the NBE, and for what purpose? As discussed in subsection 2.4 below, there are several factors that make buying gold at a price higher than what is being offered by the NBE attractive and/or push miners and traders to the informal/illegal market.

2.3 Incentives given to small-scale artisanal miners

The government of Ethiopia gives various incentives to gold miners in the country. According to the Mining Operations Proclamation No. 816/2013, special small scale, small scale or large scale miners are entitled to duty free imports of equipment, machineries and vehicles required for their mining operations; for a period of five years starting from the commencement of production. Although artisanal gold miners do not benefit from these privileges, some regions (SNNPR??) exempt artisanal gold miners from royalty payments. In this paper, however, we focus on incentives given to artisanal and special small scale miners, focusing on changes in the incentive schemes given by the NBE. There are basically two incentive systems that the government uses to incentivize the supply of gold to the NBE, and there have been changes in these incentive systems over the years.

For example, the NBE has started, on September 2011, giving suppliers the option of choosing the highest price that prevailed in the global gold market in 30 consecutive days after the supply of gold to the bank (cite ??). Later on, the NBE directive issued on April 2013, stipulates that artisanal gold suppliers should be paid a 5 percent premium on the world gold price that prevails on the day of the supply. A week after this directive, the NBE issued a letter to the CBE to instruct the end of the procedure that allows suppliers to choose the highest price of gold that prevails over the 30 consecutive days following the day of supply to the bank.

Again, after about six years, on November 2017, the NBE has reinstated the provision that allows suppliers to choose the highest price that prevailed in the global gold market in the 30 consecutive days after the supply of gold to the bank. According to the NBE, this is done with an intention of reviving the decline in the supply of gold to the NBE that started in 2014. In the same letter it is indicated that suppliers are to be paid the highest price that prevails in international market on the day of their choosing. As such, it appears that this letter cancels the 5 percent premium paid on the international price

Given the widening of the parallel market premium the country has witnessed in recent years, it is not clear to what extent these incentives work in terms of increasing supply of gold to the official channel. In this paper we will get back to these issues in a greater detail in [subsection 2.5](#) and [section 5](#).

2.4 Major bottlenecks facing the sector

The gold export sector in general has been showing poor and declining performance, missing several of its targets by a huge margin. One can list a number of bottlenecks that can explain the dismal performance of the sector. Accordingly, in this section, we discuss about the major challenges the sector is facing with a focus on the institutional, administrative and most importantly marketing related bottlenecks. To this end we use information collected through key stakeholder interviews as well as information obtained from previous studies conducted on the sector.⁷

Institutional and administrative bottlenecks

According to the study by the ministry of mining (see [Ministry of Mining \(2017\)](#)) , a large number of artisanal and special small scale gold miners complain about the lack

⁷Most of the challenges discussed below are covered/drawn from a study conducted by the Ministry of Mining (see [Ministry of Mining \(2017\)](#)).

of support and attention given by the regional mining bureaus. Although these institutions are entrusted to support and promote the sector, there is evidence that they are not helping the sector as much as they should. Specifically, miners complain about the lack of material (tools and technologies) as well as trainings that can enhance the productivity, quality standards and health/safety of the mining activity as a major problem. Most artisanal and special small scale miners are heavily dependent on traditional tools and techniques, compromising their productivity and quality of production. As a result, graduating from artisanal to special small scale miner in the given two years period is a challenge for most.

The other common problem pointed out by artisanal miners relates to problem of infrastructure. Specifically, shortage of water supply or lack of adequate road to transport water to the mining area using vehicles is a major problem that limits production of gold during the summer time. To solve this problem government can help artisanal miners dig water wells (reserves) and/or supply/facilitate supply of water pumps, and/or facilitating the finance required to do these things (see also [Ministry of Mining \(2017\)](#)). This in a way relates to access to finance problem that limit small scale artisanal miners' adoption of modern, relatively more advanced tools and technologies.

Another institutional failure that limits production and/or productivity of gold is lack of GIS support to locate mining areas with good potential. Despite the availability of this information based on studies conducted by the Ethiopian Geological Survey, coordinated GIS information support is hardly given to small scale artisanal miners. Apart from leading to poor production, this also leads to wastage of time and energy of mining workers as well as damages to the environment (see also [Ministry of Mining \(2017\)](#)).

Given that most of the mining areas are found in remote parts of the country, maintaining peace and security in and around the mining area is another challenge that potentially limits the production of gold. Sometimes such kinds of security problems arise due to conflicts that arise because of existence of unlicensed miners. Furthermore, lack of information about price and rules/regulations, including incentives provided by the NBE is another potential problem.

Issues related to income tax payments are sometimes raised as a potential factor pushing miners and traders to the informal/illegal market. Since the income tax as well as the royalty that is payable by each miner/trader are calculated based on the transaction values, miners/traders have the incentive of supplying their outputs to illegal/informal traders for the sake of hiding the value of their transactions. Given that it is difficult to trace the production or transaction values of each miner/trader, government needs to design alternative ways of enforcing such payment obligations - the current system makes government lose in terms of both tax revenue as well as channeling gold to the formal market.

Marketing related bottlenecks:

The declining performance of Ethiopia's gold export might either be due to slowing down in the production of gold (production related bottlenecks) or shifts in the supply of gold to the informal channel (marketing related bottlenecks). According to the study by the ministry of mines ([Ministry of Mining, 2017](#)), production is continuing as usual, or it is even taking place with the same or a bit larger number of miners (1.2 million) assisted by better technologies. Accordingly, the study conclude that the marketing re-

lated bottlenecks are the main reasons for the decline in export of gold. Below we present and here we present discussion on the main marketing related problems that are likely to contribute towards the decline in the supply of gold to the official channel.

One of the the marketing related problems that discourages supply of gold to the official channel (or encourage suppliers to choose the illegal/informal channel) is the physical inaccessibility of CBE branch offices to the miners or gold traders. Although the number of CBE branch offices that serve as gold collection centers increase through time, in some places these offices are still not located close enough to miners or traders. Whereas, the informal/illegal gold collectors are readily accessible to artisanal and special small scale gold miners (Source ???). Thus both the legal and illegal/informal producers of gold may tend to supply their gold to the illegal/informal traders thereby reducing the supply of gold that is channeled to the official channel.

The other problem that is potentially pushing artisanal miners to the illegal/informal channels is the minimum amount of gold that suppliers can supply to the bank collection centers. Although this minimum amount has been decreasing over time, it may have contributed towards making the illegal/informal channel more attractive. According to the NBE directive issued on October 2008 (Directive No. GT/001/2008), the NBE sets the minimum weight of gold that a supplier can sale to the bank at 250g.⁸ Since this was believed to discourage supply of gold to the official channel, among suppliers that can not easily get 250g of gold but need an immediate cash, the government saw the need to relax this requirement. Following the continuous decline in the required supply of gold to the NBE, the council of ministers has recently, on November 2017, decided to further reduce the minimum requirement to 50g.⁹

Another minor but still potential contributor to the attractiveness of the informal/illegal channel is the small fee charged by the CBE for collecting gold on behalf of the NBE. That is, the CBE deducts (charges the supplier) 0.1 percent of the value of the transaction, as a payment for the service of collecting gold on behalf of the NBE. Although this is a very small amount of payment, coupled with other factors, it can play its own role in pushing suppliers to the informal/illegal markets. Moreover, since the CBE is working on behalf of the NBE, to make the NBE's service accessible to suppliers, it is not obvious why suppliers are required to make payment for the service. Since the NBE is not making profit from exporting the gold (as it pays a 5% premium on the world price), we should also ask from where it is going to get the money, especially if it pays CBE's service fee as well? From the overvalued exchange rate of the birr, of course. Moreover, the NBE can sell the gold when the price goes up again;

2.5 Parallel Market Premium, Illegal Market and Incentives

The main factor that makes legal miners and traders to choose the illegal (informal) channel is the overvalued exchange rate of the birr or existence of a parallel market premium in the exchange rate of the birr.¹⁰ As can be seen from [Figure A4](#), the parallel

⁸This minimum weight requirement was kept the same in the joint directive issued by the NBE, Ministry of Mining and Ethiopian Geological Survey issued on April 2013 (Directive No. CMD/07/2005).

⁹This was expressed in a Council of Ministers letter to the NBE by the Council of Ministers dated November 09/2011.

¹⁰In relation to this, the ministry of mining also indicate the use of gold as a means of exchange, at its parallel market rate, to buy and sell illegal commodities in Moyale, Togo Wuchalle, Metema, Hummera,

market premium is increasing in recent years. Despite NBE paying a 5 percent premium on the international price of gold, the birr equivalent of the price might still be less than the world price converted to its birr equivalent using the parallel market rate.¹¹ This is important since, for smugglers, the birr equivalent price of gold is equivalent to the global price of gold \times parallel market rate. To be more specific, the birr equivalent price paid by the NBE is either:

$$P^{NBE} = P \times NER \quad (\text{assuming no incentive}) \quad \text{OR} \quad (1)$$

$$P^{NBE} = (1 + 5/100)P \times NER \quad (\text{assuming a 5\% premium over price}). \quad (2)$$

Whereas, smugglers will be willing to pay a price (P^s) in birr as given by:

$$P^S = P \times B(1 - \frac{\pi}{100}) \quad (3)$$

¹² Where π is the smugglers' profit margin as defined in [Equation 4](#), wherein we assume that their major cost is given by the price they pay to miners (P^s) and their revenue is given by the product of the international price of gold (P) and the parallel market exchange rate of the birr against the USD (B):

$$\pi = \frac{P \times B - P^s}{P \times B} \times 100 \quad (4)$$

Thus, selling to smuggling will be more attractive than selling gold to the NBE as long as $P^S > P^{NBE}$ (when there is no incentive), that is:

$$\frac{B - NER}{B} \times 100 > \pi \quad \text{Or} \quad (5)$$

$$R > \pi \quad (6)$$

That is, as long as the parallel market premium, defined a bit differently as $R = \frac{B - NER}{B} \times 100$, is greater than the smuggler profit margin, it is attractive to sell gold

Afar and Somalia ares ([Ministry of Mining, 2017](#)).

¹¹For example, according to [Ministry of Mining \(2017\)](#), although the NBE offers 5 percent premium over the daily international gold price, illegal collectors (contrabandists) offer 70 - 150 birr more per gram of gold ([how much will this be in percentage terms? It will give us some info about their profit margin.](#)), discouraging supply of gold to the official channel.

¹²If we instead define Mark-up $M = \frac{P \times B - P^s}{P^s} \times 100$, the smuggler price will become $P^s = \frac{P \times B}{M + 100} \times 100$ and selling to the informal market will be attractive if $r > M$ (when there is no incentive), where $r = \frac{B - NER}{NER} \times 100$ is the parallel market premium. In case the NBE gives an $I\%$ incentive, the condition that makes selling to the informal market more preferable can be stated as $r > M + I + \frac{M \times I}{100}$. [[May be we should use this expression as we don't have to define the PMP differently than the standard/usual way.](#)]

on the illegal/informal market than supplying it to the NBE. From this it is clear that eliminating or at least reducing the parallel market premium is important to attract gold to the official channel by reducing the incentives it gives to the informal/illegal market. Although not explicitly stated in Equation 5 and 6, taking legal or administrative action on illegal/informal gold traders can also boost the supply of gold to the official channel by increasing the profit margin necessary to compensate for such kind of risks.

Similarly, assuming that the NBE gives out an incentive of $I\%$, currently a 5%, premium on the price it pays to gold suppliers to the bank, the above condition becomes:

$$P^S = P \times B(1 - \frac{\pi}{100}) > P^{NBE} = (1 + \frac{I}{100})P \times NER \quad (7)$$

After rearranging and simplifying, this condition can be stated as:

$$\frac{B - NER}{B} \times 100 > \frac{NER}{B} \times I + \pi \quad (8)$$

Using the alternative definition of the parallel market premium as $R = \frac{B - NER}{B} \times 100$ and accordingly expressing NER in terms of the parallel market rate and the parallel market premium as $NER = B(1 - \frac{R}{100})$, we get:

$$R > \frac{I + \pi}{I + 100} \times 100 \quad (9)$$

From this condition we can see that an increase in the parallel market premium (R), for a given level of incentive (I) and smuggler profit margin (π), makes the supply of gold to the illegal/informal channel more attractive than supplying gold to the NBE. Specifically, for example, assuming a 5% smuggler profit margin, a 5% incentive as premium on the price of gold may not be enough to attract suppliers to the official channel whenever the parallel market premium is greater than 9.5%. Or, alternatively, assuming a 5% price incentive and a 5% profit margin, a parallel market premium that exceeds 9.5% will encourage supply of gold to the informal channel. One implication of this is that, assuming a 5% profit margin, a 5% premium on the price of gold offered by the NBE may not be enough to attract gold suppliers to the formal channel whenever the parallel market premium is greater than 9.5%. For a 5% smuggler profit margin, increasing the incentive given to suppliers of the NBE to 10% may increase the parallel market premium that makes the illegal/unofficial channel attractive to more than 13.6%.

3 Methodology and Data

3.1 Methodology

The study is based on analysis of both primary and secondary data. The primary data is collected through key informant survey (see [subsection 3.2](#) for details) and we use this data for qualitative analysis. On the other hand, the secondary data, which is mainly obtained from the NBE, is primarily used to estimate the impact of the incentive system given to artisanal gold suppliers on the amount of gold supplied to the NBE. This is done controlling for, among others, the potential impacts of changes in the international price of gold ($\ln GoldPr_{pt}$) as well as the parallel market premium (PMP_t). The estimated equation takes the following general form:

$$\ln Gold_{ipt} = \alpha + \beta_1 Prem_{ipt} + \beta_2 HP_{ipt} + \beta_3 \ln GoldPr_{pt} + \beta_4 PMP_t + X_{it} \beta'_5 + \eta_t + \delta_i + \gamma_p + \varepsilon_{ipt} \quad (10)$$

Where: i and t are indices for supplier and time (quarter or year), respectively. The dependent variable $\ln Gold_{ipt}$ is log of the quantity of gold (in kg) that is supplied to the NBE by artisanal miners. $Prem_{it}$ and HP_{it} are dummy variables for the incentive schemes available to artisanal gold suppliers and respectively capture the 5 percent premium and the option of taking the highest price during the month of delivery. While X_{it} stands for a vector of time-varying supplier level factors that are likely to determine supply of gold to the NBE, δ_i is supplier fixed effect which is used to control for time-invariant supplier specific characteristics. Finally, η_t is a time fixed effect to capture time varying factors that are common to all suppliers and ε_{it} is the usual error term.

Here the incentive scheme of giving suppliers the highest price that prevails in the 30 days following supply of gold to the bank (HP_t) is defined as:

$$HP_t = \frac{\max_{t=1}^{30} (P_t \times NER_t) - P_t \times NER_t}{P_t \times NER_t} \times 100 \quad \text{if } HP \text{ Period}=1$$

$$HP_t = 0 \quad \text{if } HP \text{ Period}=0 \quad (11)$$

Similarly, the 5% incentive given to suppliers as a premium on the international price of gold is defined as:

$$Prem_t = \frac{P_t \times NER_t (1 + I/100) - P_t \times NER_t}{P_t \times NER_t} \times 100 = I\% \quad (12)$$

That is, at times when the incentive scheme is in place, $Prem_t = 5\%$ and in periods when this incentive scheme is not in place $Prem_t = 0\%$ as it should.

Alternatively, we can estimate the model specified in [Equation 13](#) defining ‘Incentive’ as the sum of the two incentive schemes, $Incentive = Prem_t + HP_t$:

$$\ln Gold_{ipt} = \alpha + \beta_1 Incentive_{ipt} + \beta_3 \ln GoldPr_{pt} + \beta_4 PMP_t + X_{it} \beta'_5 + \eta_t + \delta_i + \gamma_p + \varepsilon_{ipt} \quad (13)$$

We have also generated the ‘Incentive’ variable as the gap between what is actually paid to suppliers and the value that they would get without any incentive. That is, $Incentive = ActualValPaid - P \times Q \times NER$. The above model is estimated using this variable as a sensitivity check.

3.2 Data

For the main analysis in this study, we have used supplier level data from the National Bank of Ethiopia (NBE). In this data we have information on each supplies to the NBE by date of supply, collection center, name of the supplier as well as quantity and value of the supplied gold along with the quality grade of the gold. Monthly data on the parallel market exchange rate of the birr is obtained from the NBE. Similarly, we have secured monthly/daily international price of gold from the NBE and other international sources. We use proclamations and letters written by the council of ministers and the NBE to identified periods with the specific type of incentive given to artisanal miners.

The secondary data we employ in this paper covers the years 2010 to 2018, as we were not able to access similar data on the years prior to 2010. Unless otherwise stated, the estimations are primarily done on a monthly/quarterly basis.

In order to complement the analysis that is conducted based on the secondary data outlined above, we collect primary data through key informant interviews of artisanal miners found in major mining areas in the country as well as through focused group discussions with key stakeholders in the sector.

4 Descriptive/Qualitative analysis

4.1 Descriptive statistics

Contribution of Gold exports to Ethiopia’s total export earnings has been continuously declining since 2012. , The share of gold export to the total export earnings of the country has declined by over 10 percentage point since 2012. This declining trend in gold exports has been driven by declines in exports of gold from both artisan and modern gold export. As can be seen from [Figure A2](#), the declining trend in the supply of artisanal gold to the NBE is true both for the quantity and value of gold supplies. Similarly, the number of trader and miners that supply gold to the NBE, although fluctuating, is also declining over time (see [Figure A3](#)).

One possible explanation to this dismal performance of the gold export sector is the declining trends of the international gold price that happened after 2012. As can be seen from [Figure A5](#), the price of gold in global markets has been increasing since 2003 up until 2012. This increase in price of gold has been steeper between 2005 and 2012, and it had a sharp fall in the first two quarters of 2013, after reaching its pick on the 4th quarter of 2012. After 2013, the price of gold has been stabilizing and increasing slightly since 2015.

The other potential explanation to the declining performance of the sector is the widening parallel market premium in the exchange rate of the birr against the USD observed in recent years. As can be seen from [Figure A4](#) the parallel market premium has been

widening almost continuously giving illegal traders an incentive to channel gold away from the official channels and thereby reducing the value of gold that the country exports.

4.2 Characteristics of artisanal gold mining sector

Production and Processing: Production technology/systems, productivity; organizational types (numbers of cooperatives and micro and small scale miners, total number of members in each of the different organizational forms) and so on;

Size and Contribution of the sector: Size of the sector (in terms of number of miners, number of suppliers to the NBE and supplied quantities and values as well as how this evolves over time and varies over regions (mining areas). We will also discuss contribution of the sector to the overall economy (in terms of employment creation, livelihood support and foreign exchange earning); asking miners to what extent their mining work contributes to their overall income: is it their primary source of income, or a supplement to agriculture or other business? In terms of contribution of the sector to employment creation, “the overall labour income to an individual miner is roughly estimated to be 8,000 to 10,000 birr per annum, with a high standard deviation over the year, and considerably vary from mineral to mineral and location to location.” (EEITI, 2016). We will compare this with the figure that we get from the survey.

Marketing: Market channel related issues (general description of the market chain involved, problems they face when trying to supply to the official channel and how easy it is to sell their products on the parallel market, risks involved and relative benefits)

Artisanal gold miners in Ethiopia do not have to worry about finding market for their products. According to the Mining Operations Proclamation No. 816/2013, holders of artisanal and special small scale gold and silver mining licenses are expected to sell their products to the NBE. The NBE through its agent, the Commercial Bank of Ethiopia (CBE), collects gold from any licensed artisanal miners or traders. The CBE conducts the purchase of gold through its several branch offices located at different parts of the country, namely Assosa, Dimma, Endesilase, Gambella, Hawassa, Mizan, and Shakiso. The price that the NBE pays to its suppliers is based on the world price of gold, but the exact price/value depends on the type of incentive scheme the NBE avails to gold suppliers. Accordingly, the price the NBE pays to its gold suppliers is equal to either the day’s world gold price plus a 5 percent premium or the world price that prevails on the day that the suppliers choose from the 30 consecutive days after the supply of gold to the NBE.

Although the NBE pays its suppliers the value of gold calculated based on international price, it is not clear if the amount of incentive offered by the bank is enough given the widening parallel market rate, as the payment is made in birr equivalent. This issue is discussed in [subsection 2.4](#), and it will be empirically tested in [section 5](#).

5 Empirical evidence

5.1 Incentive schemes and supply of gold to the NBE

In this section attempt is made to estimate the potential impacts of the incentive schemes that the NBE uses to attract supply of gold the official channel and reduce the value of gold that leave the country through illegal channels. Specifically we estimate impacts of the two incentive schemes that the bank avails to suppliers of artisanal gold suppliers. These incentive schemes are presented to suppliers in the form of a premium on the international price of gold and offering suppliers the option of choosing the day with the highest price of gold that prevails in the international market in the 30 days after they supply gold to the bank. In doing so we use alternative measures or ways of quantifying the incentives and estimate the impacts of the respective incentives controlling for movements in the international price of gold, the parallel market exchange rate of the birr as well as controlling for supplier and year fixed effects.

As can be seen from [Table 1](#), the 5 percent premium paid on the international price of gold given to suppliers of gold given to suppliers appears to have a statistically significant positive impact on the quantity of gold supplied to the NBE (see Columns 4 and 6). Specifically, compared to periods when this incentive is not in place, the quantity of gold supplied to the NBE is, on average, 2.5 percent higher during periods where this incentive is available to suppliers. On the other hand, our results show that relatively less amount of gold is supplied to the NBE in periods when the 30 days highest price incentive is in place. This result is in contrast to what would be expected theoretically and needs further checking as the variable might be picking up the fact that the policy is activated at times when the supply of gold is going down.

Table 1 Supply of gold to the NBE

	Without Year FE			With Year FE		
	(1)	(2)	(3)	(4)	(5)	(6)
Log Int. Price in Birr	-0.272 (0.258)	-0.271 (0.247)	-0.146 (0.260)	3.308 (0.398)***	3.606 (0.407)***	3.655 (0.406)***
Para. Mkt. Premium	-0.092 (0.006)***	-0.090 (0.006)***	-0.090 (0.006)***	-0.026 (0.005)***	-0.022 (0.005)***	-0.022 (0.005)***
Five perm Incentive	0.260 (0.065)***		0.148 (0.076)*	2.519 (0.248)***		2.207 (0.251)***
Highest Pr. Incentive		-0.260 (0.060)***	-0.175 (0.069)**		-0.375 (0.071)***	-0.364 (0.070)***
Constant	10.684 (2.602)***	10.928 (2.464)***	9.513 (2.626)***	-28.369 (4.090)***	-28.915 (4.091)***	-31.586 (4.155)***
Year FE	No	No	No	Yes	Yes	Yes
Number of Obs.	6495	6495	6495	6495	6495	6495
Adj. R2	0.44	0.44	0.44	0.46	0.46	0.46

Robust standard errors given in parentheses.

All regressions include Supplier Fixed Effects.

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

The above results remain qualitatively the same when we measure/quantify the in-

centives as continuous variables defined as per equations [Equation 11](#) and [Equation 12](#). As can be seen from [Table 2](#), the results are qualitatively the same as discussed above. In terms of magnitud, now a 1 percentage point increase in the ‘price premium’ paid as an incentive is associated with 0.5 percent increase in the quantity of gold supplied to the NBE. Even when we define the ‘highest price in 30 days’ incentive as a continuous variable, its coefficient is still negative defying expectations.

Equally importantly these tables present consistent findings on the impacts of movements in the international price of gold and the parallel market premium in the exchange rate of the birr against the USD. The following two subsections present brief discussions on the impacts of these two variables on the quantity of gold that is supplied the NBE.

Table 2 Supply of gold to the NBE: Using a continuous measure of incentives

	Without Year FE			With Year FE		
	(1)	(2)	(3)	(4)	(5)	(6)
Log Int. Price in Birr	-0.27 (0.26)	0.71 (0.29)**	0.71 (0.29)**	3.31 (0.40)***	5.26 (0.48)***	5.26 (0.48)***
Para. Mkt. Premium	-0.09 (0.01)***	-0.11 (0.01)***	-0.11 (0.01)***	-0.03 (0.01)***	-0.05 (0.01)***	-0.05 (0.01)***
5 perct Ince.(%)	0.05 (0.01)***			0.50 (0.05)***		
Highest Pr. Ince.(%)		-2.76 (0.20)***			-3.29 (0.28)***	
NBE Incentive			0.63 (0.04)***			0.75 (0.06)***
Constant	10.68 (2.60)***	1.26 (2.92)	-1.90 (3.02)	-28.37 (4.09)***	-45.30 (4.84)***	-49.06 (4.97)***
Year FE	No	No	No	Yes	Yes	Yes
Number of Obs.	6495	5419	5419	6495	5419	5419
Adj. R2	0.44	0.36	0.36	0.46	0.38	0.38

Robust standard errors given in parentheses.

All regressions include Supplier Fixed Effects.

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

5.2 Impact of the parallel market premium on gold supplies to the NBE

Apart from the incentive to avoid paying income taxes, one of the reasons why ASM opt for smuggling is because of the foreign exchange rate premium. Even if the NBE pays (is willing to pay) a 5 percent premium on the international market price of gold, illegal traders have the incentive to pay more and thereby channeling supplies of gold away from the official channel. As discussed in [subsection 2.5](#), an increase in the parallel market exchange rate of the birr is likely to lead to a decline in the supply of gold to the official channel by increasing the gains to smugglers traders who transact the gold at the parallel market exchange rate of the birr.

Accordingly, the empirical results presented in this paper clearly show the negative role of a widening parallel market rate on the supply of gold to the NBE for export.

Specifically, a 10 percentage points increase in the parallel market rate is associated with 3 to 5 percent decrease in the supply of artisanal gold that goes to the NBE. This result is consistent to the theoretical expectation that a widening gap between the official and parallel market exchange rates incentivize the illegal channel as smugglers/contrabandists will be willing and able to pay a higher price than what is offered by the NBE. The results presented in [Table 1](#) and [Table 2](#) remain similar across alternative estimation methods or measures of incentives used (see Columns 4 to 6).

5.3 Impact of gold price on supply of gold to the NBE

Basic economic theory suggest that production and hence supply of gold should decrease following a fall in the market price of the commodity. In the case of gold (or artisanal mining in general) this might not be the case for at least two reasons. One, artisanal miners are normally poor and they may actually respond to a fall in the price of gold by increasing its production, so as to keep their income from falling with the fall in the price of gold (or to smooth consumption). Two, since artisanal miners' alternative (outside) option does not pay as much as mining, a small drop in the price of gold does not necessary lead to a similar drop in the production of gold. Moreover, the very low cost of capital and flexible (own) cost of labor implies that the minimum threshold of gold price below which mining is not economical is relatively very low and less rigid for artisanal miners than modern/industrial miners ([Source](#)). [Name] indicate that historically when the price of gold drops, artisanal gold mining operation tends to stay the same or grow. For example, such episodes were observed following the gold price falls in the 1990s.¹³

As theoretically expected, increases in the international price of gold (see Columns 4 to 6 of [Table 1](#) and [Table 2](#)) is positively and statistically significantly associated with increases in the supply of gold to the NBE.

6 Conclusion and policy recommendations

The results in this paper show that the incentive that the NBE gives to suppliers of artisanal gold in the form of a 5 percent premium paid on the international price has a statistically significant positive impact on the quantity of gold supplied to the bank. We concur that this is an important policy measure in terms of increasing the supply of gold to the official channel. One can, however, also argue that this is a necessary policy measure needed to compensate suppliers for the artificially high value of the birr against the USD. Moreover, reality on the ground as well as the simple calculations that we presented in the paper show that the current 5 percent incentive rate may not be big enough to attract gold to the official channel. This is especially true at times when the parallel market exchange rate of the birr is in its double digits as it has been the case in recent years.

¹³Even in the case of industrial producers of gold, a drop in the price of gold will not automatically result in a similar fall in production of gold. For example, global gold production has been increasing steadily from 2280 metric tons in 2008 to 3150 metric tons in 2017, despite a reduction in global prices after 2012 ([Lederman, 2018](#)). This is because, for modern/industrial miners, slowing down production following a fall in the price of gold is not economical (especially for the once that are economically strong) ones they start production with a lot of investment. Any observed fall in production is likely, at least first, to come from miners that are economically weak and could not stand the fall in the price of gold (operate profitably in the face of a decline in the price of gold) ([Source](#)).

We thus argue that a more durable, less expensive and fair (to all export commodities) solution is to narrow down the gap between the official and parallel market exchange rate of the birr. Apart from this, below we have listed suggestions that can improve the performance of the sector:

Setting a target: the regional governments can require producers to supply a certain minimum amount of gold from a given size of land, given its potential. This can be done with the condition that the regional government can invoke the land use license given to that specific miner if and when it fails to meet this minimum level of production requirement.

In line with this, it might be better to require them to pay a fixed amount royalty payment based on the size and riches of the land that they are mining; instead of charging miners an annual income tax, based on their sales records (volume). This can minimize miners' tendency to stay away from supplying to the official channel for fear of paying income taxes. Currently the royalty payment to the regional governments is also a percentage of the income the artisanal miner gets in a given year (some regions have actually exempt this payments).

In terms of increasing the performance of gold collection, increasing the number of gold collection centers is important so as to make it easier for artisanal gold miners and traders supply their gold to the official channel.

Although it is a small amount, the CBE's service charge, a flat rate of 0.1 percent, that suppliers have to pay when supplying gold to the CBE collection centers, can discourage supplies of gold to the official channel. It may instead be wise to switch the responsibility of paying the service fee from the supplier to the NBE.

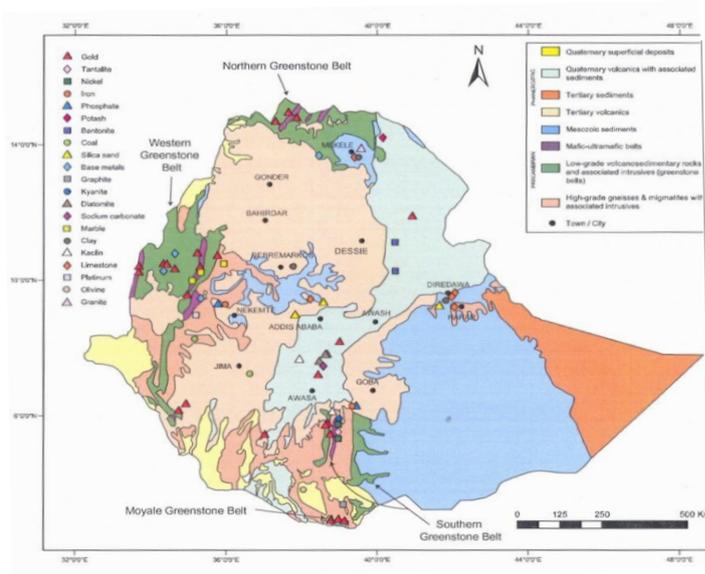
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Appendices

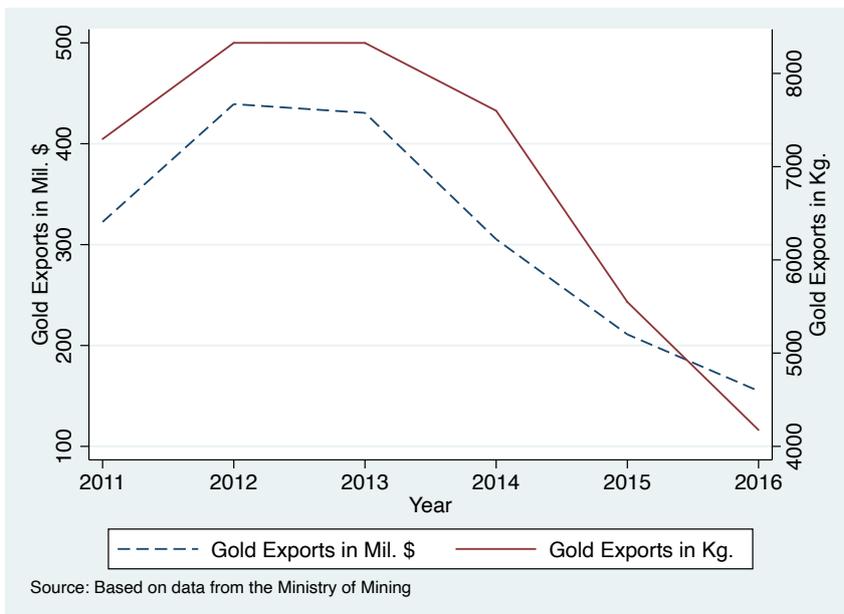
Appendix A: Descriptive Statistics

Figure A1 Ethiopia: Areas with mineral potential



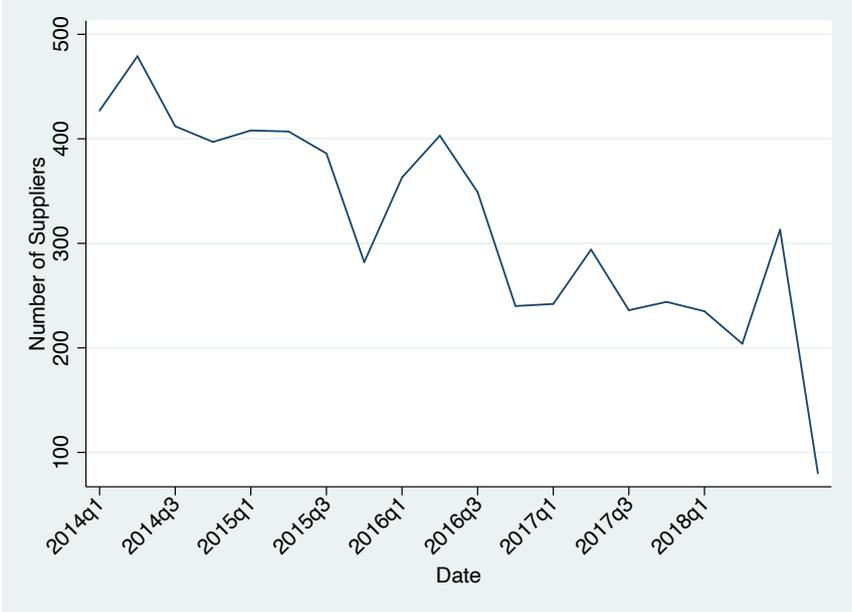
Source: Geological Survey of Ethiopia.

Figure A2 Trends in Artisan Gold Supplied to the NBE and Corresponding Export Earnings: 2010/11 to 2015/16



Source: Based on data from the Ministry of Mining

Figure A3 Trends in Artisan Gold Suppliers to the NBE: 2013q4 to 2018q4



Source: Own computation based on supplier level data from NBE

Figure A4 Trends in Parallel Market Premium

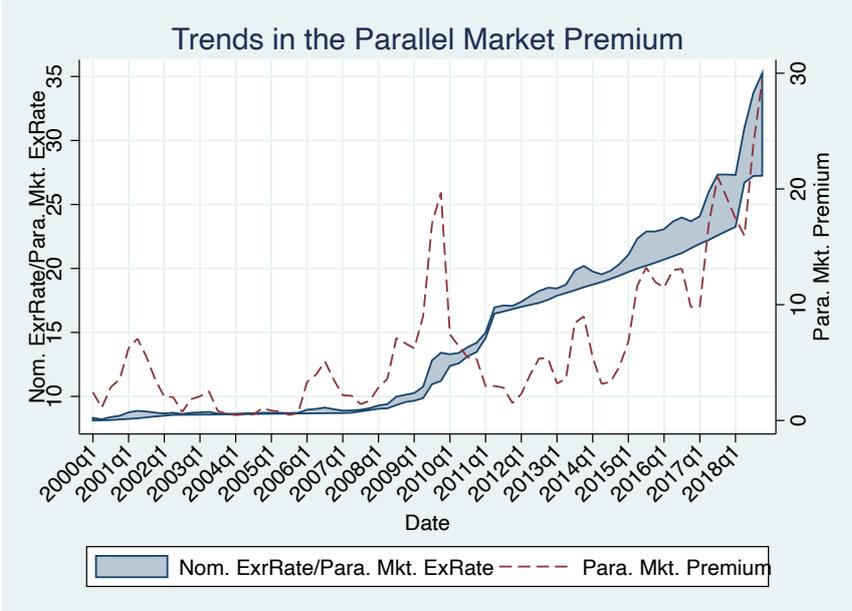
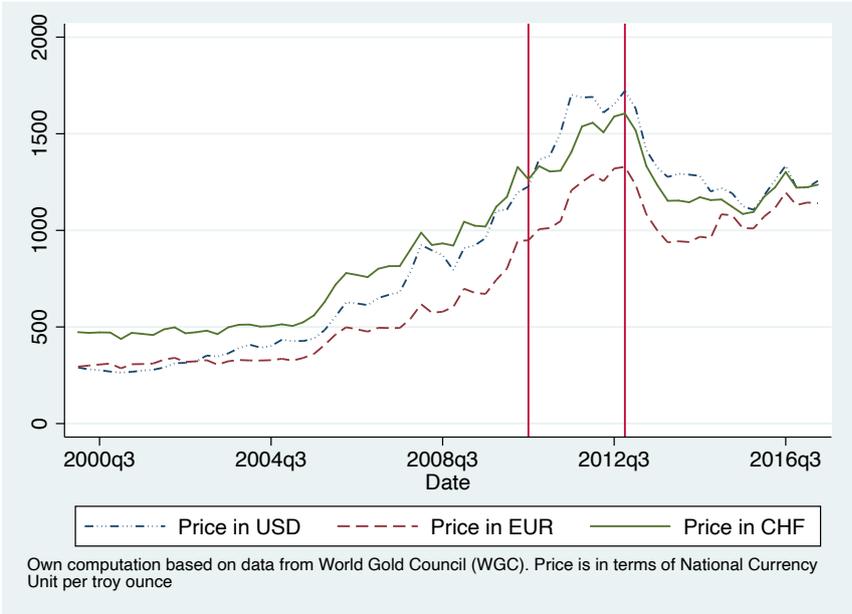


Figure A5 Trends in International Price of Gold



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