

Labour coercion and trade: Evidence from colonial Indonesia

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Throughout history coercive labour relationships – relationships in which the threat or use of force is key – constituted a major part of labour transactions. Such coercion took many different forms: slavery, serfdom, indentured labour, penal contracts, conscription, prison labour, and *corvée* labour, for example. Coerced labour was arguably more important than ‘free’ wage labour in many settings such as (plantation) agriculture, shipping, armies, and public works. Today about 25 million people are still subject to forced labour (ILO, 2017). What then determines the use of labour coercion?

Due to the hidden nature of coercion in modern times, rigorous evidence on the determinants of coercion is scarce. To circumvent such data availability issues, this paper studies a legal form of coercion: *corvée* labour in colonial Indonesia. *Corvée* labour is a form of taxation in labour in which individuals work for the state without pay for several weeks or months each year. Indonesian *corvée* labour was mainly imposed on adult indigenous males for building and maintaining roads, bridges, and irrigation works. Minor tasks involved piloting ferries, escorting state officials and prisoners, delivering letters, building roadside shelters, and transporting government goods.

This type of coercion was historically widespread. For example, major projects such as the Great Pyramid of Giza and the Great Wall of China were partially built by *corvée* labour, and deep into the twentieth century *corvée* labour remained in use in China as well as European colonies throughout Africa and Asia (Frankema and Van Waijenburg, 2014; Van Waijenburg, 2018; Hup, 2020). Moreover, *corvée* labour is still practiced today in certain developing countries (Olken and Singhal, 2011; ILO, 2017).

Corvée labour is one of the least information-intensive forms of taxation. Furthermore, a *corvée* tax can be levied in economies characterized by low levels of productivity and monetization. From the state’s vantage point, however, tax payments in labour also suffer from disadvantages in terms of fungibility, storability, and portability. The literature views low levels of labour productivity, currency usage, and state capacity as factors limiting states in shifting towards more information-intensive monetary taxation (e.g. Brewer, 1989; Besley and Persson, 2011, 2014; Johnson and Koyama, 2014, 2017). Such shifting is an important aspect of strengthening fiscal capacity, which in turn is a key aspect of long-run development (e.g. Dincecco, 2009; He, 2013; Dincecco and Katz, 2016).

This paper studies the impact of trade on *corvée* labour. I focus on trade because global price shocks aid identification of the impact of productivity changes. I focus on Indonesia due to its large size and unique data availability. A lack of large-scale *corvée* labour registers have limited empirical studies of this key form of labour coercion. I overcome this limitation by assembling the first dataset on *corvée* labour usage and exports. This new province-level dataset for colonial Indonesia spans 16 provinces and 41 years (1900–40). [Figure 1](#) displays the Indonesian Outer Island provinces in 1940. I use contemporary Colonial Reports and trade overviews to manually construct this database covering hundreds of thousands of labourers and dozens of different export products.¹

To guide the empirics, I build a simple political economy model of taxation choice that embeds a trade-off between taxation in labour and taxation in monetary currency. *Corvée* labour usage reduces the labour available for private production, hence monetary tax revenue based on private production drops. The more productive a *corvée* labourer is in private production, or the higher his output price is, the higher the opportunity costs of *corvée* labour are for both the state and the labourer. A trade boom is such a period of high marginal productivity. I thus hypothesize that an export boom, especially in labour-intensive goods, reduces *corvée* labour use.

¹The *corvée* data are collected from the annual Colonial Reports (*Koloniale Verslagen* and *Indische Verslagen*) and Statistical Overviews (*Statistische Jaaroverzichten*). The export data are collected from annual trade overviews (*Statistiek van den handel* and *Jaaroverzicht in- en uitvoer*).

Indonesian Outer Island provinces, 1940



Figure 1

While the state might want to reduce corvée impositions on productive labourers, it faces an information problem. It cannot accurately gauge the productivity of all the hundreds of thousands of labourers liable to corvée. The so-called ‘ransom’ option solved this by allowing labourers to buy themselves out of corvée duties. The buy-out option meant the state could rely on labourers’ private information. More productive labourers faced higher opportunity costs of being submitted to corvée and would thus be more willing to pay off such duties. By allowing labourers to self-select out of corvée, the state reduced its information-collection costs while still achieving a shift from in-kind to monetary taxation. Furthermore, the buy-out option enabled corvée usage to flexibly adjust to the waxing and waning of economic opportunities.

Figure 2a graphs used corvée days and exports. Corvée steeply declines towards the end of the First World War and the beginning of the post-war trade boom. With the onset of the Great Depression in 1929-30 this pattern reverses: trade collapses and corvée steeply increases. Figure 2b shows the number of ransomers closely following exports. With the onset of the Great Depression the number of ransomers dropped precipitously from a peak of 900,000 to a low of 230,000 in 1934.

Underlying the boom in exports were price booms for different products at different times. Figure 3a graphs the price indices for petroleum, pepper, and rubber. Together these three product categories constituted an important slice of total export value, ranging from 25 per cent in 1902 up to 75 per cent in 1917 and 1940. In line with Figure 3a, Figure 3b shows the export value peak around 1919 mainly being driven by oil and the peak around 1925 by rubber.

Underlying this aggregate picture are differences between provinces in specialization. West Sumatra, for example, experienced booms in oily seeds (e.g. coconuts, peanuts) in the late 1910s and in coffee in the late 1920s. Palembang, in contrast, mainly exported oil products. As the size and composition of export crop production differed across provinces, provinces were differentially affected by changes in world market prices.

Importantly, products differed in labour intensity. As a major export, oil products stand out in this respect. In 1930 in Sumatra, for example, petroleum production only involved about one per cent of the indigenous male population, while agriculture involved more than 80 per cent (Volkstelling 1930 Deel IV, 1935). The overall usage of corvée was thus likely barely impacted by oil price shocks, so it is useful to distinguish between non-oil and oil exports.

In short, to gauge the effect of productivity changes on corvée usage, I use variations in province exports. Part of the variation in exports is driven by price shocks, and these price shocks are exogenous from the perspective of individual labourers who make the ransom decision. I decompose used corvée days into three parts to separate corvée usage into two variables (liable persons and maximum days per

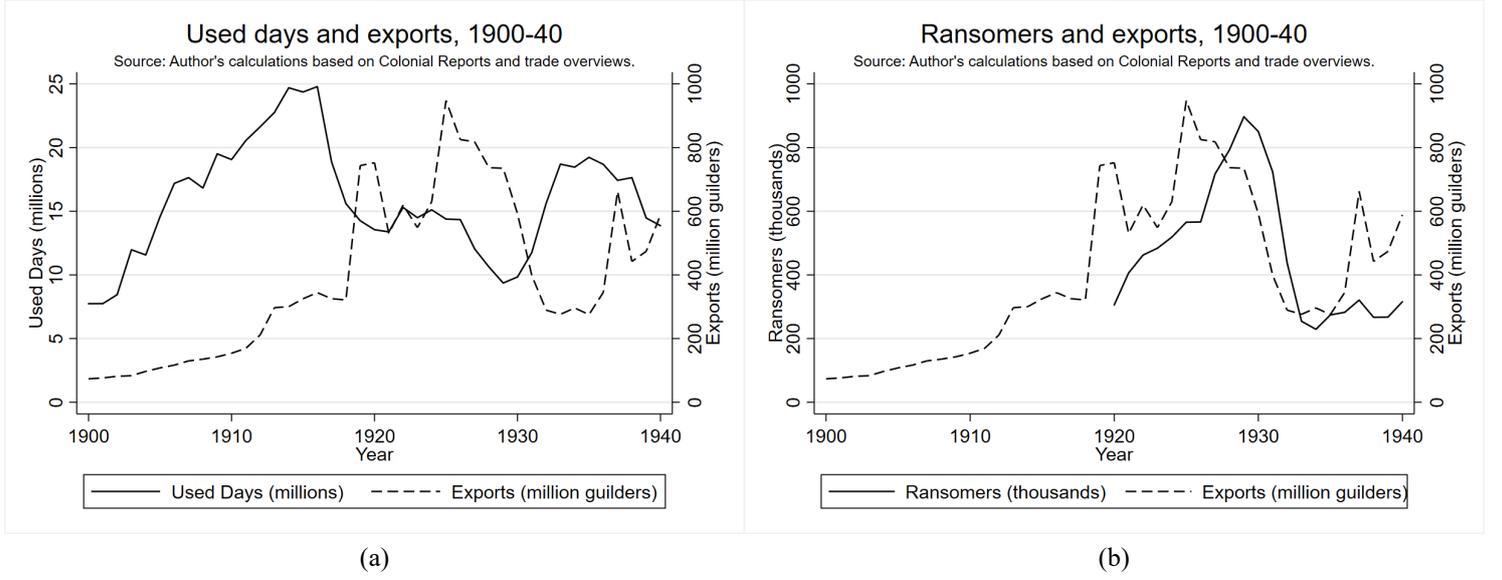


Figure 2:

liable) which were mainly affected by governmental policy choices and one variable (used days as a share of maximum days) which was mainly affected by decisions of individual labourers.

Formally:

$$\frac{Used\ Days}{Population} = \frac{Liabe}{Population} * \frac{Maximum\ Days}{Liabe} * \frac{Used\ Days}{Maximum\ Days} \quad [1]$$

Taking logs:

$$\text{Log}\left(\frac{Used\ Days}{Population}\right) = \text{Log}\left(\frac{Liabe}{Population}\right) + \text{Log}\left(\frac{Maximum\ Days}{Liabe}\right) + \text{Log}\left(\frac{Used\ Days}{Maximum\ Days}\right) \quad [2]$$

To mitigate endogeneity concerns, I construct a measure of potential exports by multiplying lagged quantities with current prices across dozens of products:

$$Potential\ Exports_{it} = \sum_n Quantity_{in,t-1} * Price_{n,t} \quad [3]$$

Where for each province i and year t : n = product category (e.g. rubber, tobacco, coffee).

I regress the log of used days per capita, and each component separately, on the log of potential exports per capita and province and year fixed effects. The main regression specifications are thus:

$$\text{Log}\left(\frac{Used\ Days_{it}}{Population_{it}}\right) = \text{Log}\left(\frac{Exports_{it}}{Population_{it}}\right)\beta + \lambda_t + \alpha_i + \epsilon_{it} \quad [4]$$

$$\text{Log}\left(\frac{Liabe_{it}}{Population_{it}}\right) = \text{Log}\left(\frac{Exports_{it}}{Population_{it}}\right)\beta + \lambda_t + \alpha_i + \epsilon_{it} \quad [5]$$

$$\text{Log}\left(\frac{Maximum\ Days_{it}}{Liabe_{it}}\right) = \text{Log}\left(\frac{Exports_{it}}{Population_{it}}\right)\beta + \lambda_t + \alpha_i + \epsilon_{it} \quad [6]$$

$$\text{Log}\left(\frac{Used\ Days_{it}}{Maximum\ Days_{it}}\right) = \text{Log}\left(\frac{Exports_{it}}{Population_{it}}\right)\beta + \lambda_t + \alpha_i + \epsilon_{it} \quad [7]$$

Where for each province i and year t : $Exports_{it}$ = value of potential exports; λ_t = year fixed effects, and; α_i = province fixed effects.

Panel A of [Table 1](#) shows the regression estimates with non-oil potential exports per capita as the

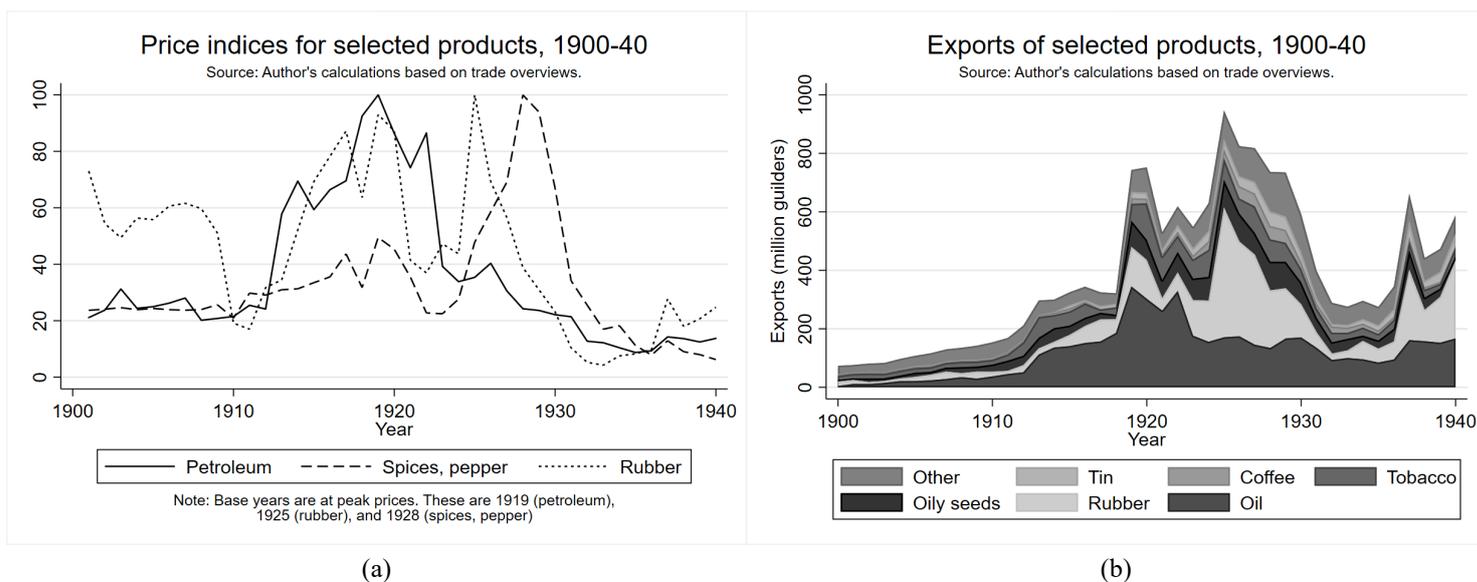


Figure 3:

main explanatory variable. Column 1 shows that a one per cent increase in non-oil potential exports per capita decreases corvée usage per capita with 0.18 per cent. As non-oil exports per capita more than tripled between 1916 and 1925, and corvée usage per capita dropped by more than half in the same period, the increase in non-oil exports explains nearly all of the drop in corvée usage.

As a placebo test, I also use oil potential exports as a main regressor. Panel B of Table 1 shows there is no association between oil potential exports and corvée usage. This is likely due to oil production involving few laborers. Oil price shocks barely impacted labor productivity, thereby leaving unchanged labourers' ransoming decisions.

The results indicate that booms in relatively labour-intensive export products reduced corvée usage. This effect does not run through policy adjustments in the number of liable or the maximum days per liable (columns 2 and 3), but through adjustments in intensity of usage by labourers buying off their corvée duties (column 4). The ransom system was thus essential in allowing corvée to flexibly adjust to productivity changes induced by trade shocks. It enabled labourers to self-select out of corvée when their marginal productivity exceeded the ransom and it did so without requiring stronger information-collection capabilities of the state.

This paper is the first to empirically investigate the relationships between fiscal modernization, corvée, and trade, and by doing so principally contributes to three literatures. First, by documenting the importance and patterns of corvée labour it contributes to the literature on labour coercion. While labour coercion is often studied in private and semi-private forms such as slavery, serfdom, and penal contracts (e.g. Nieboer, 1900; Domar, 1970; Nunn, 2008; Dell, 2010; Acemoglu and Wolitzky, 2011; Naidu and Yuchtman, 2013; Saleh, 2020), corvée labour is relatively understudied (e.g. Van Waijenburg, 2018; Hup, 2020).

Second, by estimating the impact of trade on corvée usage this paper contributes to the literature on trade and economic development (e.g. Acemoglu et al., 2005; Findlay and O'Rourke, 2007). As booms and busts in trade remain key features of the world today, learning from major historical events, such as the Great Depression trade collapse, remains important for better grasping what drives development.

Third, by pinpointing labour productivity as an important rationale for the colonial Indonesian state relying on corvée differentially across time and space, the paper contributes to the literature on fiscal modernization and colonialism, specifically regarding Indonesia (e.g. Dell and Olken, 2020; Hup, 2020). High information-collection costs are often seen as a barrier for moving towards centralized monetary taxation, both historically and currently, and partially explain the usage of solutions such as tax farming and fiscal decentralization (e.g. Coşgel and Miceli, 2009; Besley and Persson, 2014;

Table 1: Regression estimates, non-oil and oil potential exports per capita

	Log(Used Days per Capita)	Log(Liable per Capita)	Log(Max Days / Liable)	Log(Used Days / Max Days)
<i>Panel A: Log(Potential Exports per Capita, No Oil)</i>				
Coefficient	-0.18*** (0.05)	0.01 (0.04)	-0.00 (0.03)	-0.18*** (0.03)
Adjusted R^2	0.49	0.83	0.84	0.44
<i>Panel B: Log(Potential Exports per Capita, Oil)</i>				
Coefficient	0.03 (0.03)	0.00 (0.00)	0.01 (0.00)	0.03 (0.03)
Adjusted R^2	0.49	0.84	0.84	0.44
Province and Year FE	Yes	Yes	Yes	Yes
Observations	535	535	535	535

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Standard errors are two-way (province and year) clustered Driscoll-Kraay standard errors. Small sample correction is applied due to small number of clusters. Observations are weighted by the number of liable persons.

Johnson and Koyama, 2014). To understand how a shift to higher monetary taxation was achieved in Indonesia, without requiring further information-collection capabilities of the state, is therefore important. The new dataset also clarifies the potential importance of non-monetary taxation in settings such as colonial Indonesia. Studies on taxation and fiscal capacity should thus be careful not to miss this type of taxation.

In general, the results highlight that fiscal modernization, labour coercion, and trade are tightly intertwined. The finding of a negative relationship between trade and labour coercion, particularly between labour-intensive exports and coercion, stands in contrast to studies that focus on coercion in the form of slavery (e.g. Saleh, 2020). The nature of the relationship between coercer and coerced, as well as the purpose of coercion, thus matter for the relationship between trade and coercion. While trade booms may increase coercion in slaveholder-slave relationships, such booms can reduce coercion in state-taxpayer relationships. The flipside is that trade busts can increase state coercion. Since state coercion is still present today, also in the form of corvée labour, the 2020 economic downturn may induce a shift into such coercion. Studying such relationships in modern-day settings, especially by collecting better data, would be a worthwhile avenue for further research.

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