

# Dutch Coins for Asian Growth

*VOC-duiten to Assess Java's Deep Monetisation and Economic Growth, 1724-1800*<sup>1</sup>

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## Abstract

During the eighteenth century the VOC (Verenigde Oostindische Compagnie) imported over a billion small copper coins (duiten) to Java, which is a remarkable operation for the world's largest enterprise at that time, since these coins were unfit to pay for the company's wholesale trade. This article argues that the VOC responded to Java's specific need for small coins, because people increasingly relied on the market for daily necessities and became less dependent on subsistence farming. The alternative explanations of population growth, substitution and inflation do not satisfactorily explain the increased demand for these copper duiten. Therefore, this article proposes that Java's economy shifted away from subsistence farming and, particularly after 1750, probably grew.

## 1 Introduction

Between 1724 and 1795 the Dutch East India Company (henceforth: VOC) shipped more than 1.1 billion small copper coins of a type called *duit* (hen-

<sup>1</sup> The present article is largely based on my research master thesis, H.A. Feenstra, *Kisten met Koper. De opmars van de Nederlandse duit in het Javaanse geldverkeer, 1720-1850* (Amsterdam, unpublished M.Phil.-thesis, Vrije Universiteit, 2011), under the supervision of Jan Lucassen and Ulbe Bosma, whom I thank for their guidance and inspiration. Furthermore, I like to thank Joost Jonker, Pim de Zwart, Samuel Kruizinga, Lodewijk Petram and the anonymous referee for their comments on earlier drafts of this article.

ceforth, in Dutch: *duit*] to Java.<sup>2</sup> The import of small change on such a scale by world's largest enterprise at that time seems odd because these coins were too small to pay for the company's wholesale trade. The case becomes even more curious when we accept Sargent and Velde's argument that the minting of small coins was expensive and often unprofitable.<sup>3</sup> Therefore, the current explanation that the *duiten* were sold because of their copper value is unconvincing: in that case the company could have saved the costs of minting by importing copper rather than minted coins.<sup>4</sup> Hence, we may assume the imports targeted a specific demand for small change, which raises questions about the money use in Java.

Since small coins like the *duit* are used for daily transactions, they can be used to analyse how common the use of money is in a given society. This phenomenon, which has been labelled 'deep monetization', is considered important for the insight it provides into the penetration of money at an economy's deepest level, a level we cannot observe otherwise.<sup>5</sup> Moreover, following Kuznets, an increase of the money supply may indicate a shift away from subsistence farming, and perhaps even economic growth.<sup>6</sup> For, when a larger portion of the population depends on the market for buying their daily necessities, the transaction volume for which such small coins are needed consequently increases, which indicates structural changes of an economy. Hence, increases in the small money supply might point to increasing daily transactions.

These implications of currency development make insights into changes in the evolution of Java's circulation particularly relevant for the great debates about the causes of diverging economic developments between Asia and Europe. Kenneth Pomeranz and other members of the

2 J.R. Bruijn, F.S. Gaastra, and I. Schöffer (eds.), *Dutch-Asiatic Shipping in the 17th and 18th Centuries*, vol. I: Introductory volume (Den Haag 1987) 223–245.

3 Thomas J. Sargent and François R. Velde, *The big problem of small change*, (Princeton 2002); Oliver Volckart refuted their interpretation, although his analysis is limited to silver coinage and thus ignored copper coins: Oliver Volckart *The big problem of the petty coins, and how it could be solved in the late middle ages*. (Economic History Working Papers, 107/08. Department of Economic History, London School of Economics and Political Science, London 2008).

4 Ryuto Shimada, *The intra-Asian trade in Japanese copper by the Dutch East India Company during the eighteenth century* (Leiden 2005) 97.

5 Jan Lucassen, 'Deep monetization, commercialization, and proletarianization: Possible links, India 1200-1900', Paper for the Early Modern Panel, IX International Conference on labour History. The Association of Indian Labour Historians V.V. Giri National Labour Institute (Noida, March 22-24th 2012).

6 Simon Kuznets, *Population, capital, and growth: selected essays* (London, 1974); Simon Kuznets, *Modern economic growth: rate, structure, and spread* (New Haven 1966).

California School argued that the European and Asian economies showed remarkable resemblances until the middle of the eighteenth century.<sup>7</sup> More recently, Prasannan Parthasarathi also claimed that differences in welfare ratios arose between Europe and Asia – notably Britain and India – only during the nineteenth century.<sup>8</sup> Much less is known about Java's eighteenth-century economic performance. Analyses, such as Jan Luiten van Zanden's comparison of Dutch and Javanese economic structure of the supply of capital and skilled labour, start only in the nineteenth century, whereas most historiography concerning the Dutch-Javanese interaction under the VOC tends to focus on the period until 1740.<sup>9</sup> Hence, studying Java's deep monetisation improves our understanding of Asian eighteenth-century economic developments, and contributes to the *Great Divergence*-debate.

Whether economic growth was indeed the cause for the rising demand for small change is examined by exploring three alternative explanations first: population growth, substitution and inflation. Consequently, the article is structured as follows. Section 2 presents the *duit* circulation on the basis of VOC imports, local production and wear rate of the coins. Section 3 estimates the size and growth of Java's population, which allows to correct the *duit* circulation for population growth by calculating the number of *duiten* per capita. Subsequently, the impact of the *duiten* is examined by probing the extent to which *duiten* substituted barter or other types of money in section 4, while section 5 analyses the impact of inflation on the demand for small change. Eventually, I discuss Java's economic developments in relation to debate about the Great Divergence in section 6. Section 7 concludes by proposing that the increase in VOC-*duiten* per capita strongly suggests economic growth in Java during the eighteenth century.

7 Kenneth Pomeranz, *The great divergence: China, Europe, and the making of the modern world economy* (Princeton 2000); André Gunder Frank, *ReOrient: global economy in the Asian age* (Berkeley 1998).

8 Prasannan Parthasarathi, *Why Europe grew rich and Asia did not: global economic divergence, 1600-1850* (Cambridge 2011).

9 Jan Luiten van Zanden, 'Rich and poor before the industrial revolution: a comparison between Java and the Netherlands at the beginning of the 19th century', *Explorations in Economic History* 40 (2003) 1–23; Koh Keng We, 'Re-thinking the colonial transition: the case of Java's Northeast coast 1740-1850', *Journal of Southeast Asian Studies* 38 (2007) 387.



Figure 1. Map of Java under the VOC

Source: <http://www.voc-kenniscentrum.nl/kaart-java.html>, downloaded 23 October 2013.

## 2 A pretty penny

To determine the development of the number of *duiten* per capita, let us turn to the *duit* circulation first. The size of the circulation of VOC-*duiten* in Java is determined by the net imports and local production minus the wear rate. Because Batavia served as a the VOC's central hub in Asia, the *duiten* shipped to Java were partially redistributed over other parts of Asia. Therefore, the re-exports must be subtracted from the more than 1.1 billion copper *duiten* sent over from the Dutch Republic.<sup>10</sup> By analysing these factors, this section demonstrates that the net imports dwarfed the local production, whereas the wear rate was low enough to create a sustained increase of the *duiten* during the eighteenth century.

The data for the exports from the Republic show a regular influx of *duiten* since the first issuance in 1724.<sup>11</sup> On average, the VOC sent over 87,000 guilders worth of *duiten*, or approximately 15 million pieces per year. In Asia the *duit* was valued at four *duiten* for a silver *stiver* [Dutch:

<sup>10</sup> Withdrawal due to savings is not calculated separately in this article, as savings can be quickly returned into circulation. Consequently, a distinction between savings and coins temporary unspent is too fluid to estimate.

<sup>11</sup> Buijn, Gaastra, and Schöffner, *DAS*, I: Introductory volume, 226–245; on the cash flows of the VOC between Asia and the Republic see: F.S. Gaastra, *Particuliere geldstromen binnen het VOC-bedrijf 1640-1795*, Van Gelder-lezingen 1 (Leiden 2002) and Arent Pol, *Schepen met geld: de handelsmunten van de Verenigde Oostindische Compagnie, 1602-1799* ('s-Gravenhage 1989).

*stuiver*] instead of eight in the Republic, because copper was valued higher in Asia than in Europe.<sup>12</sup> With time the numbers imported increased: from 11.1 million pieces during the 1730s to 257.6 million during the 1780s. Every decade, except for the 1770s, average annual imports rose compared to the previous decade (table 1).<sup>13</sup>

Table 1. The imported number of *duiten* per decade

	Number of <i>duiten</i> p. decade	Average p. year
1720s	11.280.000	1.611.429
1730s	111.200.000	11.120.000
1740s	101.600.000	10.160.000
1750s	161.880.000	16.188.000
1760s	188.000.000	18.800.000
1770s	104.160.000	10.416.000
1780s	257.600.000	25.760.000
1790s	144.000.000	28.800.000

Source: Bruijn, Gaastra, and Schöffer, *Dutch-Asiatic Shipping in the 17th and 18th Centuries*, vol. I: Introductory volume, 226–245.

The first shipments of *duiten*, which arrived in Java in the 1720s, were mainly brought into circulation in Batavia and its surroundings to ease payments there. The new coins were an immediate success; within a month of arrival all stocks had sold.<sup>14</sup> These rapid sales demonstrate a large demand for small change in Batavia. When the VOC first issued the *duiten* in June 1724, the company announced that these coins were meant to supply the ‘modest and other people, visiting the market there’, with which they could buy ‘things of little value’.<sup>15</sup> Besides serving the public, the selling of the coins was a lucrative business; the company made a profit of 100% on the sales, because the *duiten* valued at twice their exchange rate compared to their value in silver money in the Dutch Republic.<sup>16</sup>

12 Bruijn, Gaastra, and Schöffer, *DAS*, I: Introductory volume, 185; For the remainder of the article numbers are used, instead of monetary values, as much as possible to avoid confusion about exchange rates.

13 The 1720s and 1790s counted only partially: the 1720s because the *duiten* were only imported after 1724, whereas the VOC was nationalised in 1795 and no money was sent over thereafter in the eighteenth century.

14 Nationaal Archief (further NA), Archief van de Boekhouder-Generaal te Batavia, 1699-1801 (further BGB), inv.nrs. 10817, f. 14r; 10818, f.14r; 10819, f.15r; 10820, f. 15r.

15 J.A. van der Chijs, *Nederlandsch-Indisch plakaatboek, 1602-18n*, vol. 4: 1709–1743 (Batavia 1887) 176–178.

16 NA, BGB, inv.nrs. 10817, f. 14r; 10818, f.14r; 10819, f.15r; 10820, f. 15r.

This wide exchange rate difference stimulated sailors to smuggle *duiten* to Java. These smuggling practices were, however, soon discovered because *duiten* were found in the luggage of seamen who had not survived the risky passage to Asia. Consequently, the VOC ordered that the *duiten* put into circulation in 1724 'for the convenience of the residents', to be withdrawn from circulation in December 1725.<sup>17</sup> To prevent further smuggling the VOC decided to mint its own *duiten*, with a design different from those in the Republic; these *duiten* depicted the VOC-monogram on one side and on the other the provincial arm of Holland and Zeeland, which were circulated in Asia from 1727 onwards.<sup>18</sup>



Figure 2. VOC-duiten from the mint houses in Zeeland and West-Friesland

Source: Photo taken from the author's private collection

After the successful introduction of the *duiten* in Batavia, the VOC gradually extended their distribution to other places in Java, which was facilitated by the company's territorial expansion. In 1733, for instance, the VOC introduced the *duiten* in the Priangan regencies, which had come under company control in 1677.<sup>19</sup> For convenience of the poorer residents, especially for those living in the countryside, the VOC issued half *duiten* in 1750.<sup>20</sup> During the second half of the eighteenth century, the majority of the *duiten* were sent to the VOC office in Semarang, which acted as a gateway to both parts of the principality Mataram; 75 per cent of the *duiten*

17 Van der Chijs, *N.-I. plakaatboek, 1602-1811*, vol. 4: 1709-1743, 185-186.

18 *Ibidem*, vol. 4: 1709-1743, 201.

19 Els M. Jacobs, *Koopman in Azië: de handel van de Verenigde Oost-Indische Compagnie tijdens de 18de Eeuw* (Zutphen 2000) 181; Van der Chijs, *N.-I. plakaatboek, 1602-1811*, vol. 4: 1709-1743, 348.

20 Van der Chijs, *N.-I. plakaatboek, 1602-1811*, vol. 6: 1750-1754 (Batavia 1889) 10.

distributed in Java went to Semarang – whereas 80 per cent of Semarang's trade was directed to Batavia.<sup>21</sup> Although the VOC also used other currencies and bullion, the company primarily relied on the *duit* to pay for their imports from Java's northeast coast.<sup>22</sup>

Yet not all *duiten* the VOC transported to Java remained on the island; these coins were partially redistributed to other parts of Asia as well. Approximately, the VOC sent 25 to 30 per cent to destinations outside Java – and consequently these re-exports did not contribute to Java's money supply. Already in 1728 29.4 per cent of the *duiten* was forwarded to the Moluccas.<sup>23</sup> In 1730 28.4 per cent of the *duiten* was re-exported, while in the 1750s this share was between 24 and 39 per cent.<sup>24</sup> Figure 3 shows that during the 1770s the VOC disseminated 75 per cent of *duiten* in Java.<sup>25</sup> Consequently, on average 72 per cent of the *duiten* was circulated in Java and 28 per cent was re-exported, which thus must be subtracted from the total imports.

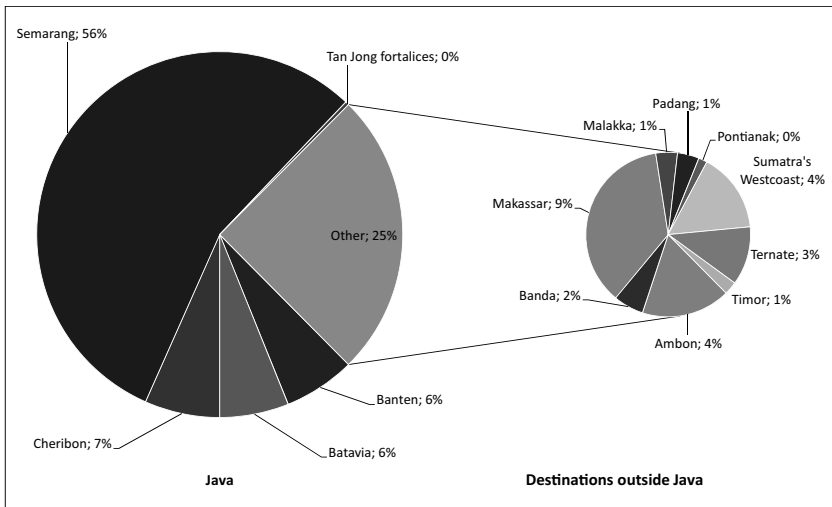


Figure 3. The distribution of imported *duiten*, 1770-1780

Source: NA, BGB, inv.nrs. 10817, f. 14r, 10818, f. 14r, 10819, f15r, 10820, f. 15r.

21 Gerrit J. Knaap. *Shallow waters, rising tide. Shipping and trade in Java around 1775* (Leiden 1996) 104.

22 *Ibidem*, 102-103.

23 NA, BGB, inv.nrs. 10817, f. 14r, 10818, f. 14r, 10819, f15r, 10820, f. 15r.

24 Shimada, *Intra-Asian Trade*, 98.

25 NA, BGB invr.nrs. 10675, 10676, 10677, 10678 and 10677.

Besides importing, the VOC sporadically minted *duiten* in Java itself. In 1743, the VOC acquired the mintage right from the *susuhunan* [monarch] of Mataram and could henceforth legitimately mint coins. The VOC coined *duiten* only twice in Java, in 1764 and 1783, when imports from the Republic faltered.<sup>26</sup>

Although the exact scale of production on Java is difficult to determine, an estimate can be made by using copper prices and the weight of the *duit*. For the minting of 1764-1765 3,050 pounds of copper were used.<sup>27</sup> Of these 3,050 pounds approximately 416,000 *duiten* could be minted (the coins weighted 3.62 grams each), with a total market value of 5,205 guilders in Java.<sup>28</sup> From this gross value the production costs and the mint master's pay must be deducted to estimate the output. Furthermore, the boss and foreman of the armoury received 2 per cent of the copper value for the manufacture of planchets.<sup>29</sup> If we assume that the coin wages and other production costs were also about 2 per cent, the number of *duiten* was approximately 400,000 pieces, with a retail value of 5,000 guilders on Java.

When the supply was disrupted again in 1783, as a result of the Fourth Anglo-Dutch War (1780-1784), the VOC's High Government in Batavia commissioned the local minting of *duiten*, 'considering the great lack of *duiten* among the society'.<sup>30</sup> Consequently, silver money could not with any possibility be exchanged for copper cash.<sup>31</sup> The threat of the Sultan of Yogyakarta to mint coins himself if the VOC did not rapidly supply him with *duiten* might have urged the company's administration to produce the coins.<sup>32</sup>

The production volume for 1783 is even more difficult to determine than for 1764, since it is unclear how much copper the High Government provided to mint the *duiten*. Moreover, due to fraud at the mint, the authorization to mint *duiten* was withdrawn in June 1783.<sup>33</sup> Probably this premature discontinuation led to a lower production than was planned. We may

26 Buijn, Gaastra, and Schöffner, *DAS*, I: Introductory volume, 226-245; C. Scholten, *De munten van de Nederlandsche gebiedsdeelen overzee, 1601-1948* (Amsterdam 1951) 64.

27 Shimada, *Intra-Asian trade*, 102.

28 Scholten, *De munten*, 23.

29 *Ibidem*, 64.

30 Van der Chijs, *N.-I. plakaatboek*, vol. 10: 1776-1787, 658.

31 *Ibidem*.

32 Hui Kian Kwee, *The political economy of Java's Northeast coast, c. 1740-1800: Elite Synergy* (Leiden 2006) 112.

33 Van der Chijs, *N.-I. plakaatboek*, vol. 10: 1776-1787, 659.



therefore prudently assume that only half as many duiten were produced in 1783 compared to 1764.

The production of the local mint, which produced merely 600,000 pieces in total, was rather modest compared the annual imports of 15 million pieces per year. This huge difference is evident in figure 4, which displays the eighteenth-century imports and local production.<sup>34</sup> Hence, the local mintage of *duiten* had a marginal impact on the volume of the circulation in Java.

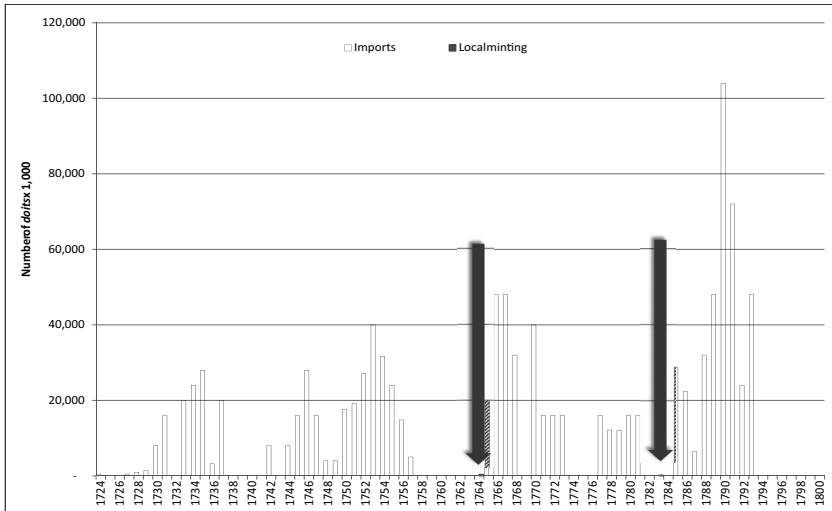


Figure 4. The number of duiten imported and locally minted, 1724–1800

Source: Bruijn, Gaastra, and Schöffner, *DAS*, vol. I: Introductory volume, 226–245; Scholten, *De munten*, 23; Van der Chijs, *N.-I. plakaatboek*, vol. 10: 1776–1787, 659.

In addition to the net imports and local production, the wear rates of the *duiten* also affected the size of the money supply by decreasing the circulation. Systematic research onto the wear rate of *duiten* is unfortunately lacking, which means that this has to be estimated by comparing known wear rates of other coins. Research in the Netherlands shows that 50 per cent of the copper 1-cent pieces issued in 1821 was returned in 1884, which equals an average annual wastage for unknown reasons of 1.09 per cent.<sup>35</sup>

34 The local minting is 1764 and 1783 are emphasized by adding arrows for those years. The sources for local production as mentioned in the text.

35 C. Hoitsema, 'Over samenstelling en omvang eener metaal-circulatie', *De economist : tijdschrift voor alle standen, tot bevordering van volkswelvaart, door verspreiding van eenvoudige beginselen van staatshuishoudkunde* (1902) 919–942, 922; H.E. van Gelder, *De Nederlandse munten* (Utrecht 2002) 162, 187; The 1-cent pieces were slightly larger than the *duiten*: *duiten* weight and size: 3.62 gram, 23 mm, 1 Ct. weight and size = 4.2 gram, 22 mm.

A comparison with silver money allows for a first impression to differentiate between losses due to wear down and to other causes. The annual average weight loss of silver coins was about 0.32 per cent, whereas the total loss of the silver was 0.4 per cent annually.<sup>36</sup> Hence,  $\frac{3}{4}$  of the loss was due to wear down. If we assume the same ratio applied to copper coins, 0.82 per cent must annually be subtracted from the existing stock of *duiten*.

Taking all this together, the development of the number of *duiten* in circulation is calculated as follows: each year the existing stock is reduced by 0.82 per cent, to which 72 per cent of the imports from the Republic are added, plus the total local currency production. This results in an average increase of 8.6 million pieces *per annum*, between 1724 and 1800, which means that by the end of the eighteenth century nearly 700 million *duiten* may have circulated in Java (figure 5).

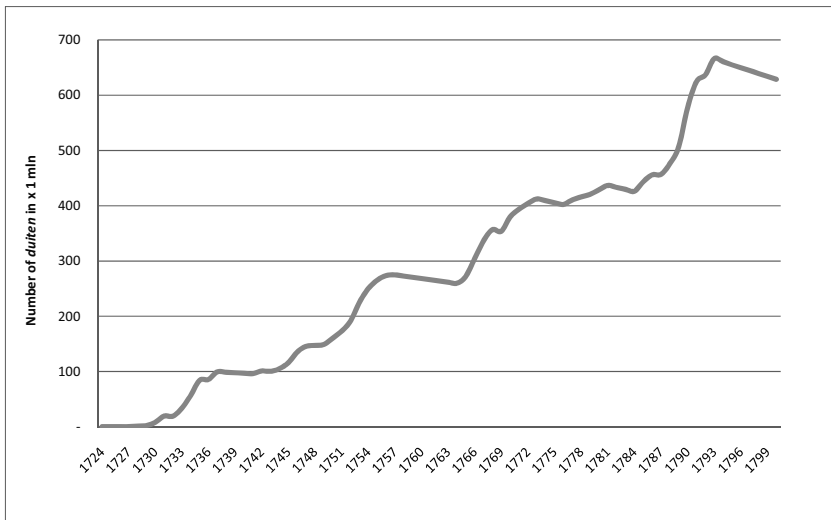


Figure 5. The number of *duiten* in circulation

Source: Bruijn, Gaastra, and Schöffer, *DAS*, vol. I: Introductory volume, 226–245; Scholten, *De munten*, 23; Van der Chijs, *N.-I. plakkaatboek*, vol. 10: 1776–1787, 659.

In the course of the eighteenth century, the *duiten* spread out over the entire island. When imports were absent (in 1737–1742, 1757–1764, the early 1780s and after 1793) the number of *duiten* in circulation decreased slightly, because local mintage was too limited to compensate for the worn down coins. Yet the volume of the *duit* circulation clearly shows an upward

<sup>36</sup> Hoitsema, 'Over samenstelling en omvang', 94; Akinobu Kuroda, 'What is the complementarity among monies? An introductory note', *Financial History Review* 15 (2008) 7–16, 9.

trend, adding up to a total of over 660 million pieces in circulation at the end of the eighteenth century, so Java's money supply can hardly be called very limited.<sup>37</sup> The next section analyses whether this growth also resulted in a per capita increase of the *duiten*.

### 3 Java's demographic development during the eighteenth century

Population growth is likely to increase the demand for money in an economy. Hence, the degree of monetisation depends on the development of coins per capita. This section reconstructs Java's demographic figures during the eighteenth century, which allows us to calculate the number of *duiten* per capita. That figure will subsequently be used to gauge deep monetisation.

To estimate Java's demographic development before the twentieth century, two issues need to be solved. Firstly, an estimate of Java's population size at the turn of the nineteenth century is required as a point of departure for the reconstruction of eighteenth-century developments. Secondly, a reconstruction of the eighteenth-century developments must be drawn up.

Although the precise pre-1900 developments are subject to debate, a broad consensus exists about the general trend of Java's demography during this period: a series of wars and revolts caused low population growth or even decline from the late seventeenth until the mid-eighteenth century, followed by a period of growth that persisted into the twentieth century. This is useful as a first indication for demographic development, but absolute figures are needed to calculate the number of *duiten* per capita.

Estimates of the population size increasingly diverge when going back in time, due to dramatic improvements in the census methods during the nineteenth century.<sup>38</sup> The first complete and reliable data stem from the 1930 census, which counted 40.9 million inhabitants, whereas the esti-

37 Jan Luiten van Zanden, 'Linking two debates: money supply, wage labour, and economic development in Java in the nineteenth century', in: Jan Lucassen (ed.), *Wages and currency: global comparisons from antiquity to the twentieth century* (Bern etc. 2007) 171.

38 P. Boomgaard and A. J. Gooszen, *Population trends 1795-1942*, Changing Economy in Indonesia 11 (Amsterdam 1991) 29, 82.

mated 30 million in 1900 is also generally accepted.<sup>39</sup> Less consensus exists about the population size around 1800, although Raffles' contemporary estimate of 4.6 million Javanese in 1815 is nowadays deemed too low.<sup>40</sup>

Several scholars have made estimates of early nineteenth-century population figures (table 2). Anthony Reid estimated a population of approximately 5 million in 1800, Boomgaard and Gooszen calculated 7.5 million in that year, while Van Zanden presented an estimated population size of 8.4 million in 1815.<sup>41</sup> Because Boomgaard and Gooszen's 7.5 million is strongly substantiated by their impressive analyses of demographic parameters and results in the most conservative figure for the number of *duiten* per capita in 1800, their estimate is used in the rest of the article.

**Table 2. Estimates of Java's population size (1800/1815)**

Author	Population (in millions)	Year
Raffles	4.6	1815
Reid	5	1800
Boomgaard & Gooszen	7.5	1800
Van Zanden	8.4	1815

Sources: Christie, 'States without cities', 23; Reid, 'Low population growth and its causes', 36; Boomgaard and Gooszen, *Population trends 1795-1942*, 82; Van Zanden, 'Economic growth in Java', 3.

From this point of departure we can reconstruct Java's eighteenth-century population figures, by using tax records and comparing nineteenth-century population statistics, which serve as complementary tools. Pre-1800 censuses are lacking, but Javanese tax registers can be used to gauge growth rates. These tax registers counted a number of tax units, the *cacah*, which referred to a number of people, usually four to six, but sometimes as much

39 *Ibidem*; Jan Luiten van Zanden, 'Economic growth in Java 1815-1939. The reconstruction of the historical national accounts of a colonial economy', accessed November 30, 2012. [http://vkclibrary.uu.nl/vkc/seh/research/lists/working%20papers/attachments/26/VanZanden\\_Economic-GrowthJava.pdf](http://vkclibrary.uu.nl/vkc/seh/research/lists/working%20papers/attachments/26/VanZanden_Economic-GrowthJava.pdf); Pierre van der Eng, *Agricultural growth in Indonesia since 1880: productivity change and the impact of government policy* (Groningen 1993) 269; Jan Wisseman Christie, 'States without cities', *Indonesia* 52 (1991) 23.

40 Christie, 'States without cities', 23.

41 Anthony Reid, 'Low population growth and its causes in pre-colonial Southeast Asia', in: Norman G. Owen (ed.) *Death and disease in Southeast Asia: explorations in social, medical and demographic history* (Singapore 1987) 36; Boomgaard and Gooszen, *Population trends*, 82; Van Zanden, 'Economic growth in Java', 3; Van Zanden's estimate for 1815 results in an estimation of 6.7 Javanese in 1800.

as 30 persons.<sup>42</sup> Hence, a number of *cacah* cannot simply be transformed into concrete population figures, so we need to be careful when using these tax registers.

Despite this limitation, we can get an indication of population growth by comparing the registers over time. Merle Ricklefs infers from two *cacahs* of 1755 and 1773-1774 that the Javanese population grew by a rate of at least 0.9 per cent per year.<sup>43</sup> He also concludes that the number *cacah* in 1755 is almost certainly too high, which means that the actual growth rate was higher than the calculated one. Consequently, Ricklefs considers a growth of at least 1 per cent per year to be very plausible.<sup>44</sup> Other scholars agree that this growth rate in the period 1755-1800 is likely.<sup>45</sup> So we may assume that the Javanese population increased by 1 per cent per year during the second half of the eighteenth century and perhaps by more.

A comparison with nineteenth-century population growth supports for this estimate. From the literature it is clear that overall conditions for demographic development changed little between 1755 and 1820.<sup>46</sup> Firstly, there was a lasting peace after the treaty of Gyanti in 1755, which continued until the Java War (1825-1830).<sup>47</sup> The absence of war probably led to an increased birth rate, since the impact of wars on the slow demographic growth in early modern Asia was mainly in delaying births and not in the immediate increase in mortality.<sup>48</sup> Secondly, Javanese agriculture experi-

42 M.C. Ricklefs, *Jogjakarta under Sultan Mangkubumi, 1749-1792: a history of the division of Java* (London 1974) 71; M.C. Ricklefs, 'Some statistical evidence on Javanese social, economic and demographic history in the later seventeenth and eighteenth centuries', *Modern Asian Studies* 20 (1986) 2; Boomgaard extensively discussed the subject in the appendix to his PhD-thesis: Peter Boomgaard, *Children of the colonial state: Population growth and economic development in Java, 1795-1880* (Amsterdam 1987) 298-309; Luc W. Nagtegaal, *Rijden op een Hollandse tijger: de noordkust van Java en de V.O.C. 1680-1743* (Utrecht 1988) 49-50; Peter Carey, 'Waiting for the 'Just King'', *Modern Asian Studies* 20 (1986) 68.

43 Ricklefs, 'Statistical evidence', 30.

44 *Ibidem*.

45 Peter Boomgaard, 'Morbidity and mortality in Java, 1820-1880: changing patterns of disease and death', in: Norman G. Owen (ed.) *Death and disease in Southeast Asia: explorations in social, medical and demographic history* (Singapore etc. 1987) 50; Reid, 'Low population growth and its causes', 35.

46 Carey, 'Waiting for the 'Just King'', 105.

47 Ricklefs, *Jogjakarta under Sultan Mangkubumi*, 21.

48 Reid, 'Low population growth and its causes', 42-43; Peter Boomgaard, 'Bridewealth and birth control: low fertility in the Indonesian archipelago, 1500-1900', *Population and Development Review* 2 (2003) 197-214; Peter Boomgaard, 'Female labour and population growth on nineteenth century Java', *Review of Indonesian and Malayan Affairs* 15 (1981) 1-31; Boomgaard, *Children*, 275-280; Boomgaard, 'Morbidity and mortality', 65.

enced a period of unprecedented growth from 1755: both rice production and the number of new *sawahs* (irrigated paddy or rice fields) increased.<sup>49</sup> Thirdly, major epidemics were absent until the outbreak of cholera in 1821.<sup>50</sup> Though the population suffered structurally from smallpox to about 1820, since the colonial government only deployed the smallpox vaccine effectively in Java from 1818-1820, we can reasonably assume that the smallpox similarly inhibited population growth before.<sup>51</sup> This continuity in the demographic conditions means that knowledge of the period from 1800-1820 can be used to estimate growth over the period 1755-1800.

In order to make this backward projection, an estimate is required of the growth between 1800 and 1820. We try to estimate this growth by confronting two approaches. The first is an interpolation between the population estimates of 7.5 million in 1800 and 14 million in 1850, which results in an annual average growth rate 1.26 per cent.<sup>52</sup> However, after 1820 demographic conditions changed: the Java war and cholera epidemic interrupted growth incidentally, whereas both the smallpox vaccination and an increase in the birth rate after the introduction of the cultivation system in 1830 fostered population growth.<sup>53</sup>

The second approach examines the crude birth and death rates, prior and after 1820. Boomgaard assumes that the pre-vaccination Indonesian crude death rate was approximately 50‰, to which smallpox contributed 10‰.<sup>54</sup> For the period 1820-1850 Boomgaard estimated an annual growth rate of 1.25 per cent, which consisted of a crude birth rate (CBR) of 57‰ and a crude death rate (CDR) of 44.5‰ (table 3). Further, the CBR and CDR were 54‰ and 36.5‰ respectively in the period thereafter, when large epidemics were absent, smallpox vaccination was fully effectuated – around 1860 – and the cultivation system was abolished around 1870.<sup>55</sup> Hence, except for the devastating effects of smallpox epidemics, the demographic conditions after 1850 were rather similar to the period prior to 1820.

49 Carey, 'Waiting for the 'Just King'', 89–91.

50 Boomgaard, 'Morbidity and mortality', 49; Carey, 'Waiting for the 'Just King'', 105–106.

51 Peter Boomgaard, 'Pokken en vaccinatie op Java 1780-1860: medische gegevens als bron voor demografisch onderzoek,' in: Godelieve van Heteren e.a. (eds.), *Nederlandse geneeskunde in de Indische archipel, 1816-1942: verslag van een symposium gehouden ter gelegenheid van het afscheid van prof. dr. D. de Moulin als hoogleraar in de geschiedenis der geneeskunde aan de katholieke universiteit te Nijmegen, 30 September 1989* (Amsterdam etc. 1989) 121.

52 Boomgaard and Gooszen, *Population trends 1795-1942*, 82.

53 Boomgaard, 'Female labour and population growth'.

54 Peter Boomgaard, 'Smallpox, vaccination, and the Pax Neerlandica Indonesia, 1550-1930', *Bijdragen tot de Taal-, Land- En Volkenkunde* 159 (2003) 600.

55 Boomgaard, *Children*, 249.

Table 3. Crude Birth and Death Rates 1820-1880

period	Crude Birth Rate (‰)	Crude Death Rate (‰)	Natural Increase (%)
1820-1850	57	44.5	1.25
1850-1880	54	36.5	1.75

Source: Boomgaard, *Children*, 249.

Since smallpox increased the annual mortality by 10‰ this must be added to the 36.5‰ CDR of the period after 1850, which then totals to 46.5‰. If, for the sake of argument, we assume that the increase in the CBR due to the cultivation system equalled half of the decline thereof after 1850, then the CBR before 1820 would be 55.5‰, which leads to a natural increase of 0.9 per cent per year. This figure is significantly lower than the 1.26 per cent calculated through interpolation. Probably the actual population growth rate was between these upper and lower estimates. Therefore, the average of 1.1 per cent annual growth is a likely estimate for the growth of Java's population between 1755 and 1820.

An estimate for the period until 1755 is perhaps even more uncertain than for the period thereafter. Again the tax registers offer some leads. Based on the *cacahs* of 1652 and 1755 Reid arrives at an average annual decline of the population of 0.28 per cent.<sup>56</sup> This decline was the result of wars and uprisings that took place between 1675 and 1755 in the principality Mataram.<sup>57</sup> Most of the Javanese population lived in this principality, which experienced peace in only 35 years out of the 80 years before 1755. Periods of war and peace alternated so that there was no linear development, which means we must differentiate our estimates between wartime decline and peacetime recoveries.

The increase in the number of taxpayers in Banten (West-Java) between 1694 and 1715 provides us with an indication of peacetime population growth. In this for Banten peaceful period the number of taxpayers increased by 14 per cent, which equals an average annual growth rate of 0.62 per cent.<sup>58</sup>

As Reid suggested, war was the main obstacle to population growth in Southeast Asia in the early modern period. The combination of increased mortality and a falling birth rate caused a population decline, averaging 0.28 per cent per year between 1652 and 1755. On the basis of the above-

<sup>56</sup> Reid, 'Low population growth and its causes', 46.

<sup>57</sup> Ricklefs, *Jogjakarta under Sultan Mangkubumi*, 20–21, 44; Nagtegaal, *Hollandse tijder*, 17–21.

<sup>58</sup> J.H. Talens, *Een feodale samenleving in koloniaal vaarwater: staatsvorming, koloniale expansie en economische onderontwikkeling in Banten, West-Java, 1600-1750* (Hilversum 1999) 98, 232.

mentioned growth rate in the peace years, this means that during conflicts the population annually declined with 1.47 per cent.

The resulting estimate of the population development is as follows (see figure 6). Around 1700 the Javanese population counted about 5.7 million people, which declined to approximately 5 million in 1708, because it suffered from the uprising of Surapati (1686-1703) and the subsequent First Javanese War of Succession (1703-1708).<sup>59</sup> Until the outbreak of the Second Javanese War of Succession (1718-1723), the population recovered to an estimated size of 5.4 million, only to decline to the level of 1708 during that war. From 1723 relative tranquillity is likely to have instigated population growth to 5.6 million in 1740. That year the Chinese Rebellion (1740-1745) broke out, almost immediately followed by the Third Javanese War of Succession (1746-1755).<sup>60</sup> As a result, the population decreased to about an estimated size of 4.6 million people. The treaty of Giyanti ended the wars and unrest in 1755, which translated into a constant population growth of about 1.1 per cent per year until the outbreak of the cholera epidemic in 1821. Consequently, the Javanese population at the end of the eighteenth century probably counted approximately 7.5 million people.

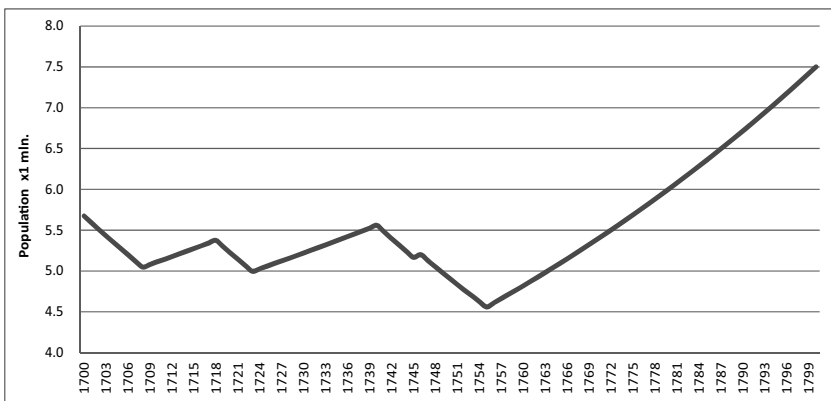


Figure 6. Estimated population in Java, 1700-1800

Sources: Boomgaard and Gooszen, *Population trends*, 82; Boomgaard, 'Bridewealth and birth control', 197-214; Boomgaard, 'Female labour', 1-31; Boomgaard, *Children*, 275-280, 249; Boomgaard, 'Morbidity and mortality', 65; Boomgaard, 'Smallpox', 600; Boomgaard, 'Pokken', 121; Carey, 'Waiting for the 'Just King''; Nagtegaal, *Hollandse tijger*, 17-21; Reid, 'Low population growth and its causes', 46; Ricklefs, 'Statistical evidence', 2; Ricklefs, *Jogjakarta under Sultan Mangkubumi*, 20-21, 44; J.H. Talens, *Feodale samenleving*, 98, 232.

59 Ricklefs, *Jogjakarta under Sultan Mangkubumi*, 20-21, 44; Nagtegaal, *Hollandse tijger*, 17-21.

60 Ibidem.



## 4 The impact of the *duit*: substitution

We can now estimate the number of *duit* per capita and start analysing what effects the large *duit*-influx may have had on the existing small coin supplies, the price level and money use. From figure 7 is it clear that the growth rate of the *duit* markedly outstripped the population growth, so the number of *duit* per capita increased throughout the eighteenth century, to peak at 96 *duit* per capita in 1793. When at the end of the eighteenth century the imports came to a halt, the Javanese population still increased, so the number of *duit* per capita declined.



Figure 7. Population and total number of *duit* in circulation

Sources: figures 5 and 6.

The strongest per capita growth occurred during the first half of the eighteenth century, when population growth stabilised and the total number of *duit* increased. During that period, total circulation rose to 265 million pieces in 1755, resulting in an average of 58 *duit* per capita (figure 8). Between 1755 and 1793 the number of *duit* per capita increased from 58 to 96 pieces, which equals an average growth rate of 1.33 per cent per year. During the second half of the eighteenth century, both the number of *duit* in circulation and the population increased, decelerating the growth in per capita *duit*, despite a tripling of the absolute number of *duit* in circulation.

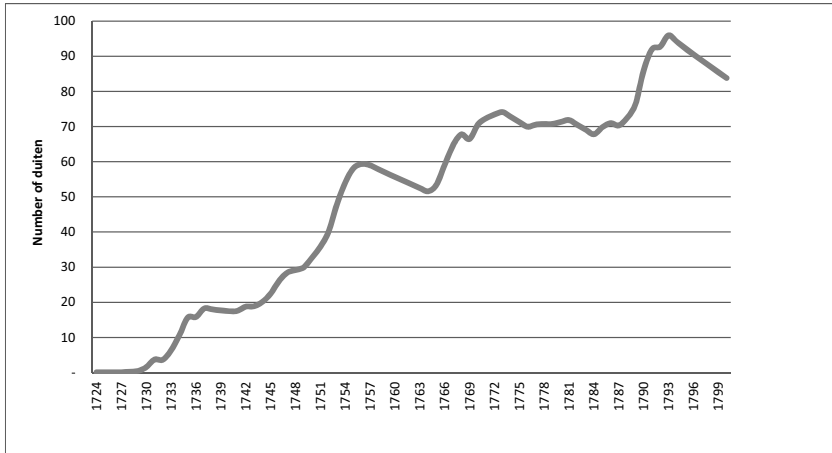


Figure 8. The number of duiten per capita

Sources: figures 5 and 6.

Yet the question is how the influx of the *duit* affected the Javanese economy. An increase of coins per capita could have caused inflation, a subject to which we return in the next section. Further, the increase in *duit* may have led to replacing existing coins. This substitution process can also explain the increased demand for VOC-*duit* and hence have reduced the increase of the small coin supply as a whole.

This section examines two forms of substitution: currency substitution – one coin replacing another – and the substitution of barter. Of course, only the smaller coins could have been substituted by the *duit*, because their function in the circulation had to be comparable. Consequently, there is not – as generally assumed – one homogeneous money supply ( $M$ ), but multiple money supplies that serve and circulate in their distinct parts of the economy, making them complementary to each other.<sup>61</sup>

Java's economy was monetised to a certain extent before the VOC introduced the *duit* in 1724. By then the VOC had already shipped money and bullion to Java for over a century. Moreover, the Javanese were already familiar with monetised transactions before the Europeans arrived on the island. The smaller denomination coins spread by the VOC are discussed below; the section starts with examining the presence of Asian coins in Java.

When the Portuguese first visited Java in the sixteenth century, several

61 Akinobu Kuroda, 'Concurrent but non-integrable currency circuits', *Financial History Review* 15 (2008) 17–36.

types of cash coinage circulated. The Portuguese called them *caixas*, the Dutch – later during that century – *casjes*.<sup>62</sup> This term was used indiscriminately for both *kepengs* and *picis*; although in practice these terms were often used interchangeably, this article distinguishes between copper *kepeng* and tin-lead alloyed *picis*. This interchangeability in terminology is understandable since the two types were rather similar; small coins with a hole in the middle, which enabled stringing them together into a larger unit of account. Copper scarcity in China triggered the production of cheaper lead substitutes in the late sixteenth century, as it had done before.<sup>63</sup>

Originally, these coins were cast in Southeast China and shipped by Chinese merchants, who used them to buy pepper and pay for their daily necessities.<sup>64</sup> Gradually the formerly barter economy of Banten's hinterlands became monetised.<sup>65</sup> At least from the 1430s onwards *picis* were produced on Java itself, in response to insufficient supplies from China.<sup>66</sup> The same mechanism applied in 1633, when fewer Chinese junks had arrived and the demand for lead to mint *picis* sharply increased.<sup>67</sup> This demonstrates that Javanese were so accustomed to the use of low value money for daily transactions, that they were willing to solve scarcity problems when they arose, and thus that Java's economy was already monetised to a considerable extent before the introduction of the *duiten*.

Since the *picis* were made of inferior quality metals, while the copper *kepengs* had become scarce from the late sixteenth century onwards, their value was well below the latter currency: around 1700, a string of 50 tin-lead *picis* had the same value as one silver *double stiver* (henceforth in Dutch: *dubbele stuiver* or *dubbeltje*), which means that one *duit* was worth

62 An extensive reconstruction is made by: Arjan Van Aelst, 'Majapahit picis; the currency of a 'moneyless' society 1300-1700', *Bijdragen tot de Taal-, Land- En Volkenkunde* (1995) 369; And a broader context is provided by: Robert S. Wicks, *Money, markets, and trade in early Southeast Asia: The development of indigenous monetary systems to AD 1400* (Ithaca, N.Y. 1992).

63 Leonard Blussé, *Strange company: Chinese settlers, mestizo women and the Dutch in VOC Batavia* (Leiden 1986) 38; Michael Mitchiner, 'Coin circulation in Palembang (Sumatra) until circa AD 1710 including coins made in Banten, Siak, Kampar, Indragiri, Jambi, Palembang and Batavia', *Journal of the Oriental Numismatic Society* 213 (2012) 23.

64 Blussé, *Strange company*, 43.

65 *Ibidem*, 39, 43, 46–47.

66 Mitchiner, 'Coin circulation in Palembang', 23; Christie, 'States without cities'; Blussé, *Strange company*, 45–47.

67 *Generale missiven van gouverneurs-generaal en raden aan Heren XVII der Verenigde Oostindische Compagnie*, vol. 1: 1610-1638 (W. Ph. Coolhaas, ed.) ('s-Gravenhage 1960) 388.

6.25 *picis*, while 24 copper *kepings* are reported to be exchanged against one *dubbeltje*, and thus one copper *duit* was worth three *kepings*.<sup>68</sup>

Moreover, the poor quality of the tin-lead alloyed *picis* made them brittle, causing a high wear rate; a carefully handled *pici* had a lifespan of approximately three to four years. This high wear rate had two major consequences for the use of the coins: they were unfit to store value, which made them unsuitable as hoarding money and hence stimulated the circulation, and secondly, the circulation needed continuous new supplies in order to remain constant.<sup>69</sup> In other words, without new supplies the coins would rapidly disappear from circulation.

This is precisely what happened around the mid-eighteenth century in Java. In 1744 the VOC attempted – vainly – to issue their own minted *picis*, but was eventually left with huge unsold stocks. It was then decided to lease-out the *pici*-minting to Chinese minters, who met with the same problem somewhat later and lamented that the *picis* were not used.<sup>70</sup> This unpopularity of the *pici* can easily be related to the popularity of the alternative small coin in circulation now: the VOC-*duit*. In 1739, for instance, the shortage of small change was so pressing that the exchange of big coins yielded a 10 per cent premium, because the Javanese were ‘*very fond of that specie* [i.e. small change]’.<sup>71</sup> This is in line with the observation about the rapid sales of the first *duiten* in the 1720s.<sup>72</sup> Furthermore, the demand for *duiten* had eliminated the market for *picis* so the company cancelled the lease of *pici*-minting formally in 1763, despite the apparent lack of small coins, which incited them to mint *duiten* locally a year later.<sup>73</sup> In this light the opinions of Shimada and Blussé, who argued that the Javanese kept preferring *picis* and only slowly and reluctantly accepted the *duiten* instead, must be revised.<sup>74</sup> Moreover, it seems that the VOC had misjudged the success of the *duit*: exactly at the moment that they tried to link-up with the existing payment modalities, the demand for the local coinage disappeared due to the popularity of their own *duit*.

Besides the local currencies, the *duit* also influenced the use of other

68 François Valentijn, *Oud en nieuw Oost-Indiën: met aantekeningen, Volledige Inhoudsregisters, chronologische lijsten, enz.*, S. Keijzer (ed.), vol. 3 ('s-Gravenhage 1858) 556; Nagtegaal, *Hollandse tijger*, 186.

69 Blussé, *Strange company*, 44-45.

70 Kwee, *The Political economy of Java's Northeast coast, c. 1740-1800*, 100-101.

71 Van der Chijs, *N.-I. plakaatboek*, vol. 4: 1709-1743, 537.

72 NA, BGB inv. nr. 10818, f. 14; inv. nr. 10819, f. 15; inv. nr. 10820, f. 15.

73 Van der Chijs, *N.-I. plakaatboek*, vol. 7: 1755-1764, 680.

74 Blussé, *Strange company*, 97; Shimada, *Intra-Asian trade*.

currencies the VOC issued in Java, mainly the silver *dubbeltjes*. The *duit* was by no means the first Dutch coin the VOC shipped to Asia, although for the most part of the seventeenth century the imports of small coinage had remained rather limited; approximately 8 per cent of the coins and bullion exported to Asia consisted of small silver change. These coins were categorised as '*payement*', unspecified small change, which were almost exclusively silver coins, although copper farthings (Dutch: *oordjes*) are mentioned once: a sum of 5,000 guilders in 1653-1654. Only from the 1680s onwards the company shipped larger amounts of silver *dubbeltjes* to Asia. Whereas the VOC exported 'merely' 400,000 guilders worth of *dubbeltjes* during the seventeenth century, approximately 13.1 million guilders worth was sent to Asia during the subsequent century. The bulk of these *dubbeltjes* was exported between 1700 and 1730: more than 7.5 million guilders worth was exported during these three decades.<sup>75</sup> After 1730, however, the number of imported *dubbeltjes* dropped noticeably.

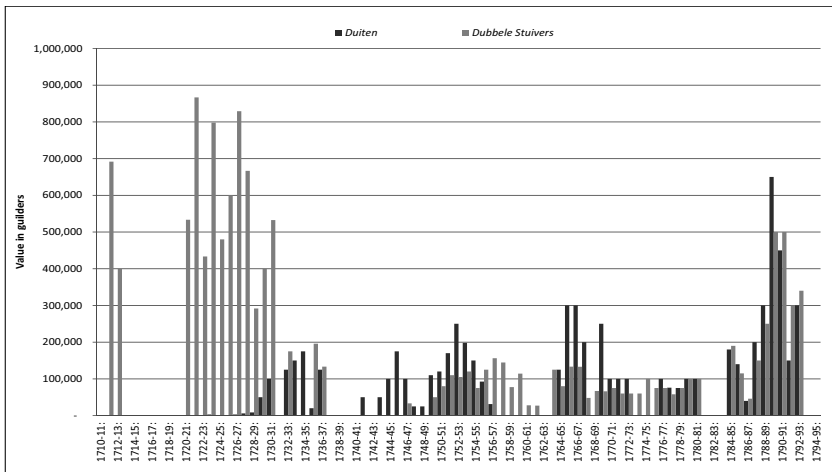


Figure 9. The export of *duiten* and *dubbeltjes* to Asia by the VOC, 1700-1795

Source: Bruijn, Gaastra, and Schöffer, *DAS*, I: Introductory volume, 226–245.

It is, probably, no coincidence that the imports of *dubbeltjes* began to decrease at exactly the moment the VOC had dealt with the initial smuggling issues of the *duiten*, by minting them with the VOC-monogram. In her dissertation Hui Kian Kwee explained this phenomenon by arguing that the

75 Bruijn, Gaastra, and Schöffer, *DAS*, I: Introductory volume, 226–245.

VOC was unable to send sufficient amounts of silver bullion and money and therefore sent copper *duiten* instead.<sup>76</sup> But this is unlikely for several reasons. Firstly, the High Government had already in 1688 requested the Board of Directors in Amsterdam to send over smaller denomination coins and expressed the need for coins with a lower value than the single *stiver* – not a higher value.<sup>77</sup> Secondly, the Sultan of Yogyakarta required copper coins rather than silver ones in 1783. Thirdly, Arent Pol concluded that there was very little need for silver *stivers* in Java, from his analysis of the compliance with the so-called ‘demand of India’ – in which the High Government estimated the amount of money and bullion needed to receive from the Republic.<sup>78</sup> Fourthly, the VOC was perfectly capable of sending over large amounts of silver to Java – including *dubbeltjes* – as becomes clear from the overview in *Dutch-Asiatic Shipping*. From figure 9 it is apparent that during the late 1750s and early 1760s the VOC imported *dubbeltjes* and no *duiten*, coinciding with the decision of the company to mint *duiten* locally, because of the scarcity of small change. In other words, the scarcity of *duiten* sent over from the Republic stimulated local minting of *duiten* and was additionally compensated for by increased imports of *dubbeltjes*. Moreover, merely 1.18 per cent of the VOC’s total exports of bullion and coins consisted of *duiten*, while at least 77.98 per cent consisted of silver (table 4).

**Table 4. Distribution of exported bullion and coin types by the VOC**

Material	Percentage
Copper	1.18
Unknown	8.66
Precious metals	90.17
Whereof:	
Unspecified silver/gold	1.31
Gold	10.87
Silver (large)	69.18
Silver (small/' <i>payment</i> ')	8.80
Subtotal Gold/Silver	90.17
Total	100.00

Source: Bruijn, Gaastra, and Schöffer, *DAS*, I: Introductory volume, 226–245.

<sup>76</sup> Kwee, *The political economy of Java's Northeast coast, c. 1740-1800*, 105.

<sup>77</sup> *Generale missiven van gouverneurs-generaal en raden aan Heren XVII der Verenigde Oostindische Compagnie*, vol. V 1686–1697 (J. van Goor, ed.) ('s-Gravenhage 1975) 189.

<sup>78</sup> Arent Pol, 'Tot gerieff van India. Geldexport door de VOC en de muntproductie in Nederland, 1720-1740', *Jaarboek voor Munt- en Penningkunde* 72 (1985) 96.

Finally, table 5 shows that the amount of silver money sent over exceeded the demand formulated in Batavia for the years 1779-1780.<sup>79</sup> It is, therefore, much more likely that the presence and imports of *duiten* reduced the demand for *dubbeltjes* considerably, than that the VOC would have been unable to provide enough silver. Rather, the opposite seems to have been the case: the VOC could provide sufficient silver *dubbeltjes* but could not meet the demand for copper *duiten*.

Table 5. India's demand and actual shipment, 1779-1780

Required amount	Bullion / coin type	Amount exported from the Republic	Bullion / coin type	Percentage shipped
800,000	Gold ingots	1,400,000	Gold ingots	175%
150,000	Re-edged Ducats	150,000	Gold Ducats	100%
1,00,000	Silver ingots (11 pennies, 20 grains fineness)	2,600,000	Silver ingots	163%
1,000,000	Reals	1,794,000	(mark) Reals	299%
		1,200,000	New Spanish Reals	
50,000	Ducatoons	400,000	Ducatoons	800%
		200,000	Half ducatoons	0%
100,000	"paijement" / small change	50,000	Shillings	150%
		100,000	<i>Dubbele stuivers</i>	
100,000	copper <i>duiten</i>	100,000	<i>Duiten</i>	100%
3,800,000	Total	7,994,000	Total	210%

Source: Bruijn, Gaastra, and Schöffer, *DAS, I: Introductory volume*, 226-245; NA, VOC inv.nr. 3471, f. 169.

Hence, the greater popularity of the more durable *duit* made it impossible to sell or issue *picis* for the Company and the Chinese minters alike, which means that around 1750 the number of *duiten* in circulation was sufficient to take over the function of the *picis* as a means of exchange for daily use. If the absence of the *picis* had paralysed payments, the Javanese would still have accepted them, although perhaps reluctantly and at a lower exchange rate. This was, however, not the case: they simply refused the *picis*, which suggests that the circulation was saturated with coins. Therefore, we may conclude that until about 1750 the *duiten* circulated together with the *picis*, but substituted them thereafter.

79 NA, Archief van de Verenigde Oost- Indische Compagnie, 1602-1795 (1811) (further VOC), inv.nr. 3471, f. 169; Bruijn, Gaastra, and Schöffer, *DAS, I: Introductory volume*, 226-245.

Moreover, as a consequence of their high wear rate the *picis* still in circulation must have disappeared within a few years, once the last coins had been brought into circulation, which means that they can safely be ignored after 1755 for estimating Java's money circulation. On the other hand, although the imports of the *dubbeltjes* seem to have been correlated negatively with the imports of the *duiten*, they were by no means driven out of circulation. Rather the larger *dubbeltje* was complementary to the *duit*. Thus, after 1750 every new issue of *dubbeltjes* or *duiten* probably increased the money supply for the segment of daily transactions.

Whether in addition to the silver *dubbeltjes* and copper *duiten* other more durable small coins were brought into circulation is impossible to tell with a satisfactory level of certainty. Nonetheless, the Sultan's 1783 threat to issue coins himself suggests that he relied primarily on the VOC to supply his lands with coins. We can therefore conclude that the money circulation in Java's interior depended on VOC-imports. Whether this was also the case for the coastal area, where smuggling was easier, cannot be proven. Repeated bans on importing copper *kepengs* suggest that smuggling was a common phenomenon, although its volume is impossible to determine. This, however, would only have increased the small change supply and thus Java's monetisation.

Although it is likely that the introduction of the *duit* in Java changed the mix of coins available for small transactions, the question remains to what extent people started using *duiten* to substitute barter. This form of substitution was probably limited because daily transactions became increasingly monetised from the late sixteenth or early seventeenth centuries onwards, and perhaps this process had even started as early as the fifteenth century.<sup>80</sup> During that period, *kepengs* and *picis* already largely substituted the barter transactions. Considering that Java's monetisation by this time had progressed considerably, the substitution for bartered transactions was probably limited after the introduction of the *duiten*.

Thus, substitution of *picis* forms an important part of the demand for *duiten* until the mid-eighteenth century. Thereafter, any increase in the number of *duiten* per capita is likely to have resulted in an increase in the deep monetisation. Moreover, the imports of *dubbeltjes* and the smuggled *kepengs* also contributed to the deep monetisation, but are not fully taken into account for the calculations of the monetisation here. Even though

80 Jan Wisseman Christie, 'Money and its uses in the Javanese states of the ninth to fifteenth centuries A.D.', *Journal of the Economic and Social History of the Orient* (1996) 243–286; Blussé, *Strange company*, 38–48.



substitution for bartered transactions may have been present, this was probably limited because Java's economy was already monetised to a considerable extent. For now we assume that this part of the monetisation at least compensated for the decrease in barter transactions, although this still may be a too conservative representation of Java's monetisation.

## 5 The impact of the *duit*: inflation

Since we may reasonably assume that the monetisation in Java deepened, the question is now whether this increase can be explained by inflation. If prices rose during the eighteenth century, every transaction simply would have required more coins, while nothing really changed. The equation of exchange demonstrates this effect more formally in the formula  $MV=PT$ . This equation describes the relationship between, on the one hand, the total money supply ( $M$ ) and the velocity of money ( $V$ ) and on the other hand the prices ( $P$ ) and trade ( $T$ ). The equation demonstrates that an increase in the total amount of money leads to either a decrease in the velocity of money, or to an increase in the product  $PT$ . Since the velocity of money is, as is common in economics, assumed stable for this period, an increase of the total money supply leads to either an increase of prices ( $P$ ), or the trade volume, the number of transactions ( $T$ ).

An increase in the general price level is more apparent and can be determined with higher levels of certainty than an increase of the transaction volume, since no sources are available for the latter. The analysis of the inflation is based on the trends in rice prices and daily wages for unskilled labourers. Since these are two relatively one-dimensional parameters, the price level depends less on other factors, such as skills, which means that these prices enable comparisons over longer periods of time.

Wages show no structural increases over the period 1650-1808. Despite fluctuations, there was no clear upward or downward trend, although nominal wages rose dramatically at the beginning of the nineteenth century. Until 1800 however, the average wage for a labourer was approxi-

mately 27 *duiten* per day, while this never rose above the level of 34 *duiten* and hardly ever paid less than 20 *duiten* (figure 10).<sup>81</sup>

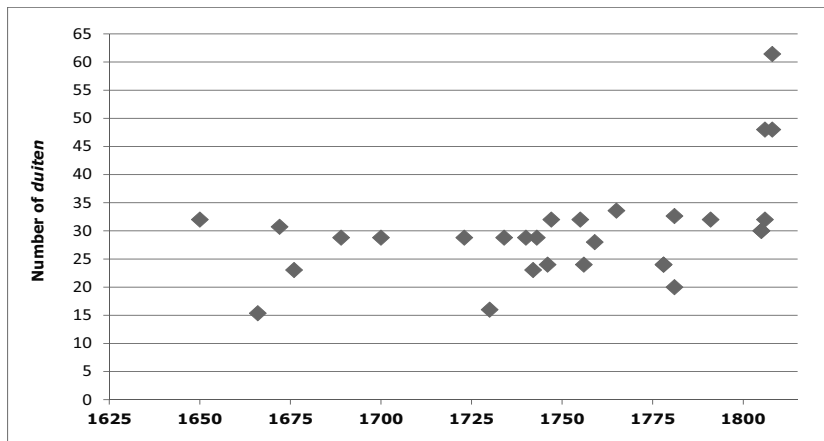


Figure 10. Nominal daily wage levels, 1650-1808

Sources: See note 81.

Rice prices also fluctuated while there was no structural increase or decrease in the price level over the long run (figure 11).<sup>82</sup> Even though these prices are too scattered to serve as incontestable proof for the absence of inflation, they nevertheless indicate a general trend. On average a daily portion of rice cost 3 to 4 *duiten* per day, which means that a wage labourer spent about 1/8<sup>th</sup> of his wage on his daily meal.<sup>83</sup> Despite large short-term

81 Peter Boomgaard, 'Why work for wages? Free labour in Java, 1600-1900', *Economic and Social History in the Netherlands* 2 (1990) 44; Van der Chijs, *N.-I. plakaatboek*, vol. 2: 1642-1677: 410-411; *Generale missiven*, vol. III: 1655-1674, 823; *Ibidem*, vol. IV: 1675-1685, 97; *Ibidem*, vol. V: 1686-1697, 341; *Ibidem*, vol. VI: 1698-1713, 141; *Ibidem*, vol. VII: 1713-1725, 647; Nagtegaal, *Hollandse tijger*, 194; *Generale missiven*, vol. IX: 1729-1737, 603; *Ibidem*, vol. X: 1737-1743, 492, 795, 1024; Van der Chijs, *N.-I. plakaatboek*, vol. 5: 1743-1750, 379-381, 491; *Ibidem*, vol. 7: 1755-1764, 13-92; *Generale missiven*, vol. XIII: 1756-1761, 100, 346; Van der Chijs, *N.-I. plakaatboek*, vol. 8: 1765-1775, 68; *Ibidem*, vol. 10: 1776-1787, 335-336, 502-503, 529, 551-553; Jan Hooyma, 'Verhandeling over den tegenwoordigen staat van den landbouw, in de Ommelanden van Batavia', *Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen* 1 (1779) 213-216; Van der Chijs, *N.-I. plakaatboek*, vol. 11: 1788-1794, 304-305; *Ibidem*, vol. 14: 1804-1808, 229, 331, 556, 595; Robert van Niel, *Java's northeast coast 1740-1840: a study in colonial encroachment and dominance* (Leiden 2005) 91.

82 Boomgaard, 'Why work,' 44; *Generale missiven*, vol. III: 1655-1674, 206; Van der Chijs, *N.-I. plakaatboek*, vol. 5: 1743-1750, 486-492; *Ibidem*, vol. 6: 1750-1754, 664, 677; *Ibidem*, vol. 7: 1755-1764, 221; *Ibidem*, vol. 10: 1776-1787, 366; *Ibidem*, vol. 11: 1788-1794, 23; *Ibidem*, vol. 14: 1804-1808, 6, 182-183, 228-229.

83 M. Kooijmans and J.E. Oosterling, *VOC-glossarium: verklaringen van termen, verzameld uit de rijks geschiedkundige publicatiën, die betrekking hebben op de Verenigde Oost-Indische Compagnie* (Den Haag 2000) 60, 91: 1 kati = 1/100 pikol, 1 pikol = 125 pond.

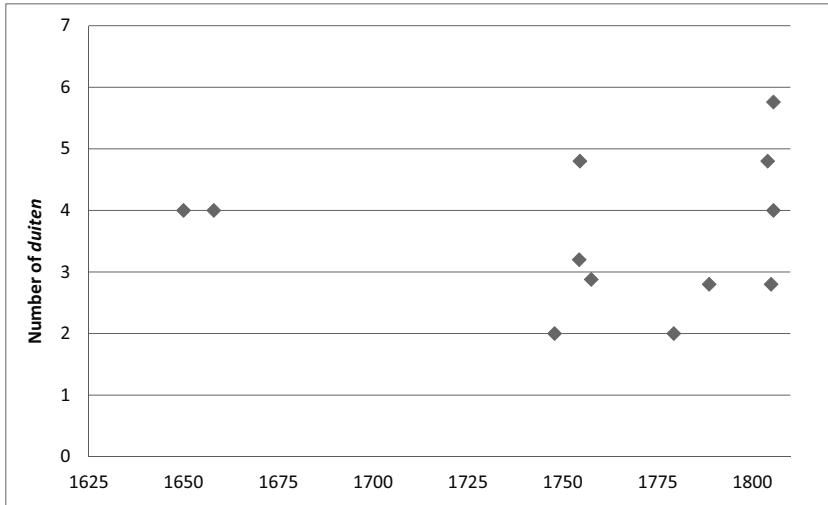


Figure 11. Rice prices per kati, 1650-1806

Sources: Boomgaard, 'Why work', 44; *Generale missiven*, vol. III: 1655-1674, 206; Van der Chijs, *N.-I.*

fluctuations in wages and prices, there is no discernible structural inflation visible between 1650 and 1800.

Probably the *duiten* were indeed used to pay wages and pay for daily necessities, because they were most convenient for both, compared to the alternative currencies: the *dubbeltje* and the *pici*. The *dubbeltje* was too large, because for a daily amount of rice 0.4 *dubbeltje* was needed. The *pici*, on the other was too small, although a daily amount of rice could be easily paid with 20 *picis*, paying a daily wage required no less than 162.5 *picis*, which was impractical of course.

For the nineteenth century Van Zanden has demonstrated that the *duit* was indeed the most common currency for wage payments.<sup>84</sup> Also, in the early nineteenth century, the *duit* was the popular means for the payment of wage labour. This becomes apparent from the wage increase of coolies in 1806, whereby it was explicitly stipulated that the daily wage had to be paid in copper money.<sup>85</sup> Furthermore, the fee increase of the pharmacist in Batavia in 1744 – from six to eight *duiten* per patient – was expressed in *duiten*, just as the remuneration for Batavia's bakers in 1740, who received 6.93 *duiten* per person per day.<sup>86</sup> Finally, from 1733 onwards, the High

84 Van Zanden, 'Linking two debates', 191.

85 Van der Chijs, *N.-I. plakaatboek*, vol. 14: 1804-1808, 331.

86 *Ibidem*, vol. 5: 1743-1750, 162; *Ibidem*, vol. 4: 1709-1743, 504.

Government sent *duiten* from Batavia to Banten for the purchase of food on the local market, for the garrison there.<sup>87</sup> These examples suggest that the presence of the *duit* was already linked to wage payments, soon after the introduction of coin.

The initial overview shows a relatively constant level of rice prices and wages between 1650 and 1800, which not only indicates the absence of inflation, but also implies that real wages remained relatively stable. This contradicts Boomgaard's hypothesis that declining real wages in this period was caused by an increasing number of wage labourers.<sup>88</sup> Although the number of wage labourers might indeed have increased, this cannot be derived from a downward trend in real wages. However, the *duiten* were perfectly fit and used for paying wages and the subsequent spending thereof, which suggest that there is a link between wages and currency, as Lucassen proposes.<sup>89</sup>

## 6 Deep monetisation, wage labour and the Great Divergence

For understanding Java's eighteenth-century economic development, Pomeranz' use of the distinction between core regions and peripheries proves useful. Whereas his main argument concentrates on shared characteristics of core regions in Europe and Asia until about 1750, different developments in their peripheries proved vital for the subsequent economic divergence of the core regions.<sup>90</sup> Contrary to the Asian peripheries, where strong population growth drew people into a monetised economy by import substitution, proto-industrialisation and declining exports of land-intensive products, such as food and timber, unfree labour limited similar developments in Eastern European peripheries.<sup>91</sup> Moreover, Europe's overseas colonies in the Americas used slave labour to increasingly supply the Old Continent with land-intensive products, which prevented the latter from overstepping the land constraint.<sup>92</sup> Hence, control over labour in the peripheries

87 Talens, *Feodale samenleving*, 231.

88 Boomgaard, 'Why work', 47; Peter Boomgaard, 'Labour, land, and capital markets in early modern southeast Asia from the fifteenth to the nineteenth century', *Continuity and Change: a Journal of Social Structure, Law and Demography in Past Societies* (2009) 62.

89 Jan Lucassen (ed.), *Wages and currency: global comparisons from antiquity to the twentieth century* (Bern 2007).

90 Pomeranz, *The great divergence*, 254.

91 *Ibidem*, 253–255.

92 *Ibidem*, 264–269.

is an essential element for the economic development of these peripheries and their cores.

However, Java was neither a direct periphery to Asia's core regions – China or Japan – nor was it a formal European colony; despite the VOC's large military influence, the company could not control the deployment of the labour force, as happened in Eastern Europe and the Americas where bonded labour and slavery dominated. Instead bonded labour and slavery declined while free wage labour was probably on the rise in eighteenth-century Java.<sup>93</sup> From around 1670 Dutch sources began to mention the so-called *coolies*, an ambiguous term for bonded and free wage labourers, who formed a social underclass of unskilled labourers. Depending on the circumstances these *coolies* worked for wages or turned to banditry. In either case they were outside the realm of subsistence farming and formed a permanent pool of wage labourers. Additionally, from around 1750 the sources mention, temporary labour migrants, so-called *bujangs*, who worked as free wage labourers either for a few years to earn money before getting married or in the agricultural low season.<sup>94</sup> Moreover, statute labour was gradually replaced by monetised taxation while work for the state was increasingly being paid for in cash, which stimulated both wage labour and Java's deep monetisation.<sup>95</sup>

Java's eighteenth-century population growth, increasing monetisation and expanding wage labour resemble other Asian peripheries more than European ones. We examined population growth and monetisation extensively, which raises the question to what extent wage labour increased. If the *duiten* were solely used for wage payment and the subsequent spending, this implies an equal distribution between both. This means that wage labour increased with half of the degree of the deep monetisation of 1.33 per cent per year, which results in an estimated yearly growth of the wage labour of 0.67 per cent. Even though economic growth cannot directly be proven, the increase in wage labour suggests the ejection of labour from self-subsisting agriculture during the second half of the eighteenth century.

Probably the production outside subsistence farming increased and it is likely that wage labour was an essential part thereof, but wage labour had not yet reached a critical mass to lower real wage levels, as Boomgaard suggested. Instead, references to labour scarcity reappear regularly until the early nineteenth century.<sup>96</sup> This might have happened during the first

93 Boomgaard, 'Labour, land, and capital markets', 62–63.

94 Boomgaard, 'Why work', 43–46.

95 Kwee, *Political economy*, 117; Boomgaard, 'Labour, land, and capital markets', 62–63.

96 Van der Chijs, *N.-I. plakaatboek*, vol. 14: 1804–1808, 566; Boomgaard, 'Why work', 47–48.

decades of the nineteenth century, since Van Zanden's estimates of a daily wage of 18 *duiten* in 1820, which is 30 per cent lower than the average of 27 *duiten* during the seventeenth and eighteenth centuries, which suggests that the labour market had changed significantly by then.<sup>97</sup>

## 7 Conclusion

Java's economy was deeply monetised around 1800, to which the large imports of copper *duiten* by the VOC had considerably contributed. Also, the VOC made a nice profit from issuing the *duiten*, which adds to Volckart's critique to Sargent and Velde. Moreover, these tremendous imports of VOC-*duiten* provided Java's residents with a reliable coin, which could store value and which at the same time eased their daily transactions. In the course of the eighteenth century the *duit* was increasingly used for small payments, such as daily wages and subsequent spending thereof, while the wear rate was low enough to sustain an increase of the *duiten* in circulation, both in total amount as well as per capita. Yet this huge influx of coins did not lead to inflation, which means that the transaction volume increased. The subsequent penetration of money use at the deepest level of Java's economy indicates a shift away from subsistence farming and suggests economic growth during the second half of the eighteenth century.

Until about 1750 the *duiten* substituted the Asian *pici*-coins, which means that no reliable conclusions can be drawn about the deep monetisation before the mid-eighteenth century on the basis of the *duiten* per capita. Once the market became saturated with small coins during the 1740s, the *picis* were no longer in demand. Thereafter, the *picis* disappeared from circulation and any increase in the *duiten* supply deepened the monetisation, which suggests that the number of people depending on the market to buy their daily necessities increased similarly.

This increasing importance of retail transactions began perhaps prior to the mid-eighteenth century, but this remains to be researched. Nevertheless, the increase of 66 per cent in the number of *duiten* per capita, supplemented with significant imports of *dubbeltjes* and smuggled *kepengs*, indicates an increased transaction volume using small coins between 1755 and 1800.

The greater reliance on the market could well have been the result of an

<sup>97</sup> Van Zanden, 'Rich and poor', 13.

increased number of wage labourers – although growing proto-industrial production or factors related to an ‘industrious revolution’ might also explain the relative diminishing importance of subsistence farming. To what extent a growing number of wage labourers or proto-industry contributed to the increased demand of small coins per capita during eighteenth century cannot yet be established with a satisfactory level of certainty. Whatever the precise causes were, Java prospered economically and demographically between 1750 and 1800. This contradicts prevailing historiographical suggestions on Java’s monetary and economic development, which picture Java around 1800 as rather backward, with few incentives for market production, low levels of commercialisation, self-subsisting farming and a very small money supply.<sup>98</sup>

The increase of the small coin supply outpaced the population growth, while subsistence farming ejected labourers, who increasingly depended on the market for their daily necessities and used *duiten* as payment for that. Moreover, these economic developments on Java show close resemblances with the economic growth in other Asia peripheries, which also experienced increasing monetisation, population growth and reliance on free wage labour. On the other hand, bonded labour in Europe’s peripheries allowed England to overcome the land constraint and industrialise, whereas Asia’s cores went on the path of labour intensification. Hence, future research into the Javanese labour market can provide essential clues for and contribute to the role of peripheries during the Great Divergence.

## About the author

**Alberto Feenstra** (1982) studied Global History at the Vrije Universiteit Amsterdam. Previously he has been employed as a research assistant at the *Geldmuseum* (Money Museum) in Utrecht. Currently he is a PhD Candidate at the University of Amsterdam, where he works on the integration of financial markets within the Dutch Republic. The project is titled: *Finance without frontiers? The integration of provincial money markets in the Dutch Republic*.

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<sup>98</sup> Van Zanden, ‘Linking two debates’, 171; Pomeranz, *The great divergence*, 267.