Deep monetization and the payment of wages in Eurasia ca. 1000-1950[1]

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Abstract

This paper introduces a comparative method to measure deep monetization levels across time and space. Deep monetization is defined as "a substantial (per capita equal to between five and ten times the prevailing hourly wage) stock of currencies in circulation, consisting of denominations equalling the value of one hour or less of waged work".
This stock is primarily conceived as a function of the demand for small-denomination currencies needed for the spending of earnings of the common man. Therefore this concept is used here as a yardstick for tracing shifts in labour relations. It uses archaeological and other numismatic evidence as a supplement to and alternative for written evidence for the history of work.
Available data for different parts of Eurasia (esp. the Low Countries, France, India, and China) show unexpected results: (1) similar levels in Western Europe and South Asia from c. 1100 to 1900; (2) Similar periods of increasing and decreasing levels overall, but diverging in the seventeenth/eighteenth centuries (increase in Europe, while temporary decrease in India); (3) Diverging developments between China and the rest. These results question some accepted wisdom in debates on labour history, but also on the Great Divergence, urbanization, migration, and economic development.
Explanations for changing levels of deep monetization may be found in shifting labour relations (in particular (de)commodification; free vs. unfree, and independent vs. wage labour) as well as in changing practices in payment frequencies and thus in credit relations of workers, which determine their power relations.

1. Questions and concepts

During more than 2,500 years of Eurasian history, work, the remuneration of work, and currencies – the means of exchange in which remuneration is often expressed – are strongly interlinked. In this paper I am looking more closely into the nature of these links by comparing developments in different parts of Eurasia in the second millennium CE; the outcome will, I hope, shed more light on long-term shifts in labour relations.

[1] An earlier version was presented at the workshop on Economic Institutional Change and Global Labour Relations, International Institute of Social History, Amsterdam, 26-27 September 2014. I thank the participants for their input. Besides, this new version has greatly profited from the input of Jaap Kloosterman.

The link between work, remuneration and currencies is not straightforward. It is, however, important in a part of the world that had seen markets develop long before our period and in which tributary and self-sufficient reciprocal labour relations had become insignificant.[2] In this world of "commodified" labour, circulation of currencies nearly always implies the remuneration of work, though remunerated work does not necessarily imply the circulation of currencies. The link between the two is weakest if currencies are primarily intended for large-scale or costly trade or when large savings are concerned. In those cases currencies consist of big coins – mostly gold or heavy silver pieces – and later on paper money, bills of exchange and the like.

There are three major situations in which work is not paid, or not paid in currencies. First, we have the case of unfree and forced work. Of course here, too, minimal remuneration is necessary in order to keep the worker alive, but this takes the form of remuneration in kind, either provided directly by slave owners or grown by the slaves themselves on plots and in time slots allowed to them. This form of wageless work is also encountered on estates worked by serfs, who grow their own food on small plots on the estate unless ordered to work without pay for their lord. Secondly, remuneration may be paid in kind instead of in currency.[3] In-living servants, who work in exchange for board and lodging (plus a token remuneration in money), are a well-known example. Soldiers and sailors also receive a substantial part of their remuneration in kind. The Indian jajmani system has to be mentioned as well. Here, craftsmen in the village community provide free services to the local farmers in exchange for a share in the total harvest for consumption. Thirdly, and most common, unpaid work is found inside the household, in which notably women and children share the income of its head, but perform all household chores for free. For an overview, see Figure 1.

Degrees of freedom of contract	**Ration**	**Right to grow own food**	**Payment in kind**	**Board and lodging (partially)**	**Payment in currencies**
Free				Performers of household work	Independent producers
			Jajmani workers	In-living wage labourers	Wage labourers (share cropping, piece rates, time rates)
					Indentured labourers
		Serfs			
Unfree	Prisoners; slaves	Slaves			

Figure 1 – The relations between types of labour relations and of remuneration.[4]

[2] Tributary societies such as the Egyptian and pre-Columbian civilizations, let alone older societies, fall outside the scope of this paper. See Lucassen 2013 and the site of the Global Collaboratory on the History of Labour Relations (GCHLR) of the IISH, which provides a taxonomy of labour relations that will be used in this paper; see https://collab.iisg.nl/web/labourrelations.

[3] Contrary to what may be thought at first sight, sharecroppers do not come under this denominator, because as a rule they have to sell the product of their work on the market, just like independent producers.

[4] Cf. Simmel 2009, 284-291 (originally Simmel 1922, 298-307).

To formulate it differently, apart from the relations mentioned – which pertain more to unfree than to free labour, and more to women and youngsters than to adult men – work in Eurasia (the upper right part of Figure 1) was performed in exchange for currencies, directly in the case of independent producers (farmers and peasants, craftsmen, traders and peddlers, transporters, shopkeepers, performers of services) or indirectly in the case of wage earners employed by them.

It should be noted, although it lies beyond the scope of this paper, that increased "dependency" on the market does not necessarily have only negative effects for the receivers of wages and other remunerations. As Samuel Johnson wrote to Boswell in 1777, money earnings had a liberating capacity since those who lived off the land were also bound to it for lack of portable wealth. Wages paid in metal currencies, in contrast, supplied "power of resistance and means of escape" from a feudal system.[5]

This idea was fully developed by the German social scientist Georg Simmel (1858-1918) in his *Philosophie des Geldes*, originally published in 1900.[6] At the same time, he realised very well that this freedom is relative: "It is not the bond as such, but being bound to a particular individual master that represents the real antipode of freedom. […] Only in most recent times has the scarcity of domestic servants in large cities occasionally provided the possibility of turning down a position for imponderable reasons. Both sides consider this a major step towards the independence of servants, even though the actual demands of the job are no less heavy than they previously were. […] A formally similar development emerges for wage labourers in a money economy. In view of the harshness and coerced nature of labour, it seems as if the wage labourer is nothing but a disguised slave. […] From the subjective aspect, however, the relationship to the individual employer has become much more loose compared with earlier forms of labour."[7]

If the remuneration of work is one side of the circulation of currencies, the spending of income is the other. Sums used in spending are smaller than sums received as remuneration for work. Even farmers selling their seasonal harvests, who receive relatively big sums, will divide their spending over the payment of rents, the purchase of necessities for the continuation of their business, as well as edibles, clothing and other goods that they do not produce themselves. All others – craftsmen and wage labourers – will spend most of their income on food and shelter and, if anything is left, on small luxuries.

The difference in size between sums received and sums spent brings us from medium-size coins most suitable for the payment of moderate sums at intervals of one, two or a few weeks (the predominant frequency for the payment of wages, but also for advances that many craftsmen could not do without) to the coins used for weekly or daily purchases. For these transactions, much smaller denominations are needed, both because of the amounts involved and because it is impossible for people always to pay with the exact money, thus creating a need for small change.

The degree of participation in a market economy is therefore reflected in the degree to which medium and small denominations are available for circulation. Because small denominations best reflect the frequency of exchanges in a society they may be considered the best yardstick of commercialised human relations.

[5] Selgin 2008, 6.
[6] Simmel 1908, 746-747; 1922, 314-321; 2009, 297-303.
[7] Simmel 2009, 299-300 (original: Simmel 1922, 316-317).

In order to measure this across space and time, I have recently proposed a formal definition of what scholars in different fields like Koen Verboven and Shailendra Bhandare have called "deep monetization". I take this to be "a substantial stock of currencies per capita in circulation, consisting of denominations equalling the value of one hour or less of waged work", in which substantial is defined as "a per capita stock equal to between five and ten times the prevailing hourly wage."[8]

The application of this definition[9] to different societies may provide an indication not only of the levels of "deep monetization", but also (and more importantly for this paper) of shifts in labour relations at their root – shifts between remunerated and unremunerated work, between remuneration in kind and in currencies, and between frequencies of payment.

Clearly, for societies with abundant records concerning these shifts, such as Western Europe in recent history, a detour via deep monetization is less interesting; but for most parts of the world before, say, 1900 it could provide a useful approach. For many places and periods, written evidence of shifts in labour relations is not readily found or, even worse, virtually non-existent. Archaeological evidence on coin circulation, to the contrary, is much more universally available, because of the metals used for most types of currency. The academic discipline of numismatics is centuries old and has brought us not only catalogues of coins from all over the world, but also estimates or even precise numbers of quantities produced and circulation patterns as mirrored in coin hoards and stray finds.[10] Sometimes deep monetization is almost the only possible approach to detecting shifts in labour relations. Most valuable, however, is its importance for making comparison possible by providing a clear and objective measuring instrument through time and space.

This paper offers a provisional overview of the available evidence on the emergence and fluctuations of deep monetization in some important parts of Eurasia as well as on the possible links between these phenomena on the one hand and shifts in labour relations on the other. For practical reasons I shall start my survey about one thousand years ago, even though the method could in principle be used from the very beginnings of coinage in Asia Minor, Northern India and China some 2,500 years ago. The survey extends the coverage of the *Global Collaboratory on the History of Labour Relations (GCHLR)*, which starts in 1500. On the other hand, it has to leave aside Africa before ca. 1900, which except for the north and the Horn was a continent without metal currencies; the same goes for pre-Columbian America. This is related to the pre-eminence of different labour relations (as well as the pre-eminence of reciprocal and redistributive societies), in which means of exchange were not needed.

[8] Lucassen 2014B. Consequently, there are two possible definitions of "medium monetization". First, in a system where multiple denominations do co-exist (as is worldwide the case since ca. 1900 and in many parts of Eurasia already long before), by replacing hour/hourly by day/daily, as I have done (without using the term "medium monetization") in Lucassen 2007A and 2007B; and, second, in a mono-denominational system (in East Asia until ca. 1900 as will be explained below), by lowering the definition of the per capita stock as equal to between one and five pieces. In this paper I will concentrate only on the reconstruction of "deep monetization".

[9] Some colleagues have proposed to use real instead of nominal wages. I consider this less appropriate and far less practical; in addition, an experiment by Pim de Zwart (IISH) regarding the Low Countries (see below) did not yield different trends. I am grateful to Pim for sharing these results.

[10] Cribb, Cook, and Carradice 1990 provide a really global introduction; cf. also Lucassen and Zuijderduijn 2014.

2. Two case studies: the Low Countries and France in the long run

Because of the ready availability of sources, Western Europe is a good starting point for the study of shifting labour relations and currency circulation. For the Low Countries from the Middle Ages until the twentieth century such a study has been done.[11] In this section I shall try to situate it in a wider West-European context by comparing it to France.

After the demise of the highly monetized Roman Empire, the feudal society of the early Middle Ages was typically redistributive, at a rather low level of intensity. Markets were non-existent or unimportant for the great majority of the population, few cities were left, and wage labour was inconsequential. A new round of monetization began with the emergence of towns in the southern Low Countries around 1100, followed by the north one century later. One single denomination was coined, the silver denarius or penny. Around 1300 a multi-fractional system came into being with the introduction of various silver denominations of two-and-a-half and eight *penningen*, greatly facilitating payments.[12] From the mid-fourteenth century, but not earlier, there appears to be a certain correlation between, on the one hand, the denomination coined most frequently over a longer period and, on the other, the level of the daily wage. This correlation suggests that the demand side preferred a currency equivalent to four times (c. 1350-1450) and later once or twice a wage earner's full daily wage. From the fifteenth century on, this comes down to once for the worse-paid and twice for the better-paid wage earner.[13] Although it is still difficult to reconstruct per capita circulation for the Burgundian Netherlands – we have production figures for certain provinces only, and population figures are very uncertain – this type of situation, in which production patterns follow wage levels, strongly suggests that the Low Countries knew medium monetization since about 1350. It also indicates an important shift to wage labour as demonstrated by Bas van Bavel[14], or points to a custom of independent producers receiving advances from merchants or customers at the same rate as labourers received their wages.

Does it also represent a situation of deep monetization? This is still open to debate, but by 1550 the Low Countries were surely deeply monetized as may be seen from Table 1.

	Circulation per capita	**Hourly wage levels**			**Circulation expressed in terms of hourly wages**	
Cross section		**Antwerp**	**Amsterdam**	**The Netherlands**	**Antwerp**	**Amsterdam / The Netherlands**
1550 N&B	0.33	0.045	0.027		> 7	< 12
1600 N&B	0.42	0.100	0.077		4	5
1650 N	0.89		0.125			7
1700 N	0.30		0.125			2
1750 N	1.37		0.125			11
1800 N	0.68		0.125			5
1840 N&B	0.49		0.125	0.108		> 4-5
1890 N	1.68		0.208	0.203		8
1940 N	4.18			0.479		9

Table 1 – Per capita circulation of small-denomination coins in the Netherlands, 1550-1940, in relation to wage levels (in guilders of account).[15]

[11] What follows about the Low Countries and in particular its northern parts is a summary of Lucassen 2014B.
[12] For a general overview of circulation patterns in Europe see Spufford 1988, 2002, and 2008.
[13] Lucassen 2007, 260-261.
[14] Van Bavel 2007.
[15] Lucassen 2014B, Table 3. At a regional level see Welten 2010, who very precisely shows which types of coins were used for which type of transactions. See for 1890 also Haupt 1894, 124-128 (per capita circulation 1893 monnaie de bronze fl 0.40 and monnaie d'appoint – which includes the *kwartje* – fl 1.70).

This possibly applies to the Southern Netherlands already a century earlier. Yet even more important than the precise beginnings of deep monetization in different parts of the Low Countries are the variations that we register afterwards. Why did monetization vary so much and, at the lower end, what kind of solutions were found for the problems resulting from those changes?

Consider the fall of small-coin circulation in the second half of the seventeenth century. The country was prosperous, and overall coin production was impressive. The key merchants who commanded coins from the mint houses, however, were much more interested in the (comparatively cheap) minting of large denominations than in the production of the small silver *dubbeltjes* or *stuivers*. And insofar as they were interested in providing silver for coining small denominations, they sent most of the *stuivers* (0.05 guilder) and nearly all of the *dubbeltjes* (0.1 guilder) overseas. The answer of the provincial governments was increasing the production of copper *duiten* (1/160 guilder) – and, for some decades, tacitly condoning the coinage of (partially low-weight) *duiten* by small principalities and noblemen in border regions. When this was not sufficient, remedies were sought in improved machinery for striking *duiten* and government orders (instead of orders from merchants, which was the rule) for the minting of silver *pijlstuivers* after 1738. In the end, only the unitary state that emerged in the French period was capable of meeting public demand for small change.

This episode shows that supply and demand for specific fractions are not automatically in equilibrium. This is not so much due to technology as it depends on which responsibilities governments are prepared to assume. The more unified Burgundian Netherlands and the Kingdom of the Netherlands were apparently more willing to act than the intermediate Dutch Republic, in spite of its very high *overall* level of monetisation.

Echoing Volckart (and *n'en déplaise* Sargent and Velde), this case study for the Low Countries shows that problems of the supply and demand of small change had been mastered as early as the sixteenth century.[16] The occasional problems that arose in the Dutch Republic stem from its political structure and economic concepts, which determined who was responsible and which instruments were available. As a result, solutions were always inadequate, to the extent that in the second half of the seventeenth century unofficial coins had to be allowed into circulation – just like in mid-seventeenth and again in late eighteenth-century England.[17] Craig Muldrew has pointed to the extension of small credit in similar situations in England; this might just as well have played an important role in the Netherlands after c. 1750. At the same time, these institutional shortages of small change – as a result of failing governments in certain periods in Dutch and English history – caution against any automatic link between currency patterns and labour relations. It is true that some of the solutions adopted leave easy traces: imported, underweight and "illegal" coin circulation is also refelcted in the numismatic evidence. Thus, the rise of wage labour in late-eighteenth century England is perfectly visible in the explosion, outside the Royal Mint, of private token production all over the country.[18] Other solutions, though, in particular the extension of credit practices, are less easily detectable when archival documents are lacking.

[16] Volckart 2008; Sargent and Velde 2002.
[17] Muldrew 2007; Selgin 2008.
[18] Selgin 2008, 7, cf. also 24-29 for detailed descriptions of how employers sought for remedies of petty coin shortages.

The Dutch case, then, strongly suggests a relation between the commodification of labour from the late Middle Ages and deep monetization, as well as between the rise of wage labour and the circulation of medium fractions. Yet before we can speak of a (northern, northwest) European pattern, it should be supplemented by other case studies. This is still impossible because research on what might be termed the social history of coin circulation has only just begun.[19] Here I can only briefly discuss the implications of some estimates for the largest country of Western Europe, France between 1789 and 1810.

In the revolutionary period, a number of coin reforms took place, mainly for ideological reasons; they combined a desire for science-based politics with a demand for in-depth reports on the current circulation of the coins that eventually had to be replaced. Contrary to the situation in contemporary England, the French state took responsibility for the circulation of small change. In these years, deep monetization is reflected in coins equal to or lower than an hourly wage, which amounted to about 2 to 3 sous.[20] As the lowest silver fractions were 6 sous, the study of deep monetization of France between ca. 1650 and 1810 may be restricted to billon and copper coins, all profusely brought into circulation, in particular since the end of the sixteenth century (see Table 2). The introduction of the copper 1 and 2 *denier tournois* under Henri III was a particularly great success, apparently gratifying a huge demand,[21] even to such an extent that – more or less like in the Dutch Republic somewhat later – adjacent petty principalities such as Bouillon and Sedan, Chateau Renaud, Dombes, Nevers and Rethel, and Orange massively started producing similar petty coins.

denomination	**deniers**	**livre**	**Until 1793/4**	**1793/4-1815: decimal**
	30		Billon 1709-1713	
				Bronze 2 décimes An 4-5
2 sous	24	1/10	Billon 1738-64; Bronze 1791-1794	Bronze 1 décime An 2 [1793] 4-9 (1/10 franc); Billon 10 centimes 1807-1810
	16		Billon 1696-1715	
	15		Billon 1641-1713	
Sou (sol) / douzain	12	1/20 (1/120 écu)	Billon c 1450-1658; Copper 1719-1728; 1767-74; Billon 1739-1748; Copper 1767-91; Bronze 1791-93	Bronze 5 centimes An 4-9; Copper 1808
½ sou / sizain	6		Billon 1628-1658; Copper 1710-1712-1724, 1767-1791; bronze 1792-94	
	4		Copper 1696-1708	
Liard / ¼ sou	3	1/80	Billon 1575-1655 ; Copper 1649-1721, 1767-91; Bronze 1792	
		1/100		Bronze 1 centime An 6-8
Double (denier) tournois (1/6 sou)	2	1/120	Billon c 1300-ca 1580; Copper 1577-1708	
Denier tournois	1		Originally silver; Billon c 1300-1586; Copper 1575-1649	

Table 2 – Small change in France, c. 1600-1810.[22]

[19] Lucassen and Zuijderduijn 2014.

[20] Cf. Desrousseaux 2012, 147 (Haute-Garonne / Toulouse 1811: "les manouvriers, qui gagnent 15 à 20 sous par jour sont payés en cuivre et en billon"). In the late sixteenth and seventeenth century hourly wages were rather 1 than 2 sous, see e.g. Goubert 1968, 333-340, and Le Roy Ladurie 1969, 123. This coincides well with the end of the *denier tournois* after 1650 and of the *double tournois* after 1700.

[21] A provisional DB of years and places of production of deniers and double deniers which are still common in the collectors market may substantiate this.

[22] Ciani 1928 and current world catalogues, published by Krause/Mishler; essais de monnaie not included.

So far I am not aware of reliable production data for small change in France before the end of the eighteenth century. Then, they clearly show that France was a deeply monetized country (see Table 3). Awaiting more detailed information for the preceding centuries I venture to suggest that this level had been reached already around 1600.

	1789	**1801 (by Lambert)**	**1801 (by Desrousseaux)**	**Ca. 1806**	**1810**
Gold			986,000,000		746,231,976
Silver écus at 6 livres			1,700,000,000		1,863,014,796
Silver half écus			131,000,000		134,510,364
Silver 30 and 15 sols			23,000,000		25,278,019[23]
Silver 24, 12 and 6 sols			80,000,000		50,623,966[24]
Silver 5 francs			86,000,000		
Silver and gold (subtotal)	2,673,996,133	1,800,000,000	3,006,000,000		
Billon (1 and 2 sols)	12,398,786	12,000,000	12,000,000		9,601,414
Copper "king's effigy"	22,758,547	20,000,000		5,000,000	
Copper sous "de cloche"		20,000,000	18,000,000	15,000,000	31,302,899[25]
Copper "Marianne"			20,000,000	15,000,000	
Subtotal billon and copper	35,157,333	52,000,000	50,000,000	35,000,000	40,904,313
Grand Total	2,709,153,466	1,852,000,000	3,056,000,000		2,860,563,436
Billon/copper livres per capita[26]	1.22	1.73	1.67	1.17	1.06
Expressed in hourly wage of 2 sous	12	17	17	12	11

Table 3 – Estimates of coins in circulation in France (in livres).[27]

[23] I.e. 30 sous (17,811,193) and 15 sous (7,466,826).
[24] I.e. 24 sous (19,894,514), 12 sous (27,287,641) and 6 sous (3,441,811).
[25] I.e. 2 sous (12,118,818), 1 sou (16,920,391), 6 deniers (2,190,035), and 3 deniers (73,653).
[26] Taking a population of 28 million in 1789, 30 million in 1800 and 38 million in 1810.
[27] Desrousseaux 2012, 26-28, 88, 402-403; Idem, 402-405 totals for 31-12-1813 (3,479,156,869 francs) and 1817, but without sufficient details for questions regarding deep monetization. See also Haupt 1894, 662-677.

Based on good data for the Netherlands from the sixteenth century and for France from the eighteenth onwards, a first provisional conclusion for Western Europe may be formulated. Deep monetization as a response to the commodification of labour – first predominantly in the guise of independent producers, gradually shifting to paramount wage labour – may have started in Northern Italy and the Southern Netherlands in the late Middle Ages, spreading to the rest of the Low Countries in the sixteenth century and to other parts of Europe in the seventeenth. More to the east, variations in unfree labour had an effect on the circulation of small change as recently demonstrated for eighteenth-century RussiaOnce achieved, deep monetization is not necessarily sustainable. Apart from shifts in labour relations leading to variations in demand for small change, the supply may vary along with the quality of state institutions. When governments fail, other suppliers may offer themselves from inside or outside the polity,[28] but alternatively credit relations may expand or contract accordingly.

3. An over-all picture of Europe at the end of the nineteenth century

How do the two countries just studied compare to the rest of Europe? To answer this question we need enough data on deep monetization for the different parts of Europe at about the same point in time. This turns out to be the case for the 1880s. As a result of much trial-and-error by mintmasters over the preceding centuries and much thinking since the Enlightenment the working of supply and demand in the case of small currencies had resulted in scholarly works and concomitant statistics.

Maybe the earliest rule of thumb for the sufficient circulation of especially small change was formulated by Joseph von Sonnenfels (1732-1817), an Austrian member of the Illuminati. In the first edition of his *Grundsätze der Policey, Handlung und Finanzwissenschaft* of 1787 he remarks that mintmasters should not overflow the market with small change, as this would drive up the price of big coins, thus endangering tax collecting. In a later edition he defined already what this implied in real terms: "Scheidemünze" (small change) should be produced "so viel pro Kopf, wie die tägliche Consumtion der Arbeitenden Klasse beträgt" (so much per capita as the amount of the daily consumption of the labouring class).[29] And in a strongly enlarged edition of 1804 he formulated a full-fledged theory, which is important enough for a lengthy quotation from the original with a translation:[30]

„[…] die Münzkammern selbst müssen der Prägung der Scheidemünze Gränzen […] in einem Verhältnisse gegen die allgemeine kreislaufende Masse zu erhalten wissen. Es ist schwer dieses Verhältniss eigentlich anzugeben. Gemeiniglich wird von der geldmasse eines States der zwanzigste Theil, oder 5% angenommen, welches zu unbestimmt scheint, da hier nicht vorzüglich das Verhältniss zu der allgemeinen Geldmasse, sondern das Bedürfniss der Ausgleichung, das ist, der kleinen Ausgaben in Anschlag kommen muss. Es ist wenigstens eine der Wahrscheinlichkeit am nächsten kommende Muthmassung, dass die Menge der Scheidemünze, auf das höchste angeschlagen, gleich seyn müsse, der Summe, wodurch die tägliche Verzehrung der arbeitenden Klasse bedeckt ist: da diese Klasse von dem täglichen	The mint authorities must themselves decide upon the fractions of small change in a proper proportion to the general coin production. It is, however, difficult to determine this proportion Usually, one twentieth part or 5 per cent of the total sum of coins in circulation is taken. But this seems to be too vague as in this case not the relation to the total sum in circulation matters, but rather the demand, and in particular the demand for means of exchange needed for small expenses. It is at least rather plausible that the amount of small change, estimated at most, must be equal to the sum which covers the daily expense of the labouring class. Therefore, because this class is used to live on the

[28] For an example from late medieval Normandy, see Cardon 2012.
[29] Sonnenfels 1787, 287 (Part II, § 271); the following text is from an edition I still have to trace (and in which the paragraph number is the same), cited by Roscher 1881, 198-203, who provides more information on the topic.
[30] Sonnenfels 1804, Part II, 393-395 (§ 237).

Handlohne zu leben, mithin auch in Scheidemünze einzukaufen gewohnt ist. In den vorigen Auflagen war das beyspiel dieser Berechnung auf folgende Art angegeben. Wenn bey einer Bevölkerung von 15 Millionen die Arbeitende Klasse 7 Millionen wären, und die tägliche Verzehrung eines Kopfes zu 4 Kreutzer, angeschlagen wird, sollte die umlaufende Scheidemünze 466,669 Gulden, ingefähr eine halbe Million betragen. Eine genauere Vervolgung der täglichen Auslage hat mich überführet, dass diese Summe viel zu klein seyn würde. Es muss nämlich auf den Vorrath, den gleichwohl jede Familie, die wochenweise ihren Lohn erhält, durch einige Tagen liegen haben muss, auch auf die Zeit gedacht werden, durch welche die Scheidemünze umzulaufen hat, um wieder in die Hände der arbeitenden Klasse zu kehren: und nach diesem Anschalge scheint die Masse der Scheidemünze nicht zu stark angeschlagen: Dass sie seyn müsse gleich dem ganzen Wochenlohne der arbeitenden Volksklasse: das wäre bey 7 Millionen, die tägliche Erwerbung eines Kopfes in den andern zu 10 Kreuzer berechnet 7 Millionen.“	daily wages and consequently to pay with small change. In the last edition I used the following example for this calculation. If in a total population of 15 million souls, the labouring class amounts to 7 million, and if the daily spending per person is 4 *kreuzer*, then the sum of all small change in circulation would have to be 466,669 *guldens*. A more precise analysis of the daily expenses has convinced me now that such a sum would be much too small. However, also the sum that stays for a few days with a family which weekly receives its wages, should be taken into account, as well as the time this takes for the small change to circulate before it returns into the hands of the labouring class. And according to this consideration the amount of small change seems not to be assessed in the following way. It should be equal to the full weekly wages of the labouring class, which means for 7 million people with an average per capita daily income of 10 *kreuzer* 7 million [*gulden*].

It is interesting to see that Sonnenfels in his seventh edition reached almost the same conclusions as I derived from the historical developments in the Low Countries and – albeit for a shorter period – in France.

Since the mid-nineteenth century comparative statistics of coin circulation in different countries become increasingly available, in particular in the framework of the different monetary unions and international monetary conferences. Existing scientific “rules” like that of Sonnenfels were now turned into laws stipulating the amount of coins of different metals to be circulated.

These circumstances also bring about the first large scale statistical overviews of coin circulation in different countries which enable comparative research into deep monetization. A pioneer in this field was the Austrian monetary statistician Ottomar Haupt (1839-1898).[31] He produced a comparative table of coin circulation, from which I borrow the sections on the smaller denominations (see Table 4).

[31] Haupt 1886 and 1894; see also *Report of the Committee* 1893, Appendix II, 213, 273-275.

	Monnaie d'appoint	**Monnaie de billon**
France	6.50	1.60
Belgique	6	2.60
Grèce	6	2.25
Italie	5.70	2.50
Suisse	6	1.50
Allemagne	12.50	1.25
Espagne	11	3.50
États Unies	6.70	1.60
Hollande	4	0.85
Roumanie	5.50	0.90
Turquie	2	?
Angleterre	15	1
Danemark	13	0.50
Norwège	3.60	0.30
Suède	5	0.30
Finlande	6.10	0.45
Portugal	11.80	2.80
Egypte	10	2.50
Autriche	2	0.65
Russie	1.80	1.25

Table 4 – La moyenne de la circulation par tête d'habitant à la fin de l'année 1885 (en francs).[32]

Unfortunately this cannot be translated immediately into deep monetization, as in some countries hourly wages equal only non-precious coins (copper, bronze, nickel, copper-nickel, billon), whereas in other countries small silver coins also qualify. In the UK, for example, hourly wages of 8 pence in 1885 comprised the silver threepence and sixpence coins.

However, starting from Haupt's detailed data, it is possible to reconstruct deep monetization levels (DML) for a few dozen countries (see Figure 2).

<table>
<tr><td rowspan="7">USA 2.7</td><td></td><td>Norway 3.7</td><td>Sweden 2.2</td><td></td><td rowspan="5">Russia 1.5</td></tr>
<tr><td rowspan="2">UK 4.5</td><td></td><td>Denmark 9</td><td></td></tr>
<tr><td>Netherlands 8</td><td rowspan="2">Germany 10</td><td></td></tr>
<tr><td></td><td>Belgium 10</td><td>Austria-Hungary 12</td></tr>
<tr><td></td><td>France 8</td><td>Switzerland 8</td><td>Serbia 11.5</td></tr>
<tr><td>Portugal <17</td><td>Spain <15</td><td>Italy 14</td><td>Greece 6</td><td>Turkey 4</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Egypt 2</td></tr>
</table>

Figure 2 – Deep monetization levels for several countries c. 1885.[33]

This overview is of course very preliminary and needs a lot of finetuning (e.g. better wage data for the same categories of workers), but some observations can already be made. The bulk of the Western European countries show deep monetization levels varying between 8 and 10. It is very well possible that Portugal, Spain, Italy, and Austria-Hungary also belong to this group. For the Iberian peninsula figures have to be reassessed by deducting exports of coins to the colonies, data which are missing for the moment. Austria-Hungary and Italy are examples of countries where the introduction of coin reforms temporarily led to overstocking the market with small fractions. The othe countries are deviant from this Western-European main pattern. I will discuss them in four groups: first, Norway/Sweden, second, the Balkans and the Near-East, third, the United Kingdom, and fourth, Russia and the USA.

[32] Haupt 1894, 66.
[33] Based on Appendix 1.

Norway and Sweden contrast interestingly with the third Scandinavian country in this set, Denmark. Not only was Denmark much more prosperous than its northern neighbours, it showed much higher urbanisation figures and concomitant occupational differentiation and agricultural specialisation.[34] This situation apparently required much more transactions in Denmark than in Norway and Sweden. This is eloquently illustrated in the following description of the Norwegian countrymen (85% of the total population) by the British Consul-General Crow, dated Christiania (Oslo), 9 November 1870.[35] He distinguishes three "classes" among them: the seafaring peasantry along the coast, the "Bonde", and the "Field Bonde" or mountain peasant. The second group is the most important: "The Bonde or real peasant is generally the owner of the land he farms. This class may be considered as the kernel of the nation. The property of the Bonde is not sufficiently large to exempt him from work, but large enough to afford him and his household establishment ample support. He farms in the majority of cases, *not so much to raise produce for sale* [my emphasis JLU] as to grow provisions and everything necessary for spinning wearing-apparel."

The equally low figures for the Balkans (Serbia's DML was temporarily so high because of over-supply) and the Middle East point to similarly low demand for means of exchange as in Norway and Sweden, even if certain indicators of economic development (e.g. the high literacy rates in the North) differed substantially. It is, however, possible that this cross section shows a more primitive situation than in the preceding decades. According to Michael Palairet, in the period 1878-1914 political freedom in the Balkans went hand in hand with economic decline.[36]

Of course the Balkan-like DML of Britain cries out for an explanation. Unfortunately, my research on this point has not developed yet. Apart from possible problems with the data, I would like to suggest that this situation is still an echo of the previous period of scarcity of small change. Muldrew and Selgin have indicated that it took the government "well into the Victorian era" to supply the public with enough small change. Therefore counterfeits and tokens found ready acceptance.[37]

Fourth, the low DMLs for the USA and especially for Russia also seem to be echos from previous periods, in this case of the widespread use of unfree labour, maintained without paying wages to them. However, this point needs more research into the consequences of what Kolchin sketched as the commonalities of the post-emancipation USA and Russia: "there was a common legacy of forced labor that Russia shared with the United States and with all other former slave societies as well. New forms of dependency that provided the ex-bondsman with at best semi-freedom became the rule."[38]

4. India

Informed about different parts of Europe, let us now turn to more easterly parts of Eurasia, and to the relations between labour and coin circulation on the other side of the "Great Divergence". First India, which like Europe had been practicing a multi-denominational and multi-metal currency system since the mid-first millennium BCE. The earliest reconstruction of the total money supply of India dates from around 1880 (see Table 5). This will be our starting point, from which we shall go back in time.

[34] Cf. Honningdal Grytten 2004.
[35] Further Report 1871, 362.
[36] Palairet 1997.
[37] Selgin 2008, 266, 295, 297; Muldrew 2007, 409.
[38] Kolchin 1987, 375. About the circulation of tokens in the American South after the Civil War see Lurvink 2014.[In the next version of this paper I will try to compare the DML of the USA to those of Brazil and Canada].

Gold coins were used only for hoarding, for export, or in order to be melted down for ornaments. Silver coins were used for paying rents and taxes, and for petty trade transactions.[39] At the end of the nineteenth century, silver coins played a much greater role in India than in Europe. In the words of an old India hand in 1892: "the whole trade of India […] is now conducted by the actual transfer of coin from hand to hand, except in the Presidency towns, and some of the large up-country towns, and even there you will see at the present day men paying their debts, by bringing in bags of rupees, rupees in thousands." [40] The ordinary man, however, saw only the lowest possible denominations in copper.[41]

	Amount (in million rupees)	
Gold coins	1,440.0	
Active silver rupee circulation	1,370.8	
Small silver coins	92.6	
Copper coins	48.1	
Cowrie shells	unimportant	
Copper coins per capita		1/5 rupee or c. 3 annas
Expressed in hourly wage of ¼ anna		12

Table 5 – Coin circulation in India, c. 1880.[42]

At first glance, the outcome that India was already deeply monetized in the last quarter of the nineteenth century – much more than the European periphery at the same time - may be surprising and in need of some qualifications. Differently from our assumptions, wages outside agriculture may have been slightly higher and working days may have been longer than eight hours, but even so the result would be a per capita copper circulation of more than five times the hourly wage. Besides, the actual copper circulation was likely higher, because the estimates may very well exclude both copper coins produced before 1862 – the first coinage under the British Crown – and "native coins" that continued to circulate. Then again, a small part of the coppers consisted of half anna pieces who have to be deducted. Yet there are other reasons to suppose that the conclusion that India was already deeply monetized by 1880 may be not too far off the mark. A recent reconstruction of labour relations for the subcontinent in 1900 showed levels of commodification (31.2% self-employed and 12.1% wage labourers) that are not very different from contemporaneous outcomes for European countries.[43]

The next question is when the threshold of deep monetization would have been reached in India: just before 1880 or much earlier? And did India experience the same sort of fluctuations we have seen in Europe? These questions cannot be easily answered. Attempts have been made to reconstruct the silver and gold stock of India on the basis of import figures for bullion (India has no silver mines). [44] Yet however accurate they may be, copper coins, the currency of the common man, are completely absent from these stories. I propose to go back in time step by step from the 1880 estimates.

[39] *Report of the Committee* 1893, Appendix I, 148.-149
[40] *Report of the Committee* 1893, Minutes, 81, question 1913. According to another interviewee only recently paper money played a role *Ibidem* 118, question 2634.
[41] *Ibidem* 117, question 2629; Stevens 2012, 362.
[42] Lucassen 2007C, 366-367, supposing a wage level for agricultural labourers of 2 annas per day of 8 hours *Report of the Committee* 1893, Minutes, 57, question 1432. For similar estimates (unfortunately not considering copper coins) see *Report of the Committee* 1893, Report, 21, and Appendix III, 307-308..
[43] Lucassen and Stapel 2014, Table 23. For Europe see cross sections 1900 for Italy, Spain and the Netherlands on https://collab.iisg.nl/web/labourrelations..
[44] The earliest attempt I know of is by Francis Capel Harrison (1863-1938) who estimated the silver stock of India in 1493 at 290 million rupees, the net imports 1493-1800 at 1,510.6 million, 1800-1835 at 611.9 million

How would the situation have been at the beginning of the nineteenth century? We know that in the nineteenth century proletarianization and labour relations stagnated in the Deccan (of which more below). If we assume that this trend is valid for India as a whole, we might expect, ceteris paribus, that demand for small currency at the beginning of the century was the same as at the end. In that case deep monetization would already have been reached around 1800. There are several reasons to believe this may be true. At the beginning of the century, most copper coinage was probably produced in mints under Indian control. The English wanted to replace it by their own coins, first completely in Indian (Persian) scripts, later with Latin script added on. In 1847, the collector of Delhi district wrote that he needed 50,000 rupees "for the use of his district to replace the native pyce", partly in order to pay the sepoys.[45] The replacement efforts only became successful in the third quarter of the nineteenth century, and even then a number of "native" mint houses remained active, some of them until India's independence in 1947.

The English production of copper coins for India in the first half of the nineteenth century is summarised in Table 6. It shows that this first attempt to dominate Indian copper production (before the mass production of reduced size from 1862 onwards) already amounted to more than 31 million rupees or more at a time when a number of native mints were still very active.[46] Given lower population figures than half a century later – when the per capita stock (Table 5) most probably only represented the copper coin production since 1862 – this points to deep monetization already at the beginning of the nineteenth century.

	English mints				**Native mints**
	Bengal	**Bombay**	**Madras**	**Total**	
1795-1796	0.03			?	?
1800-1808	0.22	[1802-1808 unknown but massive production]	[1803-1808 unknown but massive production]	?	?
1809-1812	1.29	0.28		1.57	?
1813-1825	1.52[47]	[1820-29 unknown]	0.25	>1.77	?
1826-1833	2.25			>2.25	?
1835-1848	20.21			20.21	?
1853	0.46			0.46	?
1857	0.73			0.73	?
1858	3.68			3.68	?

Table 6 – Copper coin production for India by the English (in million rupees).[48]

and 1835-1892 at 3,428.5 million, see *Report of the Committee* 1893, Appendix 3, 307-308. For modern estimates of imports since 1493 see Subrahmanyam 1994 and Prakash 2004.

[45] Lucassen 2007C, 383.

[46] Stevens 2012, 491-492, Lucassen 2007C; Lingen and Lucassen 2007, 2010-11, and 2012-13.

[47] Stevens 2012, 488. However, Benares copper coin production 1826-1827 (here 74,161 Rs = 4,746, 304 pice) is not consistent with Idem, 379: total 94,322 maunds = 9,432,200 lbs. troy (Idem 557) = 54,329,472,000 grains = 543,294,720 pice (Idem 268) = 8,488,980 rupees (Idem 269). I have borrowed here the lower number of 74, 161 rupees.

[48] Stevens 2012, 168, 263, 266, 269, 488 (for the Bengal Presidency); Garg 2013, 164 (for Madras 1824-1825), 172 (for Bombay 1809-1819); Lucassen 2007C, 383 (for 1835-1848); Bruce 2004, 711 (for later years).

These impressions find some corroboration in more precise figures for the district of Benares.[49] In 1808, the amount of (copper) pyce required for circulation in that district was estimated at 700,000 rupees.[50] Production figures for the preceding decades suggest that this was rather pessimistic.[51] The district, then still undivided, most likely coincided with the later Benares "Division", with over 5 million inhabitants in the census of 1901. Given an average population growth of 40% in nineteenth century India, the number of inhabitants may have been some 3.7 million in 1808, 10 per cent of whom in Benares city. The per capita copper coin circulation thus amounted to 0.2 rupees or 3 annas or 15 pyce. The daily wage of a labourer being 4 pyce[52], this would imply that the district as a whole was at the brink of deep monetization. If we put aside questions of the representativity of Benares District for India, the difference with 1880 is partly explained by the replacement of cowries by coppers which took place massively in Bengal in the late eighteenth and early nineteenth century and causes an underestimation of figures for ca. 1800.[53]

Further corroboration comes from a reconstruction of labour relations in the Deccan in the 1820s – the earliest data so far for India available in the CGLH.[54] Not substantially different from the 1901 outcomes for about the same geographical area, commodification of labour was well under way (independent producers , wage labourers for the market and for the state, resp. labour relations 12, 14 and 18, Table 7).

Label	**Khandesh**			**Poonah**			**Dharwar**		
	male	**female**	**total**	**male**	**female**	**total**	**male**	**female**	**total**
1 not working	15	15	30	15	15	30	15	15	30
2 affluent	0	3	3	0	3	3	0	2	2
5b working in the household	0	16	16	0	23	23	0	18	18
7 slaves	7	0	7	8	0	8	6	0	6
12 small producers	18	4	22	24	5	29	22	5	27
14 wage labourers	10	8	18	1	1	2	8	7	15
18 in state employ	4	0	4	5	0	5	2	0	2
Total	54	46	100	53	47	100	53	47	100

Table 7 – Primary labour relations (%) in three collectorates in the Deccan in the 1820s.[55]

[49] Stevens 2012, 264-265, 319-323, 336-342, 355-367, 378-379, 488; *Imperial Gazetteer of India*, Vol VII (Oxford 1908) for information on Benares Division, District and City.
[50] Stevens 2012, 264-265 in fact states 700,000 "laks" or (1 lak = 100,000) 70,000,000,000 units. Supposing these units stand for coins this would result in 20,000 pyce coins per capita which is impossible. The data for the districts of Burdwan, Jessore and Purneah also clearly show that the units meant must be rupees.
[51] Stevens 2012, 322 (annual pice production 1775-1786 of about 6 million pieces as compared to a stock of 44.8 million in 1808; 1782-1805 annual production in maunds, although incomplete, points in the same direction); Idem 341 (pice, valuing 100,000 rupees or ca. 7 million pieces, supposed to be necessary in 1806/7); Idem, 488.
[52] Stevens 2012, 321 (in a report from 1786).
[53] Stevens 2012 [passim]; Lucassen 2007A, 31-32; Hogendorn and Johnson 1986.
[54] Lucassen and Stapel 2014. Since, data for neighbouring Goa since the late 1830s (ongoing work in the framework of this collab by Paulo Mattos, Lisbon) have confirmed this impression.
[55] Lucassen and Stapel 2014, tables 1-3.

Before 1808, no estimates whatsoever are available for copper coin circulation in India. Yet luckily for us, copper coin production was heavily dependent on Japanese and European imports; most of these in fact went directly to the mint. Production figures for Indian and Nepalese mines are very scarce, but overseas trade statistics show on average constant figures for Japanese copper imported by the VOC in Coromandel (annually 200 tons) and Bengal (100 tons) and rising figures for European (mainly Swedish) copper imported by the EIC to Madras (from 100 tons in the 1750s to 200 in the 1760s) and Calcutta (from 100 tons in the 1730s to 300 tons in the 1770s).[56]

The growing copper imports, mainly for the mint houses in the eighteenth century, coincide with trends in coinage intensity that I have recently reconstructed for the period 1200-1750 – without being able to reconstruct absolute numbers.[57] The main conclusion of this long trend was that coinage activity increased threefold from 1525 to at least 1600, then decreased equally strongly in the one and a half century afterwards, only interrupted by a short recovery in the second quarter of the seventeenth century. Maybe the levels of coin circulation around 1700 were not lower than one century before, but the growth had ended. I have not been able to reconstruct so far what happened in the first half of the eighteenth century.

Combining all data on nineteenth-century circulation levels, eighteenth century copper imports, and intensity fluctuations from the thirteenth century onwards I am tempted to suggest that India underwent a first phase of deep monetization in the sixteenth century, which could barely be maintained in the seventeenth, returned to lower levels in the eighteenth, and surged to a second phase of deep monetization around 1800, which was maintained throughout the nineteenth century.

To a certain extent this trend is somewhat similar to what we have seen in Western Europe. Both there and in South Asia, monetization levels started to rise in the thirteenth century. John Deyel has described the preceding period as one in which India was "living without silver". [58] A first, still very moderate acceleration took place in India in the period 1275-1325/75, and a second one between 1425/1450 and 1525. It is tempting to point to the Black Death in between these periods, and to think of the Burgundian upswing in the Low Countries during the second. The coincidence of the first phase of deep monetization in sixteenth century north-western Europe and in Mughal India is at least remarkable.

Most tantalizing for the labour historian is the demonetization of the late seventeenth and early eighteenth centuries, and the question if it had anything to do with shifts in labour relations. What was happening? A general retreat from the market, or at least from the labour market? Or an increase of credit relations within a commodified context? As far as I know this question is new and no easy answers are available. My hypothesis would be that the latter possibility is more likely than the former. Indebtedness in the guise of bonded labour is a major theme in Indian labour history of the nineteenth and twentieth centuries. Perhaps its origins go back not to times immemorial, when the cast system came into being, but to the more recent seventeenth and eighteenth centuries.

[56] Shimada 2006, 107-128; For the ratio between Indian and foreign copper see Prinsep, who in 1780 contrasted average annual copper imports (of 4 yrs) 11,106.20 maunds with Rotas mines' production of only 2000 maunds per annum (Stevens 2012, 112); for Indian copper mines see also Lingen and Lucassen 2007.
[57] Lucassen 2014A, 34.
[58] Deyell 1990.

5. **China**

China "invented" coins at roughly the same time as – though most likely independently from – Northern India and the eastern basin of the Mediterranean. Nevertheless, it followed a different and very distinctive pattern.[59] The Qin state that eventually emerged victorious in 221 BCE adopted the so-called cash coins – cast bronze, copper or later brass round coins with a square hole and a diameter of about 2 centimetres – as the only currency. This system was continued until 1900. It spread to Japan and Southeast Asia, and was used in Vietnam until at least 1933. In China, with a few exceptions, for two millennia no other copper, silver or gold fractions were coined. Next to these cash-coins only silver ingots were used in wholesale trade and for hoarding. For convenience, cash coins could be stringed in units of (ideally) one hundred or one thousand pieces. This mono-denominational currency system offers far less research problems that the multi-denominational and multi-metal systems prevailing in the western and southern parts of Eurasia. Moreover, plenty of data are available for the Chines production of cash-coins from the very inception of the system (Table 7).

Period	**Cash coin production (millions per annum)**	**Population (millions)**	**Cash coin production per capita**
206 B.C.E.-9 C.E.	230	60	3.8
Tang (618-906)	327 (maximum)	110	3.0
996	800	110	7.3
1007	1,830	110	16.6
1021	1,050	110	9.5
Late 1060s	1,200-1,300	110	11.4
1070s-1080s	6,000	110	54.5
Early C12th	3,000		
After 1120	200		
1368-1399	190	60	3.2
1393	190	60	3.2
1554-1562	15	140	0.1
1558	29	140	0.02
1661	600	100	6.0
1680-1720	500	130	3.8
1724	1,000	125	8.0
1735	1,500	150	10.0
1740	1,222	143	8.5
1750	2,527	180	14.1
1760	3,619	196	18.4
1770	2,942	214	13.8
1780	2,622	278	9.4
1790	2,595	301	8.6
1800	3,135	295	10.6
1810	2,378	346	6.9
1820	2,165	353	6.1
1821-1837	2,400-2,500	430	5.7

Table 8 – Annual cash coin production in China, c 1000-1900.[60]

[59] Lucassen 2005, 2007A (based on the work of i.a. Richard von Glahn and Hans Ulrich Vogel); Wang 2004; Scheidel 2012.

[60] Lucassen 2005, 431-432; Burger 2008, 175 (higher population figures for 1078-1085 and thus higher per capita output; 187-189 (reconstruction for all years 1736-1820); Scheidel 2009, 154, 194, 199.

The production statistics show varying degrees of intensity. As a rule of thumb, replacements necessary due to wear and tear annually amounted to a minimum of one percent of the total stock. For a total stock of 400 cash coins (see Table 9), we arrive at about 4 cash per capita replacement.[61] Greater production in this case means an increase of the stock, smaller production, a decrease.

Cross section in years CE	**Stock in billions**	**Population in millions**	**Stock per capita**	**Daily wage**	**Stock per wage sum**	
					daily	**hourly**
9	20-30	60	300-500	<20	<15-25	<120-200
1127	30 in private market and 98 in state treasuries	110	300 (1200 if state treasuries included)	20?	15	120
1480				5-15 25-30		
1600				25-30		
1628-1644				60		
1702			400		7-8	56-64
C18th				50		
1878				75-154		

Table 9 – Stock of cash coins in relation to wage levels in China, 9 CE – 1900.[62]

Apparently, a big increase in monetization levels took place in the eleventh century, followed by a decrease between the twelfth and the sixteenth century, and again an increase in the eighteenth century. Although this periodization is important for the study of labour relations, it is not so easy to decide the question as to what per capita stock would represent "deep monetization" as defined in the introduction. At first sight, the requirements of "a per capita stock equal to between five and ten times the prevailing hourly wage" are more than fulfilled (Table 9). We should, however, not forget that a substantial part of the cash-coins did not circulate as pieces, but as "small" strings of (ideally) 100 pieces or "big" strings of 1000 pieces, which compares to medium and big silver coins in the southern and western parts of Eurasia. I do not immediately see how to tackle this problem of comparing what seem to be apples and pears.

Nevertheless, the intensity shifts observed are important as such for at least two reasons. In the first place, the chronology, which was rather similar between western and southern Eurasia, is different here. Increased monetization took place in China from the ninth century onwards, two or three centuries before India and Europe. The serious slump in twelfth-to-sixteenth-century China on the other hand is not much visible in India and Europe, if we forego the comparatively weak decrease during the Black Death. The increase in the eighteenth century is maybe visible in India as well, even though slightly later.

[61] Lucassen 2005, 432.

[62] Lucassen 2005, 432, 439; Wang 2007, 67, 72 (wage of 600 coins per month for a captain, late Han); Von Glahn 1996, 85, 247; Scheidel 2009, 154 ; Moll-Murata 2005, 241 (1878 Peking: helper -, respectively master paper hangers and taylors) .

This distinctive pattern of monetization intensity becomes understandable if we link it to shifting labour relations, in particular those described in detail by Christine Moll-Murata in the framework of the CGLH.[63] It is significant that around 1050, compulsory work for the Chinese state was converted into a tax, to be paid in cash. This suggests that self-employed peasants and craftsmen as well as wage earners became the new tax payers. In what way labour relations or credit systems changed from the twelfth and thirteenth century onwards still has to be researched. Von Glahn emphatically states that bronze coin circulation virtually stopped for two centuries.[64] Whether its partial replacement by paper money was also useful for regular wage payments or advances to craftsmen is unclear to me. In the fifteenth century the rise of private coinage brought some relief. The rise of "bond-servitude" in late Ming China implies a shift from free to unfree labour in these cash-ridden centuries.[65]

In the eighteenth century a clear shift to work for the market is visible in the CGLH-data collected by Moll-Murata. Whether this is due to an increase in wage labour or in self-employed producers working for the market is still under debate. The former possibility is supported by the increase of wage labour in various industrial sectors such as printing, porcelain making and ship building.[66]

6. **Conclusions**

This paper has shown for several parts of Eurasia that the degree to which people participate in a market economy is reflected in the intensity in which medium and small denominations are available for circulation. Small denominations best reflect the frequency of exchanges in society and so may be considered the best yardstick of commercialised human relations. This yardstick, called "deep monetization", may be defined formally as "a substantial (i.e., per capita equal to between five and ten times the prevailing hourly wage) stock of currencies in circulation, consisting of denominations equalling the value of one hour or less of waged work".

This concept is here used as a yardstick for tracing shifts in labour relations. The paper uses archaeological and other numismatic evidence as a supplement to and an alternative for written evidence for the history of work. It has proven useful for the multi-metal and multi-fractional currency systems which prevailed in the west and the south, but less so in the mono-fractional Chinese system. Nevertheless, in all cases, shifts in levels of monetization may indicate possible shifts in labour relations.

Available data for different parts of Eurasia (the Low Countries, France, India, and China) show unexpected results: (1) similar levels in Western Europe and South Asia from c. 1100 to 1900; (2) similar periods of increasing and decreasing levels overall, but diverging in the seventeenth and eighteenth centuries (increase in Europe vs decrease in India); (3) diverging developments between China and the rest (see Figure 3 as a guide to the eye).

[63] Moll-Murata 2012; For the Middle Ages see Von Glahn 1996,50.
[64] Von Glahn 2010, 83ff.
[65] Chevaleyre 2013.
[66] Moll-Murata 2008.

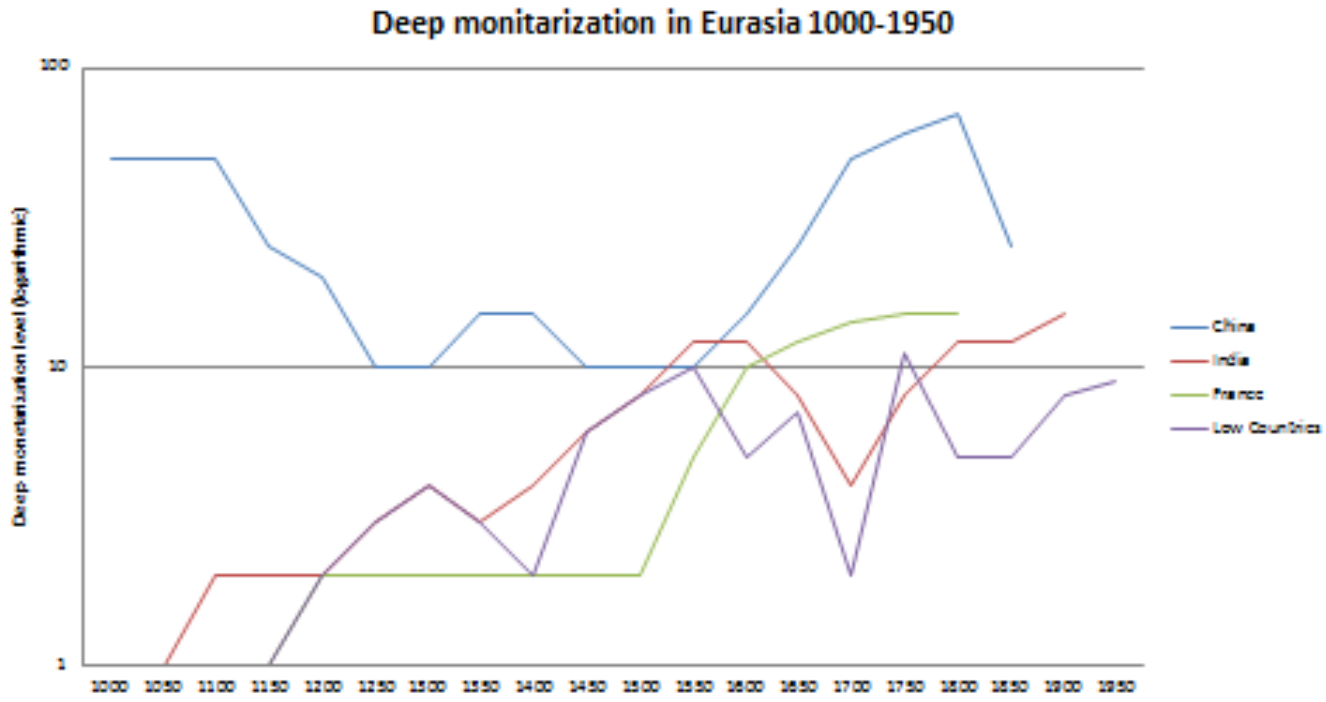

Figure 3 – Deep monetarization in Eurasia 1000-1950.

These results question to a certain extent accepted wisdom in debates on labour history, but also on the Great Divergence, urbanisation, migration, and economic development. In this paper two different types of explanation have been put forward for varying levels in deep monetization: first, actual shifts of people engaged in free or unfree work, in commodified or reciprocal work, or in different types of commodified work; second, shifts in modes of payment when the supply of small change varies independently of developments in labour relations. In such cases intervals of payment and consequently credit relations will have to change. Examples of both have been discussed: shifts in labour relations in all countries analysed here, as well as changing credit relations in the seventeenth-eighteenth-century Low Countries, England and possibly India, in contrast to France.

Although the model needs much more testing, it seems to be promising, in particular for those parts of the world which fall outside the modern North Atlantic. At the very least, it could serve as an indicator for situations in which important changes in labour history may have taken place.

Explanations for changing levels of deep monetization may be found on the demand side in shifting labour relations (free vs. unfree; (de)commodification; independent vs. wage labour) as well as in changing practices in payment frequencies and thus in credit relations of workers, which determine their power relations.

Appendix 1

Deep monetization levels in various countries in the 1870s-1880s.

By combining the data on small coin circulation in particular countries, collected by Ottomar Haupt, with evidence on wage levels and working conditions in the same countries as produced in British parliamentary papers it is possible to reconstruct deep monetization levels around the 1870s-1880s.[67] For now, this reconstruction is possible for a handful of countries.

Per country the following items will be addressed:

- the hourly wage level of ordinary workers;
- the fractions equal to that sum or less
- the circulation figures of these particular fractions;
- these circulation figures per capita;
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*.

Austria-Hungary:

- the hourly wage level of ordinary workers; 10 *Kreuzer* = 1/10 *Florin* (assistant builder Vienna: *FR* 1870, 554-559);
- the fractions equal to that sum or less: 1858-1891: all coppers (1/2, 1 and 4 kreuzer) and billon coins of 5 and 10 kreuzer qualify, from 1892 all coppers (1 and 2 Heller) and nickels (10 and 20 Heller qualify, whereas 1 old kreuzer = 2 new heller;
- the circulation figures of these particular fractions; end June 1892: old billon coins 35.7 million *Florin*, old bronze 14.8 million, new bronze 0.2 million, new nickel 1.7 million, totalling 52.4 million *Florin* (Haupt 889-890);
- these circulation figures per capita; 1.22 Florin *(Ibidem);*
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level: DML* 12[68].

Belgium:

- the hourly wage level of ordinary workers; 0.25 Belgian francs or 25 *centimes* (many data in *FR* 1871, 21-66);
- the fractions equal to that sum or less: bronze 1 and 2 centimes, nickel 5, 10, 20 centimes;
- the circulation figures of these particular fractions; 8.465 million francs in bronze and 6.6 in nickel (Haupt 66, 227);
- these circulation figures per capita; 2.50 francs (*Ibidem*);
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level: DML* 10.

Denmark:

- the hourly wage level of ordinary workers; 10 skilling rigsmont (lower skilled workmen 6 Rigsdaler per week = in 1854-1874 96 skilling Rigsmont per day: *FR* 1871, 141-143*);*

[67] Haupt 1894 and *Further Reports* 1870 and 1871. [NB Countries, still to be added in the next version of this paper: Finland (cf Haupt 1894, 344-345), Rumania (*ibid* 238), Bulgaria (*ibid* 257), Canada (*ibid* 262), Mexico (*ibid* 528), and Japan (*ibid*, 410-411)].

[68] Haupt 1894, 890 commenting on the release of the new coins notes that it appears too big, given the already available old stock.

- the fractions equal to that sum or less: 10 skilling Rigsmont (1854-1874) = ~ 22 ore from 1874 onwards[69], so that qualify all bronze 1,2 and 5 ores as well as the (.6) silver 10 and 25 ore pieces;
- the circulation figures of these particular fractions; 700,000 krone coppers in 1885 and 880.000 coppers in 1893 (Haupt 339-340); silver 10 ore production 1874-1884 = 1,234,000 krone, and silver 25 ore production 1874 = 2,035,000 krone; resulting in 3,969,000 krone total small change 1885[70]
- these circulation figures per capita:1.99 krone;
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level: DML* 9.

Egypt:

- the hourly wage level of ordinary workers; 2 piaster (men in cotton factories 1 shilling a day, quarrying 1 sh 8 d, good excavators 2 sh 6 d, workmen 2 shillings = 20 piasters: *FR* 1871, 148-158)
- the fractions equal to that sum or less: until 1885 2 piasters (or qirsh) = 80 paras = 1/100 pound; 1876-1909 2 piasters = 20 ushr al qirsh; so that all coppers of 1 up to 40 paras, struck in Cairo qualify; besides small silver pieces of 10 and 20 paras and 1 qirsh; from 1886-1891 the Berlin mint provided for nickels and bronzes;
- the circulation figures of these particular fractions; as production figures for small silver coinage are unknown before 1884, only coppers, valuing 152,734 Egyptian pounds may be quantified (Haupt 71, 89-91);
- these circulation figures per capita: before 1884 0.022 Egyptian pound in copper and un unknown but possibly equal sum in small silver, which very roughly would add up to 0.05 Egyptian pound
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 2.[71]

France:

- the hourly wage level of ordinary workers: 30 centimes (Charente: assistant artisans 3 – 5 francs per day, country labourer 2.50 – 3; Cherbourg town artisan 3, town labourer 2.25, country artisan 2.50, country labourer 2: *FR* 1871, 171-185)
- the fractions equal to that sum or less: bronze 1, 2, 5, 10 centimes, silver 20 (hardly struck after 1869) and 25 centimes (struck until 1848);
- the circulation figures of these particular fractions: at the end of 1885: 60 million francs of bronze coins (Haupt 1894, 674), plus silver 20 and 25 centimes. Haupt does not distinguish between the different fractions of the silver monnaies d'appoint (all fractions between 20 centimes and 2 francs, totalling 250 million francs)
- these circulation figures per capita; 1.60 french francs in bronze and 6.50 francs in monnaie d'appoint, totalling for all denominations up to 25 centimes ~ 2 french francs
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 8.

[69] Until 1874, 1 rigsdaler (.4064 oz. silver) = 96 skilling rigsmont; 1 krone (.1929 oz. silver) = 100 ore from 1874 onwards. Therefore 1 skilling equals 0.0042 1/3 oz. silver, while 1 ore equals 0.001929 oz. silver, or 1 skilling = ~ 2.2 ore.

[70] My calculation of total production 1874-1885 from Krause/Mishler.

[71] Even after the new small coins had arrived from Berlin (for 126,217 Egyptian pounds of nickels and for 5,317 bronzes), Haupt 1894, 91 comments: "On voit que l'émission de la petite monnaie se tient dans les limites très étroitement traces."

Germany:

- the hourly wage level of ordinary workers; 1 *silbergroschen* = 10 *Pfennig* (Handarbeiter Silezia 1867-1868 7 Silbergroschen in Summer and 10 in winter: *FR* 1871, 848-453);
- the fractions equal to that sum or less: as wages have risen since, all Kaiserreich copper fractions of 1 and 2 Pfennig and all nickels of 5, 10 and 20 Pfennig qualify;
- the circulation figures of these particular fractions; end 1885: 45 million *Mark*; end 1892 61.5 million *Mark* (Haupt 66, 210-211);
- these circulation figures per capita; 100 *Pfennig* or 1 *Reichsmark (Ibidem);*
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level: DML* 10.

Greece:

- the hourly wage level of ordinary workers 40 lepta (*FR* 1871, 194-201);
- the fractions equal to that sum or less: all coppers of 1, 2, 5, 10, 20 lepta, and silver 20 lepta (struck 1874-1883) and 25 lepta (struck in very low numbers 1833-1855);
- the circulation figures of these particular fractions: October 1885 coppers circulating for 4.5 million drachmai (Haupt 135-137) plus silver lepta pieces, valuing ~600,000 drachmai[72];
- these circulation figures per capita; copper 2.25 drachmai per capita (Haupt 66), including small silver ~2.50 drachmai
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 6.

Italy:

- the hourly wage level of ordinary workers: 20 centesimi (*FR* 1871, 210)
- the fractions equal to that sum or less: copper 1, 2, 5, 10 centesimi, and silver centesimi (struck 1863-1867);
- the circulation figures of these particular fractions; coppers struck 1862-1886 at 76.2 million lire (Haupt 713-714[73]), plus 7 million lire of silver 20 centesimi[74];
- these circulation figures per capita: 2.75 lire per capita;
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 14;

Norway:

- the hourly wage level of ordinary workers: 4 skilling (*Fr* 1871, 364-395);
- the fractions equal to that sum or less: 4 skilling = 1/15 of the new 2 krone pieces and its fractions as struck from 1875 onwards = 0.13 1/3 ore; therefore all bronze 1, 2 and 5 ore pieces qualify as well as the silver 10 ore pieces
- the circulation figures of these particular fractions: in late 1885 400,000 krone consisting of bronze pieces (Haupt 342-343), plus 681,000 krone of siver 10 ore pieces struck 1875-1883[75], totalling 1,081,000 krone;
- these circulation figures per capita 0.50 krone per capita;

[72] My calculation from Krause/Mishler.
[73] There are reasons to believe that there was an extreme over supply of coppers as none have been struck in the 28 years between 1867 and 1895; nickel 20 centesimi pieces appeared only in 1894. Compare this with neighbouring France.
[74] My calculation from Krause/Mishler.
[75] My calculation from Krause/Mishler.

- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 4;

Portugal:

- the hourly wage level of ordinary workers 30 reis (*Fr* 1870, 152-157 rather vaguely suggests 300 reis per day[76]);
- the fractions equal to that sum or less: all copper and bronze fractions of 3, 5, 10 and 20 reis (silver only upwards from 50 reis);
- the circulation figures of these particular fractions: 1885 2 million milreis copper and bronze coins (Haupt 420-421);
- these circulation figures per capita: 0.50 milreis (Haupt 421);
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 17[77];

Russia:

- the hourly wage level of ordinary workers: 10 kopeks (*Fr* 1871, 523-558).
- the fractions equal to that sum or less: copper ¼, ½, 1, 2, 3, and 5 kopeks, silver 5 and 10 kopeks
- the circulation figures of these particular fractions: 10 million rubles in bronze coins (Haupt 766); plus[78] silver kopeks 1867-1885: Rs 545,500 and ditto silver 10 kopeks: Rs 4,750,500, totalling Rs 15,295,500
- these circulation figures per capita;15.3 kopeks
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 1.5[79];

Serbia:

- the hourly wage level of ordinary workers: 20 para (*Fr* 1871, 841);
- the fractions equal to that sum or less: all coppers of 1, 5 and 10 para, all copper-nickel coins of 5, 10, and 20 para;
- the circulation figures of these particular fractions: 1,89,000 dinar in copper and 3,200,000 dinar in copper-nickel coins, totalling 5,098,000 dinars (Haupt 1894, 154);
- these circulation figures per capita: divided by 2.2 million inhabitants this yields to 2.3 dinars per inhabitant;
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 11.5[80].

Spain:

- the hourly wage level of ordinary workers; 0.8 reales (*Fr* 1871, 606-651)
- the fractions equal to that sum or less: 0.8 reales = 8 decimos (1852-1864) = .0304 oz. silver = ~23 centimos according to the post-1869 system, which qualifies copper 1, 2, 5, and 10 centimos and silver 20 centimos (struck in insignificant numbers 1869-1870)

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[76] For similar wages on the Azores see *Further Reports* 1871, 430-437; for Madeira *Idem* 438-441.

[77] Probably partially circulating in the colonies, like Angola, see Haupt 1894, 423-424, and Crib, Cook and Carradice 1990, 238, 248, 253, 256-257, 262.

[78] My calculation from Krause/Mishler.

[79] A figure to be raised in the years to come. For instance, at the end of 1891, the small-change stock had risen to nearly 20 million rubles, or nearly a DML of 2.

[80] Note that all coppers were solely struck in 1868 and 1879 and all copper-nickels only in 1883 and 1884, whereas coining these small denominations was resumed only from 1904 onwards. It is likely that at the end of 1885 most small coins were still in stock in Belgrado, to be released in circulation only by bits and pieces in the years to come.

- the circulation figures of these particular fractions: in 1892 57,199,652 pesetas in copper (Haupt 515-516);
- these circulation figures per capita: 3.50 pesetas (*Ibidem*);
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 15[81];

Sweden:

- the hourly wage level of ordinary workers: 18 ore (*Fr* 1871, 656-667);
- the fractions equal to that sum or less:18 ore pre 1873 reform equals 20 ore afterwards. Therefore the following fractions in 1885 qualify: bronze 1, 2 and 5 ore and silver 10 ore.
- the circulation figures of these particular fractions: at the end of 1885: 900,000 krone in bronze coins (Haupt 341), plus[82] 1, 079,100 krone in silver 10 ore coins, totalling 2 million krone;
- these circulation figures per capita: 44 ore;
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 2.2

Switzerland:

- the hourly wage level of ordinary workers 19 centimes (*Fr* 1871, 669-687);
- the fractions equal to that sum or less: all bronze (of 1 and 2 centimes or rappen) and nickel coins (of 5, 10 and 20 rappen)
- the circulation figures of these particular fractions at the end of 1885: 4,500,000 million Swiss Francs (Haupt 147; cf 139ff, 360 ff, 840ff, and 893ff);
- these circulation figures per capita: 1.50;
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 8.

Turkey:

- the hourly wage level of ordinary workers: 30 para (300 para per day for a married day labourer: *Fr* 1871, 713-747, esp. 720 for Anatolia, see also information for Izmir, Koordistan etc. elsewhere in this report);
- the fractions equal to that sum or less: coppers of 1, 5, 10 and 20 paras (excluding 44,170,000 copper pieces of 40 paras, and equalling 1 piastre), plus 20 silver para pieces;
- the circulation figures of these particular fractions; at the end of 1885 in copper 73 million piasters (113 million piasters in total minus 40 million coppers of 40 paras, struck AH 1255/ry 17-23), plus 5 million silver 20 para pieces, struck from AH 1255/ry 9 [1847] to AH 1293/ry 8 [1883] (Haupt 828-829[83]), totalling 78 million piasters;
- these circulation figures per capita; 3 piasters or 120 paras (25 million inhabitants: Haupt 1829);
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 4.

[81] Like in the Portuguese case, a substantial portion was sent to the colonies, especially Cuba, but also to Puerto Rico and the Philippines, see Haupt 1894, 314, 517, 691; Crib, Cook and Carradice 1990, 288, 290,
[82] My calculation from Krause/Mishler.
[83] Plus my calculation from Krause/Mishler.

United Kingdom:

- the hourly wage level of ordinary workers: 8 pennies per hour (6 shillings per day, see […];
- the fractions equal to that sum or less: all coppers (mainly farthing, halfpenny and penny) as well as small silver coins (mainly 3 pence and 6 pence);
- the circulation figures of these particular fractions at the end of 1885: 1.6 million pounds sterling coppers (Haupt 1894, 491), plus 3.52 million pounds in threepence and in sixpence[84], totalling 5.12 million pounds = 102.4 million shillings;
- these circulation figures per capita: divided by 36 million inhabitants this yields to nearly 3 shillings = 36 pennies per inhabitant;
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 4.5.

USA:

- the hourly wage level of ordinary workers; 15 cents (Fr 1871, 853-937);
- the fractions equal to that sum or less: bronze 1 and 2 cents, nickel 3 cents, copper-nickel 5 cents, silver 10 cents or dimes;
- the circulation figures of these particular fractions at the end of 1885; 15 million dollars in billon coins plus 13,085,546 million dollars in silver dimes 1853-1885, totalling 28 million dollars
- these circulation figures per capita; 50 dollar cents (cf. Haupt 562).
- these per capita circulation figures divided by the hourly wage level, i.e. the *deep monetization level*: *DML* 2.7.

[84] Total production 1834-1885 was 1 million pounds in threepence and 4 million in sixpence, totalling 5 million pounds, minus 20% withdrawn (the percentage estimated by Haupt 1894, 490 for all silver coins) makes 4 million pounds, minus about 12% for exports to colonies (*ibid* 491) makes 3.52 million pounds in total (calculated from Krause/Mishler). For the circulation of English copper coins, valuing 35,000 pounds in New South Wales (Australia) see Haupt 1894, 797.

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