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Standards, Metrology, and Politics in Babylonia in the Imperial Age[1]

By M. Jursa (Vienna)

Drawing on Babylonian data from the Iron age, this paper is built around a series of case studies with a bearing on the overall topic of metrology, standards and equivalences. Several of these case studies concern metrology *sensu stricto*, while others refer to standardized procedures in certain socio-economic settings. The paper's principal interest lies in describing change and in establishing its causes, or at least in exploring pathways for doing so. Causation will involve recourse to societal, economic, metro-mathematical and political forces, including the latters' drawing on religion and religious institutions both for the justification and the implementation of 'standards'. This in turn throws into sharper relief some *propria* of Iron Age Babylonia's society, economy and political system.

1. Metrology

Regarding the primary systems of metrology, length, capacity and weight, Iron Age Babylonia (and its northern neighbour Assyria) stand squarely in the millennia-old Mesopotamian tradition (Powell 1987-1990). The three systems were interdependent, as a standard capacity (the sila or *qû*) was defined as a cube of a certain standard dimension that would hold a standard quantity (2 minas) of water. While this remained unchanged, all three still underwent partly far-reaching changes in our period.

Weight

We begin with weight. Here, we have essentially continuity with regard to the basic system, which is inherited from the third millennium:

1 *šiqlu* ('shekel', ca. 8.3 g) × 60 → 1 *manû* ('mina', ca. 500 g) × 60 → 1 *biltu* ('load', ca. 30 kg).

Tradition kept weight standards quite stable for millennia, even though the preserved weights show the expected oscillations around a mean.[2] Calibration weights with inscriptions guaranteeing their precision exist since the third millennium.[3] The guarantors are most often rulers,[4] beginning from the mid-third century and down into the first millennium: from our period, weights bearing an inscription of Nebuchadnezzar and Darius are attested. Occasionally gods are mentioned as dedicatees. It is assumed that calibration weights were sometimes kept in temples, but actual proof of this is still considered scarce.[5] Non-rulers mentioned with their name on weights are either craftsmen (zadim "stone cutter"), in the late third millennium, or have a priestly background. The latter is already attested in the Early Dynastic period[6] and is true for the two pertinent cases from first millennium BCE Babylonia.[7] One of the weights in question, belonging to a diviner, in fact has an archaeological context: it comes from a room in the eastern courtyard of the Etemenanki, the *ziqqurrat* or temple tower associated with the main temple of Babylon, Marduk's Esangila.[8]

For the present purposes, the most important object is BM 91005, described as follows in the British Museum's data base: "Diorite (?) mina weight in the shape of a sugar loaf; engraved with cuneiform inscription stating that it was a copy of a weight that Nebuchadnezzar II had made after the standard of Shulgi; property of Marduk-shar-ilani."[9] This attribution to a private ownership (one Marduk-šar-ilāni – a possible Late Babylonian name) has been repeated in the secondary literature ever since the object was first published, but it is mistaken. The inscription reads:

BM 91005 (1892-12-14, 1)

1. ⌜2 ma⌝.na ⌜gi.na⌝
   níg.ga ^{d}amar.utu lugal dingir^{meš}
   gaba.ri ki.lá
   šá ^{d}pa-níg.du-ùru
   lugal ⌜ká⌝.dingir.ra^{ki}
5. [du]mu ⌜^{d}pa-a-ùru⌝

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[1]) Research for this paper was conducted under the auspices of the project "The Material Culture of Babylonia during the First Millennium BC" funded by the Agence Nationale de la Recherche (ANR) and the Austrian Science Fund (FWF), I 3927-G25.

[2]) Powell 1971: 249-73 lists all the then known specimen; for more recent research, see Hafford 2012.

[3]) Powell 1971: 205-7.

[4]) 24 cases *vs* 10 in Powell's list (fn. 2).

[5]) Hafford 2012: 50-1.

[6]) Hafford 2012: 39.

[7]) The duck weight BM 91440, perhaps from Sippar, naming the diviner Zēria of the Mudammiq-Adad family (unattested elsewhere; Powell 1971: 257-8, and a late Babylonian weight excavated by Koldewey, see the following note.

[8]) Powell 1971: 249 (but the page reference to Koldewey's *Wiedererstandenes Babylon* should be 188).

[9]) https://www.britishmuseum.org/collection/object/W_1892-1214-1, accessed 6.6.2022. An image can also be found in Finkel and Seymour 2008: 175 ("the object itself belonged to one Marduk-ša^{sic}-ilani, and weighs 978.3 g").

˹lugal ká.dingir.ra^{ki}˺
a-na ˹gaba˺.ri
ki.˹lá ^{d}*šul*˺-*gi*
lugal *ma-aḫ-ri ú-kin-ni*
(spade of Marduk on left side)

"Two[10] minas, of correct (weight), property of Marduk, king of the gods, copy of a weight that Nebuchadnezzar, the king of Babylon, son of Nabopolassar, king of Babylon, had made with due precision as a copy of a weight of Šulgi, an earlier king."

Line two does not contain a name "Marduk-šar-ilāni" but simply the designation of the god Marduk with one of his epitheta, "king of the gods", in other words, this weight was property of the Esangila temple. This is borne out by the presence, on the left side of the object, of an engraving of the god's symbol, the spade of Marduk (which also was overlooked hitherto, as far as I can tell). In other words, this inscription shows that Nebuchadnezzar ordered a weight bearing an inscription of Šulgi to be reproduced several times and stored in the main temple of Babylon. The fact that there were multiple copies shows that this was not, or not merely, an act resulting from 'antiquarianism' or reverence due to a legendary king of lasting fame in Mesopotamian cultural memory. The purpose was future reference and the creation of calibration models. The fact that the standard thus enshrined came with the authority of great antiquity was an obvious plus from the point of view of Nebuchadnezzar's institution-building programme of which this weight is clearly an aspect (below section 4).

While such efforts were taken on the level of government to keep the weight system stable (or perhaps, to make it more so), some terminological changes in the weight system occurred on the level of daily use. They involve the subdivisions of the shekel. Traditionally, the shekel could be divided into 180 'barley corns', *uṭṭetu*, and there were also units of three and 60 barley corns. Only the 'barley corn' was used frequently in accounting and metal weighing, the other units were short-lived or 'academic' only. This changes significantly from the sixth century onwards, when for the first time a specialized terminology for fractions of the shekel became to be used quite widely: *mišlu* and later *zūzu*[11] (1/2), *šalšu* (1/3), *rebûtu* (1/4), *ḫummušu* (1/5), *suddû* (1/6), *bitqu* (literally 'slice', 1/8, later occasionally replaced by the Iranian loan *dānaka*), *ḫallūru* (lit. 'chickpea', 1/40), *girû* (lit. 'carat', *i.e*. fruit of the carob tree, 1/24), and somewhat later, *māʿat* (< Aram., 1/12). The latter comes also in halves (*ḫeṣī*, 1/24 of a shekel) and fourths (*rabʿ*, 1/48, both Aramaic loan words).[12] As evidenced by the presence of many words taken from every-day speech (rather than actual numerals), including loan words, the driving force behind this development is obviously 'bottom-up' and economic. There was a need for this terminology because in this period, for the first time in Mesopotamian history, silver money actually circulated widely in society in physical form. When 'top-down' standardization started to intervene with the intention to regulate the silver quality that was in circulation, it would avail itself of this new terminology, see below, section 2.

Capacity measures

Moving to capacity measures, there is continuity with the preceding period in terminology (mostly) and in the actual volume of the principal measure, the sila or *qû* (one litre, ca.), but beyond that the system was modified heavily in the early Neo-Babylonian period. The system of capacity measures that was created in the late third millennium and was predicated on the size of the *qû* was transmitted to the beginning of the first millennium mostly in this, its 'classical' form:

1 *akalu* (lit. 'bread') × 6 = 1 *qû* (1 litre) × 10 = 1 *sūtu* × 6 = 1 *pānu* × 5 = 1 *kurru* (300 litres)

However, the *sūtu*, a measure also used in actual measuring, could vary in size between 4 and 12 litres. While the traditional 10 litre standard remained the norm for the *sūtu*, one also finds *kurru* of 120 *qû* (based on the 4 litre *sūtu*) to 360 *qû* (based on the 12 litre *sūtu*). Both the 'classical' system and its variants were abandoned later in the first millennium, when the following system became the universally followed norm (changes to the 'classical' system are in **bold**):

1 *akalu* (lit. 'bread') × **10** = 1 *qû* (1 litre) × **6** = 1 *sūtu* × 6 = 1 *pānu* × 5 = 1 *kurru* (**180** litres)

This system settled on the variant *sūtu* of 6 *qû*, but at the same time it increased the number of *akalu* in a *qû* to 10. Thus, while the resulting *kurru* of 180 litres was substantially smaller than its 'classical' predecessor, the number of *akalu* per *kurru* (1800) remained the same in both systems.

Why exactly this variant system prevailed remains uncertain. It clearly has the advantage over alternatives involving other *sūtu* measures in the 4-12 litre range that the numerical relations resulting from the 6 litre *sūtu* are easy to manage in the sexagesimal system. However, this is also true for the 'classical' system that was predominant until it was replaced by the new system from the

[10]) The photo in the British Museum's online database shows scratches in the stone that can be interpreted as remnants of the numeral "2" – previously, this number has not been read. 2 minas is in any case the expected reading, given the object's weight.

[11]) *zūzu* survived into the Roman, Sasanian and Early Islamic Near East.

[12]) Powell 1987-90: 511-3; Hackl 2013, 2016.

late eighth century onwards – so why change it at all? The 'new' system is first attested during a short phase of Assyrian rule over Babylonia, in the context of the issuing of food rations to palace dependants;[13] and a few decades later, in the seventh century, it was used universally throughout Babylonia – which was again dominated by Assyria much of the intervening time. Could the Assyrians have had anything to do with the change? Probably not in the sense that a genuinely Assyrian system was adopted: Assyrian capacity measures work differently from Babylonian ones. It is possible that Assyrian material culture had a role to play in that the Assyrian flatbread (*akalu*) might have been quite small[14] and consequently a smaller 'unit' *akalu* would have made sense in the eyes of an Assyrian palace accountant – but the increase of the number of *akalu* in the *qû* (and its concomitant reduction in size) in the new system may just as much have been owed to the desire to keep numbers neat (1800 per *kurru* in the old and the new system). The main reason for the change in the number of *qû* per *kurru*, I would argue, must be sought in economic change and economic mentality. Since the third millennium BCE, it was a recognized topos in Mesopotamian literature and administration that one shekel of silver *ought* to buy one *kurru* of barley: higher prices were considered problematic, lower, favourable or desirable. This equivalence is used in late third millennium accounting[15] and is cited in law codes and tariffs and is also evoked (through its allegedly being superseded) in propagandistic royal inscriptions.[16] By the late eighth century, this was completely unrealistic if the *kurru* of 300 litres was intended. More silver was in circulation in Mesopotamia by then than had been in the Middle Bronze age, owing among other things to the Assyrian conquests in the West, and the purchasing power of silver had dropped. It did so even more in the seventh and sixth century. When Nabonidus boasted in the mid-sixth century that during his reign of abundance as much as 270 litres of barley were to be had for a shekel of silver,[17] this would hardly have been much of a recommendation for him according to Middle Bronze age standards, but according to actual price data of the sixth century, it was (as expected) a propagandistic exaggeration.[18] The median rate is 120 litres to a shekel, and during the most economically prosperous phase of the century, from roughly 580 to 550 BCE, rates of 180-220 litres per shekel occur with some frequency. It is for this reason that the 'new' *kurru* of 180 *qû* was preferable in the end: it made the deeply engrained standard of one shekel = one *kurru*, if not easily attainable, then at least credible. Here, the clash of economic realities and culturally conditioned expectations of standard equivalences caused the adaptation of metrological norms.

Length measures

The Middle Bronze age cubit, *ammatu*, of ca. 50 cm is the base of the Late Babylonian system, too. However, its internal subdivisions changed. While the 'classical' system, slightly simplified, is as follows:

1 *ubānu* ('finger', ca.1.66 cm) × 10 = 1 *šizû* ('stacked hands') × 3 = 1 *ammatu* ('cubit', 50 cm) × 6 = 1 *qanû* ('reed', 3 m)

The late Babylonian system is modified by the introduction of **pušku*, 'handbreadth', as one sixth of a cubit and, equally, four fingers – making the cubit consist of 24 fingers. Furthermore, the 'reed' is redefined as consisting of 7 cubits rather than 6.[19]

1 *ubānu* ('finger', ca. 2.1 cm) × **4** = 1 ***pušku*** ('handbreadth') × **6** = 1 *ammatu* ('cubit', 50 cm) × **7** = 1 *qanû* ('reed', 3.5 m)

This system is first attested in the Assyrian period of the seventh century, and its crucial variable, the *pušku* 'handbreadth', is almost certainly a loan from Assyrian.[20] The introduction of the 7-cubit reed remains hitherto unexplained. Assyrian influence is plausible here, too. It would have been indirect, however. The Assyrian 'reed' was made up of six cubits, but the Assyrian cubit likely was about 3-5 centimetres longer than its Babylonian counterpart.[21] As the 'reed' was a crucial practical tool of the building trade, it is not implausible that Babylonian workers employed on Assyrian public building projects ended up reinterpreting their Assyrian masters' 'reed' as consisting of seven of their traditional Babylonian bricks. Alternatively, the Assyrians might simply have imposed their 'reed', as a hegemonial tool of construction supervision. But then they would have adapted its subdivision by dividing it awkwardly, for the standards of Babylonian metrology, into seven cubits – as the Babylonian cubit and the brick format that depended on it would have been much harder to modify, as deeply embedded in cultural practice (and quite literally built into extant structures) as they were. Here, then, metrological standards follow power politics but also make allowances for tradition to the detriment of metro-mathematical practicality.

[13]) The earliest attestations, to my knowledge, are found in TCL 12, 2 and 3, dated to the first year of Tiglath-pilesar III as king over Babylonia (727 BCE).

[14]) On Assyrian bread and its depictions, see, most recently, Postgate 2015.

[15]) *E.g*. Englund 2012.

[16]) *E.g*. Zaccagnini 1997: 367; Vargyas 1997; 2001: 55.

[17]) Quoted, *e.g*., in Vargyas 2001: 55.

[18]) For barley prices in the sixth century, see Jursa 2010: 443-51.

[19]) Powell 1987-90: 469-71.

[20]) Actually, from Aramaic *via* Assyrian. The connection was first suggested by Powell.

[21]) Powell 1987-90: 474-6.

Seed measure

The final metrological point to be discussed here refers to field area or seed measure, which defines a surface by the amount of seed (actually seed for planting and fodder for the plough animals) necessary to cultivate it. Metro-mathematically, it is predicated on the number of *qû* necessary for a square of 100 × 100 cubits, but it is usual outside of specialized contexts to distinguish the different systems by the number of square cubits corresponding to one *kurru* (180 litres) of seed ('seed and fodder'). Different possibilities for coordinating the seed-measure with measures of length (and area) were explored in mathematical-metrological school exercises.[22] In archival texts one finds: 1 *kurru* = 60,000 square cubits[23] (late seventh century), 54,000 square cubits (sixth century Babylon and Borsippa, early sixth century Sippar), 50,000 square cubits (sixth century Sippar and Uruk) and finally 52,000 square cubits (Uruk, late fourth century).[24] Here, metrology reflects straightforward economic change. All these standards refer to seeding rates (and hence cultivation intensity) that exceed earlier practice. This is in keeping with the overall character of Late Babylonian agriculture as a particularly resource-intensive high-yielding agrarian regime in comparison to other phases of Babylonian history.[25] Smaller *kurru*s correspond to more intensive cultivation. The shifts in standards from the seventh century (60,000) to the varying standards of the sixth century shows a rational response in metrological terms to agrarian requirements, as does a school text that relates different seed measures to different types of land.[26]

2. Standardization regarding silver money and silver-based exchange

Profiting from a conjuncture of interlocking internal and external factors, including demographic growth, agrarian expansion, and lavish royal spending on infrastructure and building projects, the Babylonian economy of the sixth century transformed into arguably the first truly monetized economy on record and allowed it to experience significant economic growth. The transformation was facilitated and helped along by an institutional framework that adapted flexibly to the changing needs of this economy both in a 'top-down', royally sponsored manner as well as from the 'bottom up'.[27]

The role of standards and equivalences here is completely different from what we find, *e.g.*, in the so-called 'command economy' of the Ur III state in the late third millennium BCE.[28] Prices fluctuate heavily according to supply and demand – markets were volatile and not very well integrated. 'Ideal' prices and customary conversion rates – such as the one-shekel-equals-one-*kurru* norm – were invoked or presupposed occasionally, but they were always subject of negotiation by the interested parties and were never applied consistently. Customary rates tended to govern the compensation of masters for the training of apprentices or of the owners of slaves working in the outside economy, for instance, but also there, rules were flexible.[29]

In the seventh and early sixth centuries, when pertinent evidence begins to become available, interest rates were quite volatile. The traditional interest rate of 20% p.a., which owes its existence not to economic necessity but to tradition (and in the final count, to metro-mathematical principles), continues to be attested, but it is by no means the only one, and 'early' rates in general range from 11.66 to 20%. Higher rates of up to 33.3%[30] are rare (but not completely unknown). In the later sixth century, the standard of 20% is nearly universally followed. Thereafter, in the fifth century, interests rise significantly to 30-40%. There is therefore a clear secular trend towards increasing interest rates. While it is unknown which factors exactly drove this trend, it clearly resulted from an economic process, not from government intervention. We do have occasional references to an interest-determining "tariff of the land/region", *nisḫu ša māti*, which show that there were institutional attempts to establish fixed interest rates. The aim of these interventions clearly was to impose the 20% rate, counteracting the general trend towards lower rates at the begin of the sixth century as well as the opposite trend towards higher rates in the fifth century. It is unclear which institutions were responsible: probably city or temple councils in conjunction with local governors and royal officials. It is unlikely to have been the crown as a matter of general policy, as that would have been said explicitly. In any case, the motivation behind these interventions in the 'money market' (such as it was) consisted in the desire to maintain the traditionally sanctioned, 'just' rate inherited from previous periods.

After the seventh century, when ever more silver circulated in Babylonia, silver fineness became an important concern for the first time in Mesopotamian history. It was increasingly common to stipulate certain degrees of

[22]) Friberg 1997, especially 292-304.

[23]) To convert figures in square cubits into square metres, divide by 4 (1 m = 2 cubits).

[24]) For references, see Jursa 2005: 19.

[25]) This is argued at length in Jursa 2010, *e.g.* 49-50.

[26]) Jursa 1993-1994.

[27]) Much of the data pertaining to the long sixth century are gathered and analyzed in Jursa 2010, for the subsequent Late Achaemenid and Hellenistic period, see Monerie 2018 and Pirngruber 2017. Pirngruber 2021 is a recent synthetic essay drawing together several threads of the pertinent argument and placing it into a comparative framework.

[28]) Englund 2012.

[29]) Hackl in Jursa 2010: 700-25; *ibid*. 682 for the 'quitrent' owed to slave masters.

[30]) Excluding punitively high interest rates (*e.g.* 80%) after missed deadlines for payment.

fineness in contracts calling for payments of silver money, and the temple smiths are known to have refined to a standard fineness much of the silver entering the sanctuaries' coffers. The terminology also describes various types of ingots as well as *Hacksilber*.[31] The state started to intervene, too. In the sixth century, as early as the reign of Nebuchadnezzar,[32] silver bearing some kind of mark or having a particular shape, *ginnu* silver (the exact physical characteristics are unknown), started to circulate. The mark, whatever it was, intended to convey information about the silver's fineness and/or the institution that guaranteed for this fineness. This institution may have been the crown, or else the temples, acting probably on behalf of the crown: it is clear in any case that state interests underlie the introduction of the *ginnu* mark. *ginnu* silver was originally earmarked for certain state-related transactions (most likely for tax payments). However, it circulated widely and without restriction at the latest around 520 BCE. About the same time, silver (including occasionally *ginnu* silver) sometime came to be designated as "income of the treasury (cashbox)," *erbu ša aranni*, by which term a mark of quality was intended. This silver had passed through a vetting process at the hands of a state institution, and that institution had conveyed a mark of its guarantee – for its fineness, general quality and/or possibly also weight – onto the silver. Again, the details elude us.

References to coinage – in existence in Western Asia and increasingly in Greece since the sixth century – and to fiduciary money are absent from the Babylonian record before the Hellenistic period. It would be tempting (and has been attempted) to connect either *ginnu* or *erbu ša aranni* or both with some form of coinage, but so far no truly convincing argument in favour of this thesis has been advanced. Even though we can be certain that Achaemenid *sigloi* circulated in Babylonia – they have been found in the archaeological record – silver continued to be weighed until the arrival of the Greeks and their coinage. Thereafter, frequent references in particular to the *statēr*, or tetradrachm, can be found. It was equated with two Babylonian shekels. As has recently been argued by Monerie and van der Spek against the long-held *communis opinio*, these coins were not treated as bullion by the Babylonians, *i.e.*, they were not normally weighed, but they were counted.[33]

For the present context, the evidence briefly reviewed here is ambiguous. The dominant characteristic of the Babylonian economy in comparison to that of preceding periods is precisely the absence of many of the typical standardized rules and constraints that characterize much of the institutional economy of the third, and partly even the second, millennium BCE. At the same time, we see the attempt of state institutions, or of institutions close to the state, such as temples, to impose, without a true economic rationale, a traditional standard (interest rate) on the economy that was clearly potentially free-wheeling in this respect. On the other hand, temple and state institutions stepped in when there was an increased demand for regulating the quality of silver in circulation. They did so clearly in their own interest, but the standards they set certainly strengthened the institutional framework of the Babylonian economy. The flexibility of the Babylonian economic mindset is also demonstrated by the way it could handle the arrival of Greek (fiduciary) coinage.

3. Standardization in a religious context and the promotion of Esangila as 'model temple' by the king

Regularity, and thus standardization, of cultic service is a core characteristic of the 'official' cult in Babylonia. The temple institutions were considered the household of the divinity they housed, and all economic activity in the temple, at least on the surface level, was predicated on the needs of serving the deity in one way or another. The whole system was based on the (normally unexpressed, but ubiquitous) assumption of a *quid pro quo*, of an equivalence of input and return: swayed by the veneration offered to them, the gods would provide their blessing and security to the community.[34] In emic Babylonian terms, temple service and sacrifice of foodstuffs in particular was considered 'caring for' and 'feeding' the gods, and their tastes, as is fitting for entities conceived of as immortal and hence unchanging, were conservative to the extreme. Change or cultic reform always had to be framed as a return to older practices that had been neglected for one reason or another. Traditionally, it was the ruler's primary role to guarantee for the fitness for purpose of the temples and their personnel. The following will not belabour these well-established points. Rather, we will look at (aspects of) a particular facet of the system in the Late Period, viz. the process by which the temple of Marduk, Esangila, was promoted by the Neo-Babylonian kings not only as the religious and ide-

[31]) Jursa 2010: 474-90. A convenient summary of the available data can be found on http://persiababylonia.org/archives/background/metal-object-measure-and-cash-silver-in-first-millennium-bce-babylonia/ (accessed 6.6.2022).

[32]) Levavi 2014.

[33]) Monerie 2018; van der Spek 2017.

[34]) Babylonians were obviously aware of the fact that this assumption was regularly falsified by lived experience, and consequently divine justice (or its absence) is a major concern of 'Wisdom literature' such as the Babylonian Theodicy. There is however no reflection of these concerns in the prescriptive and descriptive sources dealing with the temple cult. Cultic laments aimed at placating divine wrath make regular reference to the gods' unpredictability and their unrestrained and unrestrainable power to destroy as well as deliver. Still, this ritualistic acknowledgement of divine omnipotence is offered with the clear expectation of the predictable efficacy of the cultic means employed to offset the dangers of the gods' anger.

ological hub of their state ideology but increasingly also as a model temple other such institutions were expected to base their procedures on.

A short Late Babylonian tablet, dated to 3rd of March, 606 BCE and belonging to the archives of Eanna, the temple of Ištar in Uruk in southern Babylonia, reads as follows:

YBC 3457 = YNER 1, 8 (collated)

1. 2 giš bán meš *ana ma-nu-ú ina* igi lugal
ina ˹ká *qát*˺*-nu ki-i iḫ-ḫi-iṭ*
35 1/2 ma.na *re-e-ši* 1 bán *tak-ka-su-ú*
ki-i iš-šú-ú 8 ma.na *ḫa-a-ṭu*
5. *a-na* lú mu me *i-qab-bi*
˹*um*˺*-ma al-la a-ga-a la tu-ban-*˹*na*˺*-a*$_4$
l.e. *lìb-bu-ú šá* d en *ba-nu*
rev. 7 1/2 ma.na še.bar *a-tar*^{áš}*-ti*
ina igi-*ni-ku-nu ter-ra-a-ma*
10. *in-na-a*^{ʾ} *ù ina lib-bi a-ga-a*
lu-ú ú-šu-uz-za-tu-nu
iti.še ud.8.kam mu.19.kam d ag-a-ùru
lugal tin.tir ki

"When 2 wooden *sūtu* measures (of six litres capacity each) were weighed against the mina in the king's presence in the Narrow Gate, (the result was) 35 1/2 minas (17.75 kg). When (the king) made a check for one *sūtu* (6 litres) of *takkasû* (bread), 8 minas (4 kg) (of barley) turned out to be the necessary raw material. So (the king) said to the bakers: 'you should not use more than this for the preparation of the offerings; the preparation is to be made as it is for Bēl (*i.e.* in Esangila). You have an excess of 7 1/2 minas (3.75 kg) of barley at your disposal (viz. for every *sūtu* (6 litres) of *takkasû* expected from you). Give it back. You should now keep to this (rule).' 8.12.19 Nabopolassar, king of Babylon."[35]

This is an example for the Neo-Babylonian Empire's interest in promoting an increasing countrywide standardization of procedures in the administration of the temples and the cult. The topic is the preparation of a certain type of food offering, the *takkasû* bread, for which purpose the priestly bakers of the Eanna temple were customarily issued barley as raw material, with the expectation of keeping the excess as part of their income. The quantities involved are the issue at hand.

The language in this text is highly technical and terse, and much information is implicit rather than explicit. All the quantities referred to explicitly in this text are small and certainly would not merit royal involvement if they were all that is at issue here. The point that is being made is one of principle, of establishing a standard in relation to a base quantity of *takkasû* offering bread. The actual amounts of grain to be redistributed as a consequence of the royal decision would have been a multiple of what is discussed here, the calculation being based on the standard figures sanctioned by the king. The interpretation of the difficult first part of the text follows from the second part (lines 6ff.). There, it is clear that the bakers of Eanna have been issued with barley for the preparation of the offerings (*bunnû*) in excess of expected standards; they are required to give back the excess and are enjoined to keep to the standards forthwith, following the Esangila temple's best practice. From this, it follows that this quantity of barley is under discussion in the text's first part. After working out the metrological minutiae,[36] the text can be interpreted as follows: The king's inspection found a) that the bakers of Eanna customarily received two *sūtu* (12 litres) of barley for making one *sūtu* (6 litres) of *takkasû* bread (implicit), b) that these two *sūtu* of barley, weighed together with the standardized wooden *sūtu* measures used in the temple, amounted to 35.5 minas (17.75 kg, explicit), the weight of a *sūtu* measure being 10 minas (5 kg, implicit), c) that therefore the bakers had received 15.5 minas (7.75 kg) for making one *sūtu* of *takkasû* (implicit), d) that for making one *sūtu* of *takkasû,* only 8 minas (4 kg) of barley were actually necessary, as by the standard followed in Esangila (explicit), and e) that as a consequence, 7.5 minas (3.75 kg) of barley were to be given back (explicit) for every *sūtu* of *takkasû* for which the bakers had been issued materials (implicit).

As a result of this ruling, therefore, a priestly baker in Eanna could expect to receive in the future a much smaller amount of barley from the temple for the manufacture of the *takkasû* bread that was expected of him. This royal ruling cannot have been particularly popular among the community of temple bakers in that it amounted to a massive curtailing of their incomes while the share of the gods remained untouched: in essence, the king eliminated a priestly privilege. See below on the political implications.

Beyond the arcane language and subject matter (that belie the serious economic implications for the Eanna priesthood), this text merits interest for two general points. The first is metrological. Nabopolassar was auditing disbursements made by the temple that were measured, as was customary, in capacity measures. However, there was a strong desire to really 'get it right', as a point of principle, and for that reason, uniquely in our documentation, weight measures were brought in by the king (or rather, the royal administration) and used to calibrate the capacity measures. The implication is that weight measures were considered more reliable in this case (which, after all, also involved ascertaining whether the gods received their just share), and as a consequence, in general. This ties in well with what good evidence

[35]) YBC 3457, full edition and discussion of the philological issues in Jursa 2022; for the sake of clarity, parts of the argument made there are repeated here.

[36]) For the details, see Jursa 2022.

we have seen above for the crown's customary involvement in the maintenance of exact weight standards, while similar evidence for capacity measures is missing (even though this may be owed to the accidents of discovery). In any case, it stands to reason that once a weight standard was established, given the technology of the time, it could very easily be used to calibrate capacity measures, much more so than vice versa.[37] In fact, there is one more Eanna document that refers to the 1 *sūtu* = 8 minas standard in the context of *takkasû* deliveries – and also here the context is that of setting standards.[38]

The second point is historical. This is the earliest of a sequence of texts referring to the Neo-Babylonian kings' wish to promote the Marduk temple Esangila (sometimes jointly with the less prestigious Nabû temple Ezida in Babylon's 'twin city' Borsippa) as an organizational model, as a standard, for other temples to follow.[39] I will not review the entire evidence in detail, a few examples may suffice.

Under Nabonidus, Esangila practice was propagated as a standard for agricultural accounting and entrepreneurial involvement (in the crown's interest) in temple farming. A pertinent model contract for Esangila is known from the Eanna archive, where it must have been kept for reference purposes. In the northern temple of Ebabbar in Sippar, that temple's rent farming agreement with an outside entrepreneur was concluded in the presence of the highest-ranking functionaries of Esangila – who obviously were involved as auditors on the king's behalf.[40] Similarly, in the sphere of long-distance trade, we have a debt note owed by a merchant who was supposed to deliver foreign goods (*mēreštu*) to Eanna. The debt noted stipulated that the merchant deliver the goods "in the same way as those for Esangila and Ezida."[41] The point the text makes is that standards applying to the acquisition of goods for the two large temples named are supposed to be valid also for Eanna. The trader was bound to accept certain conversion rates for the goods he was supposed to buy with the silver the temple had given him. The underlying principle is thus the same that we see in operation as early as the third millennium, *e.g*. in the Ur III period, when merchants already had 'standing orders' from temples and other institutional households and standardized rates were used.[42] What would seem to be an innovation here is that the institution setting the standard is named: Esangila and Ezida were responsible – they set and presumably could adapt these rates as they saw fit.[43]

In the cultic sphere, Nabonidus's interference with the offering regime in Eanna shortly after his ascent to the throne is well known.[44] His bearer of the royal seal (*rab unqāti*) declared to the Eanna temple:

"as during the reign of Nebuchadnezzar, give the regular offerings to the brewers and bakers as (is done in) Esangila and Ezida, and give allotments to the prebendary gardeners of the Lady-of-Uruk as (is done) for the prebendary bakers of Bēl and Nabû" (YOS 6, 10; Frame 1991: 55-9).

Similarly, in another document from the same period, we see the "governor" (*bēl pīḫāti*) of Esangila, Nabû-nādin-aḫi, instruct Eanna officials about various standards they were expected to uphold in a cultic context. This man is the country's chief treasurer, as the Esangila temple also served as the crown's treasury, and the major taxes extracted from the temples on behalf of the crown were levied in this official's name. This role of his is implicit in the – technical and only superficially 'innocuous' – statement I quote from the lengthy document (which is preserved in two copies)[45]:

kaš.ḫi.a, [*š*]*á* ^{lú}lunga^{meš} *ú-qar-ra-bu* 1-*en* 3 še.bar, ⌜*i*⌝-*man-da-du tak-ka-su-ú ma-la* ^{lú}muḫaldim, *ú-qar-ra-bi* 1-*en* 4 še.bar *i-man-da-du ... ina* 1 ma.na *dul-lu ep-šú,* 1/2 [m]a.na sík.ḫé.me.da *u* sík<.za>.gìn.kur.ra *pap-pa-si-šú* (BM 114555: 5b-8, 11b-12, no significant variants in BM 114552)

"... Regarding the beer which the brewers present (for the offerings): they shall measure (and take) three times that amount of barley. In addition, as for the *takkasû* bread offerings, as much as the bakers present (for the offering), they shall measure (and take) four times (that

[37]) This is obviously notwithstanding the fact that conceptually the weight standard was originally established through a procedure drawing on length standards and using the mass of water as a norm.

[38]) The text *NBDMich*. 52 is unfortunately damaged (https://cdli.ucla.edu/dl/photo/P235147.jpg). As far as can be said, this text dates to (early in) the reign of Nabonidus and belongs into the context of that king's cultic reforms in Eanna, when standards for priestly remunerations and deliveries to the king were set anew (see below). Possibly the text explicates the obligations and rights of the newly installed function of "royal courtier in charge of the royal cash box (in Eanna)," *ša rēš šarri ša ina muḫḫi quppi ša šarri*. In any case, it is said that the beneficiary of the rights treated in the text are to have *takkasû* delivered to them by the bakers measured in the *sūtu* of eight minas to then pass it on to the palace, probably in the same measure (lines 18-20). The overall volume of that payment, according to the text, amounted to 1000 *kurru* of barley in the time of Neriglissar: a substantial income for the crown. A full study of this tablet will be presented elsewhere.

[39]) Most of the pertinent evidence (but not the present texts) is collected in Jursa and Gordin 2019: 44-50.

[40]) van Driel 1987-1988; Jursa 1995: no. 24.

[41]) Kleber 2017: no. 11.

[42]) *E.g*. van Driel 2002: 3-29; Cripps 2014.

[43]) The merchants in question were certainly not entirely free agents as far as their interaction with the temples are concerned. This can be deduced from the degree of standardization that is in evidence in the dossier edited by Kleber 2017: 56-68.

[44]) Beaulieu 1989: 117-27.

[45]) First edited in Payne 2007. Aspects of the text were discussed in Jursa and Gordin 2019: 47-48 and in Quillien 2022: 356.

amount). ... From one mina of finished (dyed wool), half a mina of red or purple wool is his (weaver's) prebendary income ..." (BM 114552 // BM 114555, 9.12.1 Nbn).

The 'governor' of Esangila establishes standards for the remuneration of priests employed in the preparation of the offerings in Eanna. He sets, *i.a.*, a new standard for the *takkasû* bread offerings, stating that the bakers were supposed to receive for the preparation of a given quantity of *takkasû* the fourfold amount of raw materials. Only now, in the light of YBC 3457 discussed above, can we really understand what is happening here. Rounding numbers slightly, until the intervention of Nabopolassar, Eanna's priestly bakers used to receive double the amount of raw materials for the *takkasû* that was expected of them. Nabopolassar then cut this down to a ratio of 1:1, more or less eliminating the priestly income from *takkasû* production. The economic impact of this ruling can be gauged from the information included in *NBDMich*. 52,[46] according to which the king expected to receive a total of 1000 *kurru* worth of *takkasû* deliveries from the bakers (duly measured in the *sūtu* of eight minas of barley treated in YBC 3457): the total of *takkasû* offerings will have been significantly higher.

BM 114552 // BM 114555 now show that some fifty years after Nabopolassar's heavy-handed interference with administrative norms in Eanna, Nabonidus had his finance minister not only reinstate the older standard and priestly privilege, but actually double it. As the priestly bakers were an important faction within the temple community and as we can assume that the other changes promoted by the *bēl pīḫāti* according to the text quoted above were similarly generous, we can see what this amounts to: it is well known that Nabonidus came to the throne in a coup,[47] and he obviously needed the support of the temple administrations – certainly that of Esangila, but also that of Eanna of Uruk. He would seem to have bought it by granting the priests lavish privileges, through changing equivalences and standards in the cultic sphere.

4. Conclusions

The Neo-Babylonian system of standards and equivalences, in the metrological sphere as well as conceptually, in religion and the cult, remained deeply-rooted in its millennial tradition throughout the period under discussion. Still, many changes occurred under varying circumstances.

We have seen changes in the weight system that respond to the demand for an articulated terminology in the range of shekel fractions, owed to the needs of an economy that became ever more strongly monetized and marked by the wide-spread circulation of physical silver. A specific terminology for silver qualities and pertinent standards developed, to some degree in a decentralized and bottom-up fashion, subsequently as a result of institutional (state) intervention. In this respect, the crown and the temples responded rationally and pragmatically to the changing economic environment. A similar approach is reflected in the variant standards for seed measure, which were tied to changing agrarian circumstances and which were consciously adapted as local circumstances demanded. On the other hand, we find a value- and tradition-driven response to the new economic setting in the case of institutional attempts at fixing interest rates against a secular trend towards, initially, 'abnormally' low and subsequently 'abnormally' high rates. It is argued here that a similar reasoning – the wish to be able to maintain the traditional 1 *kurru* of grain = 1 shekel of silver standard – underlies the reduction in size of the *kurru* (given the greatly diminished purchasing power of silver in our period).

Politics drive change, too: unintentionally or to some degree accidentally so in the case of length measures, where seventh century Assyrian rule directly and indirectly prompted departures from the inherited system, intentionally in the sphere of the cult and priestly remunerations that we have looked at. Neo-Babylonian kings promoted Esangila as a model temple in various aspects and actively intervened in the organizational affairs of other temples for that purpose. In a wider sense, this is related to their interest in centralization and institution building, which aimed at strengthening the crown at the expense of vested local/provincial interests: we see state building through standardization. In a narrower sense, the double change of the *takkasû*-offering bread standards in Eanna shows us, through the technical and narrow lens of equivalences in the cult, Neo-Babylonian power politics. The strong king Nabopolassar curtails priestly privileges, and half a century later, the new and still weak king Nabonidus essentially buys priestly support by re-instating and doubling these same privileges.

[46]) See note 38 above.

[47]) *E.g.* Beaulieu 1989; Frame 1991; Kleber 2008: 12-3; Beaulieu 2018: 238-43.

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