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## Revenue loss from legal timber in Indonesia

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## ABSTRACT

The link between forest revenue administration and under performance of revenues from legal timber has received little attention in the literature. This article analyzes revenues from the timber royalty and reforestation fund fee, two important forest non-tax revenues in Indonesia whose tropical forest has been under threat of extensive deforestation particularly from commercial timber logging. It shows that revenue realization does not reflect potential with two key findings: first, timber royalty revenues represent only 52% of their potential, and second, revenues from reforestation fund fee suggest a counter-intuitive pattern – revenue realization is 34% above its potential. We provide plausible explanations from the perspective related to features of revenue collection. We further consider policy relevance in terms of forest revenue administration.

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## 1. Introduction

Forests make a significant contribution to public revenues in tropical regions around the world (Whiteman and Lebedys, 2006). In Indonesia, collected revenues are generally below their potential (Kelly, 2012; Handadhari, 2005). The loss of non-tax revenues (NTRs) from the forestry sector is estimated to be approximately IDR 2.5 trillion annually (KPK, 2013). Revenues derived from forest resources are often used to finance development in general as well as forestry-related measures (Searle, 2007; Krott, 2005). A low revenue collection likely contributes to low capacities to implement public services. The public budget for climate change mitigation in Indonesia, for instance, is able to address only 15% of the targets in the national plan for green house gas emission reduction, including those directed to the forestry sector (MoF, 2012).

Improved information and better understanding of revenues in the forestry sector can help to enhance the governance of forest revenues. How much are the potential and collected revenues from timber? How large is the gap between them and what might explain the revenue loss? This paper poses these questions for two sources of revenue, i.e. timber royalty known as forest resource rent provision (PSDH/Provisi Sumber Daya Hutan) and reforestation fund fee (DR/Dana Reboisasi) fee, which represent the country's two most important non-tax revenues in the forestry sector, and seeks to explain the revenue collection-potential gap in relation to the system of revenue administration. This is one of the first studies to look at these questions systematically.

Similar research merely estimates forest revenues (e.g. Kim et al., 2006), highlights potential revenue loss due to illegal logging (e.g. Human Rights Watch, 2013), and qualitatively discusses possible causes of revenue shortfall especially from legal timber. Conversely, this research seeks to understand revenue administration from the specific policy context and setting within which it operates.

We are able to show using official data that revenues from forest resource rent provision (PSDH), a timber royalty, and fee for reforestation fund (DR) do not reflect their potentials. Moreover, on the contrary to existing studies that focus on corruption as an overriding explanation of revenue shortfall (e.g., Tacconi et al., 2009), which we hold as a profoundly important factor, this study offers an explanation from a wider perspective of forestry revenue administration by highlighting a variety of factors related to billing, payment and reporting.

This paper is organized as follows. It briefly provides the context for revenue management and forest economic rent (Section 2), revenues from legal timber in Indonesia (Section 3) before explaining the research methodology (Section 4). In Section 5, findings are presented and discussed. In Section 6, policy implications are discussed in relation to forestry revenue administration.

## 2. Revenue management and forest economic rents in Indonesia

In many tropical countries, forests are owned by the state and the government seeks to capture economic rents from forest resource use through a set of fiscal instruments and schemes (Karsenty, 2010). In Indonesia, rents from forest are captured through tax and non-tax revenues. Tax revenues accounts for about IDR 13.8 trillion or USD 1.5

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billion (2011 data, including tax revenues from agriculture) while non-tax revenues contribute around 3.3 trillion rupiah or 362 million US dollar (2011 data). Forest non-tax revenues (NTRs or Penerimaan Negara Bukan Pajak, PNBP) are the focus of this study. Forest NTRs are categorized into timber and non-timber. Timber NTR comprises four types of revenues: reforestation fund, forest resource provision, forest utilization, and stumpage value compensation. Non-timber NTR covers additional areas including, among others, forest area use for non-forest purposes, violation of forest exploitation, tourism and hunting.

Theoretically, economic rents from forest use should be collected at each step of the timber extraction chain. Non-tax revenues include license fees and fees according to annual allowable cut, stumpage volume, felled timber volume, volume of logs transported to the log pond, volume of processed products, and volume of exported wood products (Karsenty, 2010). In Indonesia, the Ministry of Forestry collects rents based on the concession area and cut timber volume at the log pond. Land area-based rent is collected via the forest utilization permit fee (IUPH), while volume-based rent is collected via the forest resource rent provision (PSDH), and reforestation fund (DR), which applies only to timber from natural forests. Partial coverage of the value chain may lead to sub-optimal rent capture.<sup>1</sup>

PSDH and DR are the focus of this study. These are ex post instruments in that they collect actual or realized revenues after forest resources have been used (Brosio, 2006). Together the instruments constitute a large portion of overall forest revenues; in 2011 for instance, they accounted for 83% of total NTRs from both timber and non-timber (Table 1).

Under Indonesia's fiscal decentralization, some forest NTRs are collected and distributed to central, provincial and local governments through revenue sharing arrangements. Timber royalty (PSDH) and the reforestation fund fees (DR) are among those shared.

### 3. Revenue and information flows in legal timber

The collection of timber NTR follows a process involving revenue flow and information flow about revenues, encompassing billing, payment and reporting activities (Fig. 1). At the billing stage, a holder of a forest utilization permit (concessionaire) submits a proposal of production output to the authorizing official which then issues production report document to the concessionaire and billing official. Following this, a payment order for the timber royalty and the reforestation fund fee is issued by the billing staff and forwarded to local forest agencies and technical units at the Ministry of Forestry. Companies pay NTR on the basis of this order to the Ministry of Forestry's treasury who will later deposit the payment to state treasury.

In terms of information flow about revenues, the concessionaire needs to submit a payment report to the local forest agency who in turn submits it to the provincial forest agency and, at the same time, makes this information available to the secretary general, business directorate general and head of technical service unit, all of which are at the Ministry of Forestry. A consolidated payment report is then submitted by the finance auditor at the Ministry of Forestry to the minister of forestry and its secretary general. Only agencies related to forestry are involved in the revenue and information flows in this entire process – from billing to payment and reporting.

### 4. Methodology

The calculation of potential revenues from the timber royalty and reforestation fund fee from timber production uses the official formula and tariff, given below, and secondary data published regularly by

government agencies. Data paucity and data inconsistency necessitated some assumptions. The results of the calculation are compared with estimated and collected revenues from timber royalty and reforestation fund fee published by the Ministry of Forestry in order to estimate the revenue potential-realization gap.

#### 4.1. Data and assumptions

##### 4.1.1. Timber production

Round timber production data for the period 2007–2012 was obtained from Forestry Statistics 2012 (see Table 2). Based on size, round timber was categorized into round timber (diameter > 30 cm) and small round timber (diameter < 30 cm). Round timber can be produced under the following permits: (1) timber forest product utilization business permit from natural forest (IUPHHK–HA, Izin Usaha Pemanfaatan Hasil Hutan Kayu Hutan Alam); (2) timber utilization permit (IPK, Izin Pemanfaatan Kayu) and other valid permit (ILS, Izin Lain yang Sah); (3) Perum Perhutani (state-owned forest enterprise); (4) timber forest product utilization business permit from plantation forest (IUPHHK–HT, Izin Usaha Pemanfaatan Hasil Hutan Kayu Hutan Tanaman); and (5) other sources (Sumber Lainnya). Other sources category includes timber from community plantation forest (HTR), community forest (HKm) and timber outside forest areas.

Small round timber was assumed to be produced only under the timber utilization permit (IPK) and other valid permit (ILS), while sources of round timber were IUPHHK–HA, IUPHHK–HT, Perhutani, and other sources (community plantation forest, community forest, and others), including IPK/ILS. Data for weight of timber per timber species produced using a IUPHHK–HA permit were obtained from Statistics Indonesia (BPS, 2012).

##### 4.1.2. Definition of timber

For the calculation of forest resource rent provision (PSDH), timber refers to all timber that are subject to NTR, which would include timber from natural forests, plantation forests, and community plantation forests as well as other forests area subject to this fee. As for reforestation fund, timber refers to any timber obtained or taken only from natural forests.

##### 4.1.3. Categorization of timber, price, and tariff

The simulation for PSDH in this study refers to benchmark prices for timber by type and by source<sup>2</sup> and make the following assumptions. Timber from IUPHHK–HA uses round timber benchmark price for each type as applied in Region 1 (covering Kalimantan, Sumatera, Sulawesi and Maluku) and 2 (Papua, Nusa Tenggara and Bali). The quantity of round timber by type is derived from total timber production multiplied by the weights assigned to each timber type and to each region (both type and region are percentage proportion of total timber production).

Timber from IPK/ILS is divided into round timber (diameter > 30 cm) and small round timber (diameter < 30 cm) with a 50:50 proportion. Small round timber comes from land clearing prior to industrial timber plantation (Hutan Tanaman Industri, HTI) and mining activities in forest areas. Round timber (diameter > 30 cm) is further grouped into Meranti (*Shorea* spp.) and Rimba Campuran (mixed species) with a 50:50 proportion. Round timber uses the benchmark price of Meranti and Rimba Campuran in Region 1 while small round timber uses the price for timber with a diameter of less than 30 cm.

Timber from Perhutani, the state owned forestry enterprise, by species is classified as teak and forest timber (kayu rimba) with a 45:55 proportion as suggested in the proportion of timber production in the 2011 annual report of Perhutani. Teak (*Tectona grandis*) is the primary product of Perhutani, contributing around 45% to total timber production. The remainder 55% of timber production is obtained from forest

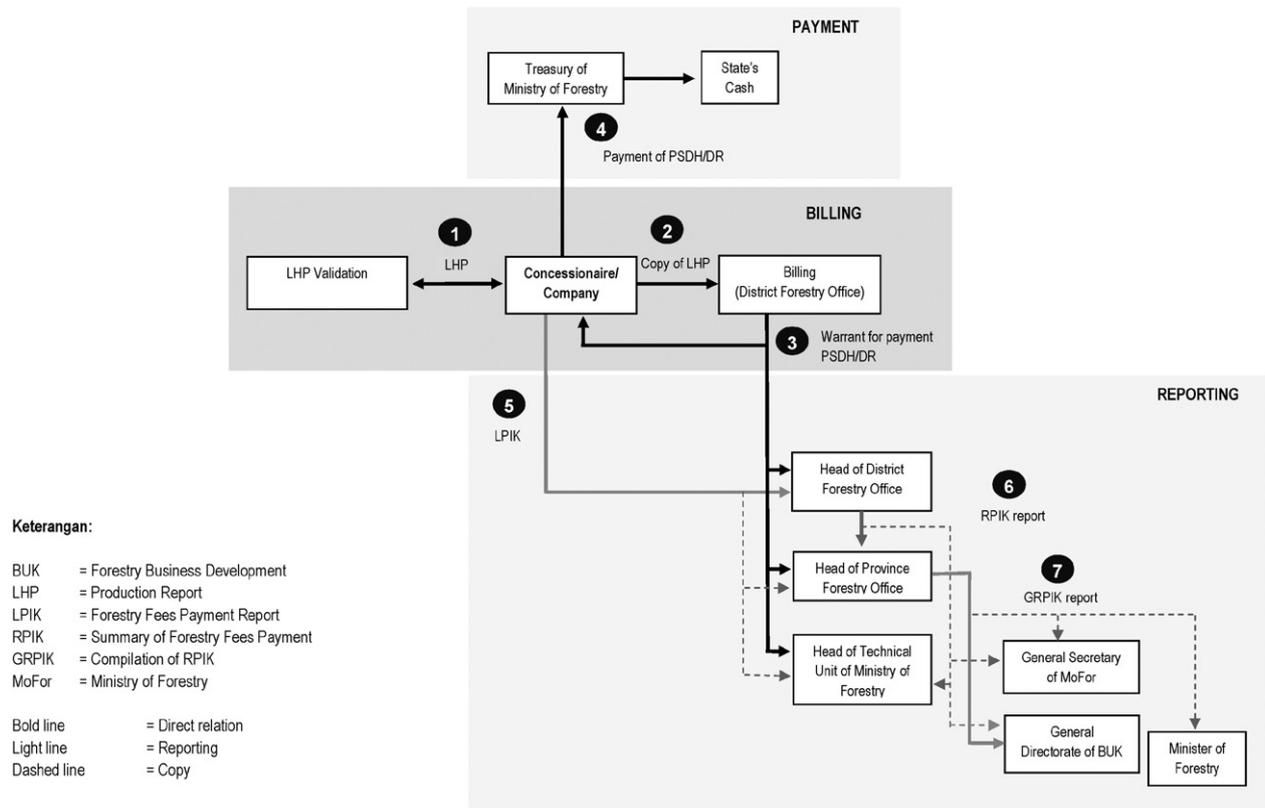
<sup>1</sup> Sub-optimal rent capture due to partial coverage of the extraction chain should be differentiated from sub-optimal rent capture due to the NTR structure and system (Amacher et al., 2001) or timber quality (Vincent, 1990). For a more general discussion on sub-optimal forestry rent capture in Indonesia, see Brown (1999).

<sup>2</sup> Attachment to the trade minister regulation issued in 2007 on determining benchmark price for the calculation of timber and non-timber NTRs.

**Table 1**  
Selected timber and non-timber NTRs in 2011.

Type of NTR	NTR instrument	Target (billion Rp)	%	Realization (billion Rp)	%
Timber	Reforestation fund fee (DR)	1279.18	43.51	1822.92	55.9
	Forest resource rent provision (PSDH)	1359.05	46.23	868.55	26.7
	Forest utilization business permit fee (IUPH)	94.89	3.23	119.26	3.7
	Stumpage value compensation (GRNT)	0	0.0	97.29	3.0
Non-timber	Forest area use (PKH)	175.02	5.95	315.67	9.7
	Levy for entry to natural tourism spot (PMOWA)	17.15	0.58	24.56	0.7
	Fee for transporting wild animals/plants (IASL/TA)	10.04	0.34	5.41	0.2
	Penalty fee for violations in forest exploitation (DPEH)	0	0.0	4.25	0.1

Source: Unpublished data from Finance Bureau, Ministry of Forestry.



**Fig. 1.** Administrative system of timber NTR.

timber such as Mahoni (*Swietenia macrophylla*), Rasamala (*Altingia exelsa*), Sonokeling (*Dalbergia latifolia*), Pinus (*Pinus merkusii*), Damar (*Agathis dammara*), Akasia (*Acacia mangium*), Sengon (*Paraserianthes falcataria*), and Johar (*Cassia siamea*). Teak uses benchmark price from Perhutani teak timber while Kayu Rimba uses average benchmark price from Kayu Rimba Perhutani.

Timber from IUPHHK-HT and so-called other sources are grouped into seven timber types (on equal proportion) as classified in the minister of trade decree on timber benchmark price.

Further assumptions are made for discussions in Section 6 for timber royalty (PSDH) revenues using domestic and international timber market prices for the period of 2008–2012 released by the Global Wood Trade Network. Here, the average price of Meranti in the domestic market is set as the reference price for domestic market. The choice is justified as the Meranti species grows across Indonesia and is the primary product of natural production forest. The average export price of Meranti round timber in Serawak (free on board price) is used as the international timber price since an international reference price for Indonesian round timber is not available given that export is prohibited.

The reforestation fund fee is based on government regulation specifying forestry NTR tariffs for timbers from IUPHHK-HA and IPK/ILS.<sup>3</sup> Tariffs for IUPHHK-HA are based on the type of timbers by origin, while timber from IPK/ILS is divided into (1) round timber and (2) small round timber, in a 50:50 proportion. Round timber is further grouped into Meranti, Rimba Campuran and Kayu Indah all of which have tariffs set according to area of origin multiplied by weight generated from the percentage proportion of timber type relative to total timber production. Small round timber uses an average reforestation fund tariff levied upon timber with a diameter of less than 30 cm.

**4.1.4. Estimated revenues**

Estimated revenues refer to amount of revenues as estimated in the minister of finance regulation or PMK (i.e. PMK Perkiraan Alokasi). The revenues were estimated for each year from its past consecutive three budget years of actual forestry revenues by derivation (province and

<sup>3</sup> Government Regulation no. 92 year 1999 on tariff for non-tax revenues applicable in forestry and agriculture.

**Table 2**  
Round timber production by source during 2007–2011.

Year	Source of production					Total (million m3)
	Natural forest		Timber plantation		Other sources (million m3)	
	IUPHHK-HA (million m3)	IPK/ILS (million m3)	Perhutani (thousand m3)	IUPHHK-HT (million m3)		
2007	6.44	4.39	48.03	20.61	0.71	32.20
2008	4.63	2.76	97.48	22.32	2.19	32.00
2009	4.86	6.62	87.83	18.95	3.80	34.32
2010	5.25	14.49	98.00	18.56	3.72	42.11
2011	5.09	0.60	112.86	19.84	21.79	47.43
2012	5.14	0.75	142.46	26.13	17.10	49.26

Source: General Directorate of Forestry Business Development, Ministry of Forestry.

district). We use the values in this regulation for estimated revenues from timber royalties and reforestation fund fees. The PMK data is used as it has been reconciled by both central and sub-national government line agencies and thus is expected to be more reliable than the revenue data in the Ministry of Forestry's annual statistics.

#### 4.1.5. Revenue realization

Realization value for revenues from timber royalty and reforestation fund fee refers to the allocation of forestry revenue sharing in the finance minister regulation (i.e. PMK Alokasi) which provides actual revenues for the period of January to October of the year in concern. For revenues in the remaining two months, we use the value of reserves funds also provided in this regulation.

#### 4.1.6. Potential revenues

Potential revenues refer to revenues that can be realized from produced timber as it is being officially reported for a given period and at a given tariff and price as they are prescribed in the regulation. The values for the two NTRs are derived from simulation using (a) round timber production data and (b) calculation formula for timber royalty and reforestation fund fee as published and employed by the Ministry of Forestry. The definition of potential revenues does not refer to estimated amount of revenues using the most reasonable method available (e.g. as defined in Kim et al., 2006) but to ones using the method prescribed by the regulation. This is intentional so as to enable a direct comparison between potential revenues and realized revenues as defined and applied in the actual practices of forestry revenue policies. Additionally, the definition of potential revenues was not in reference to the annual allowable cut rate, a rate that did not always fully represent the timber produced, but rather to actual timber production.

#### 4.1.7. Exchange rate

The tariff for the reforestation fund fee is set in USD based on the existing regulation. Here we use an annual average exchange rate for respective years during the years of study with 1 US dollar equals 9900 rupiahs.

## 4.2. Formula

### 4.2.1. Forest resource rent provision (PSDH)

Forest resource rent provision is technically a levy imposed as compensation for the intrinsic value of forests products, both timber and non-timber, extracted from forests areas. Its official formula is:

$$\text{PSDH} = \text{timber volume stated in production report} \times \text{rate of levy} \times \text{benchmark price}$$

The benchmark price refers to the trade minister regulation which was in effect during the years under study.

### 4.2.2. Reforestation fund (DR)

Reforestation fund fee is collected from concessionaires in natural forest, primarily for purposes of reforestation and forest rehabilitation. Its official formula is:

$$\text{DR} = \text{timber volume} \times \text{tariff}$$

Timber volume is derived from two types of reports, the production report for the selected cutting and replanting permit (TPTI/Tebang Pilih Tanam Indonesia) and the cruising report (LHC/Laporan Hasil Cruising) for permit other than those under the TPTI system, which allows only 6–8 trees per hectare to be felled (Primack and Corlett, 2005). The cruising report contains an inventory of forest stumpage prior to felling.

## 5. Analysis

### 5.1. Revenues from timber royalty (forest resource rent provision fee, PSDH)

#### 5.1.1. Findings

The results of our simulation suggest that the values of estimated and collected timber royalties, as reported in the regulation of finance minister (PMK, Peraturan Menteri Keuangan) were far below their potential. In the period of 2007–2012, the weighted average of estimated timber royalties reached only 63% of their potential value. The gap was even greater in realized or collected revenues, which on weighted average accounted for merely 52% of the level that the state should have been able to capture (Table 3).

In general, the revenue gap between realization and potential revenues shows an upward trend. In part this can be associated with an increasing trend of round timber production during 2008–2011 reaching its peak in 2011 with 47 million m<sup>3</sup> production, when the realization-potential gap also hit the highest mark across years (Fig. 2). To date, higher timber production has implied more revenue loss from timber royalty for the state.

#### 5.1.2. Discussion

There are several plausible explanations for the gap between realization and potential revenues from timber royalty, related to billing, payment and reporting, as discussed below.

**5.1.2.1. Billing.** First, the billing for auctioned timber was underpriced below the benchmark price. Timber which has been confiscated, had its ownership changed, or auctioned have no legal permit. Thus far there was no definite tariff of timber royalty for auctioned timber (Kemenhut, 2005). While auctioned timber data is rarely available, a report by the Supreme Audit Agency (BPK, 2009) suggested that PSDH and DR revenue loss from confiscated timber in 2008 from only one district in West Kalimantan amounted to Rp 5.5 billion or USD 500,000. The average quotation for timber royalty, reforestation fund fee, and local retribution was only IDR 161,850/m<sup>3</sup> for round timber according to

**Table 3**

The comparison between estimated and realized revenues from timber royalty (PSDH) and their potential revenues for 2007–2012.

Years	Timber royalty (PSDH), billion of rupiah			Difference between revenue estimation and its potential (billion Rp)	Difference between revenue realization and its potential (billion Rp)	Revenue estimation to its potential (%)		Revenue realization to its potential (%)
	Estimation	Realization	Potential			All	Estimation < potential	
2007	1217		1362	145		89	89	
2008	1499	969	1356	– 143	385	111	89	71
2009	1249	833	1400	151	567	89	89	60
2010	597	799	1606	1009	807	37	37	50
2011	893	856	2034	1141	1178	44	44	42
2012	791	999	2110	1319	1111	37	37	47
Weighted average						56		52

Notes: (1) While values of estimated and realized revenues from timber royalties in this table are values for both timber and non-timber, the value of potential revenues here only recognizes royalty for timber, thus undervaluing potential revenues from timber royalties. As signified in the text, the choice to calculate only timber royalty is motivated by data paucity. (2) Data for PSDH estimated and realized revenues are from various minister of finance regulations on the allocation of revenue sharing from forestry sector. PSDH potential revenues are own calculation.

Ministry of Forestry (Kemenhut, 2005). Lower auction prices like this were intentionally set below the benchmark price as prescribed in the regulation (BPK, 2009). This was relatively lower and could be deemed inappropriate for at least two reasons: (1) the prevailing benchmark price to calculate timber royalty and reforestation fund fee for Meranti timber was 218,400/m<sup>3</sup> (excluding local surcharge); and (2) the potential economic rent could be higher if the reference price followed market price (see Section 6). According to the Timber Companies Association (APHI, 2012), auctioned timber originating from repossession or confiscation may have been included in timber production reports of the Ministry of Forestry and stated under the category of timber from “other sources”. However, official report from the Ministry of Forestry has yet to reveal definite amount (m<sup>3</sup>) and percentage of auctioned timber. The consequence of this is that any calculation of timber royalty revenues would tend to result in higher than revenue realization given that other sources category was mistakenly factored in as having the same tariff as the regulation prescribed for legal timber.

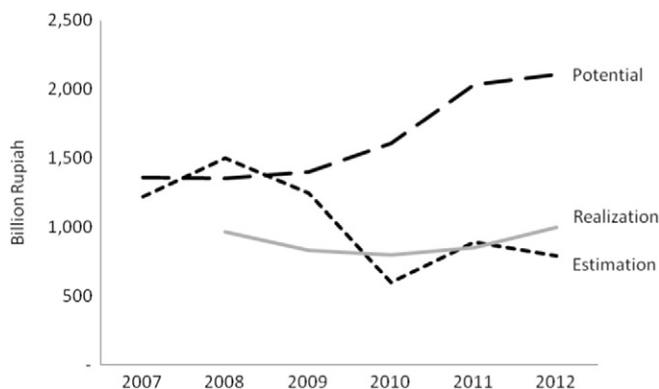
Further implications follow. Concessionaires may save incurring production costs as they are not obligated to pay for forest inventory expenses for auctioned timber. Moreover, the auctioned timber can be a sort of formalization mechanism for “informal” timber. In an informal economy, legality is one of the defining criteria to separate formal from non-formal (Mead and Morrison, 1996). The payment of timber royalties and reforestation fund fee for illegal timber (that are confiscated and auctioned) can be a way to surmount legality obstacle. In a sense this practice is similar to timber retribution paid by illegal loggers in Kalimantan to obtain “legality” (Casson and Obidzinski, 2002). The newly issued regulation to impose a levy of 100% on the timber benchmark price for concessionaire and or individuals who damage forest

stumpage, the stumpage value compensation (GRT), is expected to suppress the circulation of illegal timber in Indonesia going forward.<sup>4</sup>

Second, timber royalty is not imposed on timber from IPK/ILS areas categorized as “uneconomic”, technically defined in the regulation as areas where volume of stumpage or timber with ≥30 cm diameter accounts for not more than 50 m<sup>3</sup>.<sup>5</sup> Thus, although the timber has economic value, it is not subject to royalty payment if it is stemming from timber utilization permit (IPK)/other valid permit (ILS) uneconomic areas. On the other hand, small round timber (≤30 cm in diameter) originating from IPK/ILS is categorized as “economic” and pay the royalty at a tariff of 1% of the benchmark price. In the simulation, calculation of potential timber royalties assumes that all timbers from IPK/ILS were economic, thus augmenting potential revenues compared to realization.

Third, royalty payments are calculated according to selling prices to upstream timber processing companies owned by the same group as the permit-holding company, instead of the benchmark price set by the Ministry of Trade. Such practice is still carried out by several concessionaires in natural forest for instance in the provinces of South Sumatera and Riau (Ginoga et al., 2001).<sup>6</sup> Setting selling prices lower than benchmark price, it is a form of transfer pricing with an unfavorable consequences for state revenue collection. As a result, our simulation for timber royalty revenues is likely to be inaccurate if (a) the selling price fluctuates yet its fluctuation is below the benchmark price and (b) details related to timber processing flow, as is the case in aforementioned provinces, are unknown. If this practice was removed, timber royalty could be much higher.

**5.1.2.2. Payment.** Breaches of forestry business regulation are not uncommon. This includes paying timber royalties lower than actual production and bribery is exerted to cover such violations (TII, 2011). As indicated in Section 3, royalty payment is not made directly to the state treasury; the payment would be made first to the account of Treasury of Forestry Ministry, with copies to forestry agencies at the province and district/municipality levels. Since payment data is not integrated, this might lead to different amount of revenues reported by the government than the actual payment made by concessionaires. Data discrepancies still occur despite a so-called data reconciliation process carried out by the Ministry of Forestry and the Ministry of Finance. In this study, the potential value of timber royalty revenues, based on data of timber production, shows a disparity with the revenue realization based on reports from both Ministry of Forestry and Ministry of Finance.



**Fig. 2.** Revenue realization, revenue potential and revenue gap for timber royalty (PSDH), 2007–2012.

<sup>4</sup> Government regulation no. 12/2014 on tariff and types of non-tax revenues applicable to forestry.

<sup>5</sup> Minister of Forestry Regulation no. P14/2011 on timber utilization permit.

<sup>6</sup> A discussion with the staff of Ministry of Forestry in September 2014 for this study revealed that this practice was still occurring until 2010. This practice may influence the simulation results for time frame 2007 to 2010.

**Table 4**  
Timber royalty revenue estimation and realization: the difference between Ministry of Forestry and Ministry of Finance data.

Years	Timber royalty (PSDH) revenues, billions of rupiah				Difference between MoF regulation and MoFor report on timber royalty estimation (billion Rp)	Difference between MoF regulation and MoFor report on timber royalty realization (billion Rp)
	Estimation in Ministry of Finance regulation	Realization in Ministry of Finance regulation	Estimation in Ministry of Forestry report	Realization in Ministry of Forestry report		
2007	1217		972	670	245	
2008	1499	969	1499	618	0	350
2009	1249	833	428	674	822	159
2010	597	799	1123	797	-526	2
2011	893	856	1359	869	-466	-12
2012	791	999	1305	986	-514	13

Notes: (1) Negative sign indicates higher target or realization from the Ministry of Forestry (MoFor) than estimation and allocation from the Ministry of Finance (MoF). (2) Data for Ministry of Finance's PSDH estimated and realized revenues are from various minister of finance regulations on the allocation of revenue sharing from forestry sector while data for Ministry of Forestry's PSDH estimated and realized revenues are derived from Indonesia Forestry Statistics published by the Forestry Planning Directorate of the Ministry of Forestry.

5.1.2.3. *Reporting.* First, the government's record of payment and production are not detailed, as evident in official publications of Ministry of Forestry such as the Forestry Statistics 2008–2012, which provides data on timber production but does not disaggregate it by species. Similarly, the reported amount of timber royalty revenues remain general without further specification about timber sources. Detailed data are not available through the Forestry Ministry's website nor made available upon request. Data in the Supreme Audit Agency (BPK) reports did not specify types and source of timber at a national level, although they provided patchy data at selected sub-national levels such as provinces and districts. For a general overview of forestry data issues, see UKP4 et al. (2014) and Kemenhut (2011). Lack of detail in official records limits the accuracy of calculation for potential timber royalty revenues since each timber species is associated with a different benchmark price.

Second, the lack of coordination between line ministries is an issue. Official reports published by the Ministry of Forestry and the Ministry of Finance reflect this par excellence: their revenue estimation and realization data for forestry-based revenue sharing are inconsistent. From 2007 to 2012, the data show significant discrepancies for almost all years (Table 4). The discrepancies may be due to (a) the Ministry of Forestry submitting different formats of data to the Ministry of Finance and/or (b) the Ministry of Finance employs its own record and formula for timber royalties. Assuming that coordination was functioning, Ministry of Finance regulation (PMK) on forestry revenue-sharing ought to be based on the report of Ministry of Forestry for data consistency. In this paper, data from Ministry of Forestry for timber production and data from Ministry of Finance for timber royalty estimation and realization were used.

5.2. Revenues from reforestation fund fee

5.2.1. Findings

An unusual pattern was found in the reforestation fund estimated and realized revenue data, as compared to that observed for timber

royalties (Table 5). Counter-intuitively, the revenue realization from reforestation fund fee is on (weighted) average 34% higher than its calculated potential across all years. If 2010 is excluded from observation, at which revenue realization was smaller than its potential, weighted average of revenues collected from reforestation fee becomes 55% above its potential.

GoI revenue estimation on average matched our estimates for the period 2007–2012 (weighted average 99%), although the gap between revenue estimation and revenue potential in this period fluctuated to a great degree, with the value of revenue estimation lying both below and above the level of revenue potentials.

The trend of revenues from reforestation fund based on Ministry of Finance regulation data shows that revenue realization is consistently higher than the estimation except for 2010 (Fig. 3). Furthermore, it indirectly suggests that the actual logging in natural forests which includes timber production from IPK/ILS is higher in most years under study than that of estimated timber production as applied in the estimated revenues by the Ministry of Finance.

5.2.2. Discussion

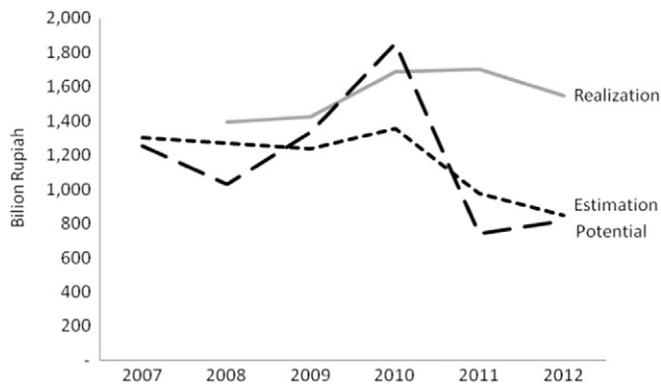
Why was revenue realization from the reforestation fund fee higher than its potential? A number of arguments, again in relation to the administration of forest revenue collection, might explain this.

5.2.2.1. *Billing.* First, the tariff for reforestation fund fee is specified in US which fluctuates according to exchange rate changes. The use of USD for reforestation fund was a subject of criticism since round timbers are prohibited for exports and can only be sold on the domestic market (Barr et al., 2011). In this study, average annual exchange rate for respective years is used as basis for reforestation fund revenue calculation and it is therefore possible that for certain year(s) the exchange rate was higher than the average exchange rate. Given this, the actual revenues likely turn out to be higher than the potential revenues.

**Table 5**  
The comparison between estimated and realized revenues from reforestation fund fee (DR) and their potential revenues, 2007–2012.

Years	Reforestation fund fee (DR), billions of rupiah			Difference between revenue estimation and its potential (billion Rp)	Difference between revenue realization and its potential (billion Rp)	Revenue estimation to its potential (%)		Revenue realization to its potential (%)		
	Estimation	Realization	Potential			All	Estimation > potential	Estimation < potential	All	Realization > potential
2008	1271	1391	1030	-241	-361	123	123	135	135	
2009	1236	1423	1336	100	-87	93		107	107	
2010	1354	1688	1852	498	164	73	73	91		
2011	978	1700	740	-238	-960	132	132	230	230	
2012	847	1545	814	-33	-731	104	104	190	190	
Weighted average						99	115	81	134	155

Notes: (1) Negative sign indicates that estimated and realized revenues from reforestation fund fee is higher than its potential. (2) Data for DR estimated and realized revenues are from various minister of finance regulations on the allocation of revenue sharing from forestry sector. DR potential revenues are own calculation.



**Fig. 3.** Revenue realization, revenue potential and revenue gap for reforestation fund fee (DR), 2007–2012.

The calculation of reforestation fund revenue potential for 2010 suggests a higher amount than its realization. There are two plausible explanations for this. First, a surge of logging in IPK/ILS areas (see Table 2). Large-scale logging occurred before the issuance in 2011 of the presidential instruction on the moratorium on permits for primary natural forests and peatlands. Prior to the instruction, large-scale exploitation took place in natural forests (HPH and forest use permit holders). In 2010, logging in natural forests by concession holders reached 5.2 million m<sup>3</sup>, higher than the level of two preceding years with an average of 4.7 million m<sup>3</sup> (Kemenhut, 2012). Logging in IPK/ILS areas carried out by forest use and forest conversion permit holders was even more dramatic and reached 14.5 million m<sup>3</sup> that year. Forest use permits were issued for mining while forest conversion permits were for palm oil plantation, both of which were among the key contributors to deforestation (Abood et al., 2014). Murdiyarso et al. (2011) hold that the cause for excessive logging was the high volume of forest use permits issued prior to the moratorium being enforced. Central Kalimantan is a case in point, where nearly all permits for forest use were issued before the instruction was put in effect (Kemenhut, 2012).

The second explanation relates to the revenue object. The reforestation fund fee is not imposed on timber originating from IPK/ILS areas categorized as uneconomic, technically defined as the potential of timber with  $\geq 30$  cm in diameter from area of no more than 50 m<sup>3</sup>, although the timber species is of high economic value. In addition, small round timbers in areas categorized as economic IPK/ILS pay a very small tariff (USD 2 per m<sup>3</sup>). Consequently, revenues from the reforestation fund fee would significantly decrease if production from natural forests within IPK/ILS areas is higher than that of total production by IUPHHK-HA permit holders. This led to higher revenues based on a simulation for 2010 (which referred to timber production in natural forests, i.e. IUPHHK-HA and IPK/ILS) while substantial volume of timber may be originated from uneconomic IPK/ILS areas, for which reforestation fund fee was not imposed.

**5.2.2.2. Payment.** At payment stage, it is more likely that upstream timber processing industries rather than permit holders explain why the realization of revenues from the reforestation fund fee is higher than its potential. Ginoga et al. (2001) found that HPH permit holders selling timber to timber processing industries outside of its corporate group will be the one who pays reforestation fund fee, while in-group selling means that the timber processing industries latter who pay at selling price (here in-group timber sale aims to recover production costs of the permit-holder). Given this, timber production of such HPH permit holders which is subject to and pays reforestation fund fee is likely not to be recorded in production data, while the reforestation fund fee it paid was recorded as forestry NTR. The amount of revenue from the reforestation fund fee therefore turns out to be smaller in the simulation than its realization for 2007–2009 and 2011 because the calculation makes use of timber production data recorded in HPH with natural

forests use permits. Conversely, in 2010 potential revenues were higher than revenue realization due to a surge in timber production in IPK/ILS, largely induced by companies' strategic anticipation of the forthcoming permit moratorium.

**5.2.2.3. Reporting.** The first explanation relates to weak monitoring and documentation of violations by permit holders. As APHI (2012) pointed out, some of HPH permit holders cut trees beyond their allowable cut in addition to cutting outside their concession areas, both of which were enabled by weak government monitoring. Identified violations are not always sanctioned (TII, 2011). Even though timber produced in this way might have contributed to the reforestation fund, their production would not be documented in the mandatory production report (APHI, 2012).<sup>7</sup> Accordingly, a discrepancy in results between produced timber and the reforestation fund fee paid to the government by HPH permit holders. Simulation using timber production data under such circumstances generates a lower level of revenue potential than what was collected.

A second explanation relates to the partial availability of data under the other sources category. At the time, timber data collection under this category, notably natural forest timber, was not high on the priority of the Ministry of Forestry. While this timber type was subject to the reforestation fund fee, its production was only partially registered stemming mostly from voluntary reporting by permit holders. Consequently, production data under this category did not fully reflect actual timber production and thus erroneously represented the revenue potential relative to its revenue realization.

A third explanation relates to the fact that the types of timber recorded in the Forestry Statistics under other sources category are limited and not disaggregated. Timber production data here under this category does not reflect actual production. Revenue realization from reforestation fund fee is therefore higher compared to revenue potential as permit holders paid the reforestation fund fee for logged timber whose production is only partially unrecorded. However, while it is plausible as an explanation, the effect on realization-potential gap is negligible given the small proportion of other sources category in the whole structure of timber production.

## 6. Policy relevance

We now turn to policy relevance by focusing on the administration system for forest non-tax revenues (NTRs). The essential elements of forestry revenue administration include inter alia revenue collection data, timber price and tariff as well as monitoring and compliance (Kim et al., 2006).

### 6.1. Revenue collection data

Provincial and district forestry agencies and the Ministry of Forestry itself are not equipped with adequate or accurate data, nor with an integrated data management system (such a system would include timber forest product utilization business permits, timber production quota and targets, and actual production data) to enable them to establish optimal NTR base. Forestry NTR data at the central government level tends to be more comprehensive compared to those of province and district governments. Currently (see Fig. 1), the treasury at Ministry of Forestry holds the most comprehensive NTR data, even though payment must be reported by concessionaires to forestry agencies at province and district levels. Therefore, in the presence of information discrepancy, data from the Ministry of Forestry is often used preferentially.

The mechanism to collect payment for timber royalty and reforestation fund fee is a mixture of official and self-assessment, through which

<sup>7</sup> It can be added here that despite concerns like these the State Audit Agency (BPK) granted unqualified opinion on the financial statements of the Ministry of Forestry for 2011 and 2012.

**Table 6**  
Comparison of price and tariff for timber royalty (PSDH).

Years	Price (Rp)			PSDH tariff (Rp)		
	Price in trade minister regulation (Rp)	Domestic market price (Rp)	International market price (Rp)	From benchmark price in trade minister regulation (Rp)	From domestic market price (Rp)	From international market price (Rp)
2008	600,000	2,357,050	2,717,540	60,000	235,705	271,754
2009	600,000	2,118,211	2,485,920	60,000	211,821	248,592
2010	600,000	1,960,144	2,240,164	60,000	196,014	224,016
2011	600,000	2,191,895	2,451,103	60,000	219,190	245,110
2012	600,000	2,235,498	2,440,500	60,000	223,550	244,050

Notes: (1) PSDH tariff 10% from price. (2) US\$ to rupiah exchange rate is the average annual rate for each year of study period. (3) Benchmark price is from the 2007 Ministry of Trade regulation which was effective from 2007 to 2012 before being replaced later. Domestic and international timber market prices are from the Global Wood Trade Network.

a technical member of staff of the forestry agency calculates timber production from the report supplied by concessionaires. Such production reports are then used by the agency's field monitoring staff for validation. With data not being properly validated, it is hardly possible to accurately determine the amount of potential revenues. On the other hand, the absence of proper data validation leaves room for collusive corruption between concessionaires and some actors in public agencies to make payments to the state lower than what concessionaires are supposed to pay (Smith et al., 2003).

### 6.2. Price and tariff

Domestic and international prices of timber are 3–4 times higher than the benchmark price set by the Ministry of Trade for timber royalty payment (Table 6). This confines the state from capturing a more appropriate share of economic rents. The loss of economic rent is even greater if the government determines timber royalty payment using only benchmark price while companies use market price for sales. In this sense, by setting a far lower price than market prices the government is indirectly subsidizing companies.

For reasons mentioned, domestic market price needs to be taken into account in establishing price reference as part of timber royalty calculation. In this regard it is worthwhile to underscore that revenue loss resulting from the exclusion of international price as price reference in timber royalty calculation would only occur if the prohibition to export round timbers was revoked. For the period of study, timber export was prohibited.

### 6.3. Monitoring and compliance

Compared to those in other extractive industries such as mining, institutions in the forestry sector, both at national and sub-national levels, have relatively more straightforward duties and functions in the areas of monitoring and compliance enforcement. However, capacities to enact the mandate are limited due to for instance financing and manpower constraints. Measures for monitoring and enforcement of payment compliance are inadequate, even overlooked, leading to under or non-payment. Consequently, the government has not been able to sufficiently capture economic rents from forest resources use.

Establishing a link between payment and timber legality is one viable tool to improve compliance. In one of its criteria, the newly introduced timber legality verification system (SVLK) requires concessionaires to provide the proof of payments, to be verified through receipts of timber royalty and reforestation fund fee payments along with a payment order detailing timber type, volume, and tariff (Kemenhut, 2010).

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