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Building Larsa: Labor-Value, Scale and Scope-of-Economy in Ancient Mesopotamia

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Prospect

The working group at Hirschbach met to address a set of comparative historical questions about how ancient labor (often, a rubric for mass or forced labor) was compelled or procured in ancient economies. This paper will interrogate some of the premises for those questions themselves, by way of an econometric exercise. What are the grounds for assuming that coercion or inequality (political, social, or economic) should be the determining theoretical problems for research? Are either social and legal degrees of "unfreedom" or political and economic inequality the crucial explanatory forms to seek out and examine? In what other contexts of political economy could ancient mass labor be understood? What tools can we use to think about the largest possible formal representations of the ancient economy, given the massive methodological and documentary challenges presented by the sources?

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Abbreviations used in this essay include: AbB I = Kraus 1964; AbB II = Frankena 1966; AbB IV = Kraus 1968; AbB IX = Stol 1981; AbB XIII = van Soldt 1994; ARM 26/2 = Charpin *et al.* 1988; ETCSL = The Electronic Text Corpus of Sumerian Literature (http://etcsl.orinst.ox.ac.uk); *FI* = Civil 1994; RIMA 2 = Grayson 1991; RGTC 3 = Groneberg 1980. Other sigla follow CAD.

Our interest in "forced labor" mischaracterizes or ignores political ideologies of consensualism in early states and their mutually supporting feedbacks. (Unless otherwise qualified, the term "forced labor" in this paper refers to all forms of labor which were compelled by extra-economic means, and where the consent of the laborer was of secondary importance.) Forced labor arose as a topic for modern research in the first place because it was mostly mass labor which was ever necessary for states to document in antiquity—thus the sources for it are relatively plentiful—and so produced source-mimesis. Beneath this, however, lies our very modern assumption that labor is fundamentally a social and economic disutility; our everyday understanding of value itself is a realized market price minus deprivation of costs, labor being chief among them.[1]

My argument is twofold: one, that the social and political benefits of community labor were *perceived* as shared rather than coerced in antiquity (notwithstanding the probability of unequally shared benefits) and labor investment as something other than a deprivation or disutility; two, that the *scale* of mass-labor projects deliberately and programmatically obscured (then as now) the fact that they were economic products of distinctly minor importance relative to dispersed labor inputs in the larger economy. The very success of monumental architecture in persuading ancient populations of the power of the state has been equally successful in persuading modern scholars of state-labor's essential character as both compelled *and* economically important, thus reifying in modernity a set of political relations first propagated in antiquity (as ARM 26/2 238 puts it, "Kingship is his brickmold and (his) dynasty is his wall."). Correspondingly, the low-status and spatially dispersed farming work which formed the backbone of the Mesopotamian economy left few traces in the archaeological record, and had less of a role to play in state ideology. To us, farming seems an essential but quotidian part of ancient economic life—important but, frankly, boring.[2]

Why does monumental architecture fascinate us? City-walls, temples, and canals, were projects with high public profiles, but exceedingly low costs within the scope of the larger economy (approximating a "Gross

[1] See the distinction made by Giampietro *et al.* 1993: 230–31 of productivity as constituted both by work accomplished and "costs" such as time, energy consumed, wages paid, *etc*.

[2] Arguing for the centrality of agriculture, Rothman 1994: 150 wrote: "Irrigation agriculture and to a lesser extent pastoralism were the bedrocks of economic life for the state institutions of palace and temples as well as for all other sectors of society …. agriculture is *the* most critical economic enterprise in the society as a whole."

State Product" or the like). Even assuming certain production bottlenecks, these costs were in fact so low that we should assume that compulsion would normally have been not only unnecessary, but counterproductive to the larger ideological goal of mass-labor, which was to construct the imagined community of the city-state through participatory enactments of authority and compliance,[3] and the complementary social goals of individuals to build self, identity, and status in relation to other groups. Through the case studies below, I will demonstrate that formal economic analysis can prove this.[4] The econometric utility of one of the most consistent, emic standards of Mesopotamian valuation, the labor-day, offers a formal structure leading to a more authentic index of value than prices and wages for the ancient economy. Before diving headlong into my historical analysis, however, it is necessary to contextualize it within theoretical positions about economic value in classical economics, the study of ancient economics, and their relation to one another. Readers who wish to skip ahead to the experiment may go to p. 261.

Scale, Value, and Scope-of-Economy

In modernity

One of the most intractable problems in ancient economics is the question of scale; one of the most durable questions in modern economics is the problem of value. Of the vast number of documented transactions we have at our disposal from Mesopotamian antiquity, not one is uncompromised by some question of its originary social circumstance, its repre-

[3] Bretschneider *et al.* 2007: 1 recognized precisely these social capacities of monumental architecture (and similarly Uziel 2010): "By making particular use of the natural landscape and the artificially created environment, the monumentality of public buildings helped to improve social cohesion and legitimated a particular societal system. Moreover, their intergenerational use gave such buildings great potential for communication and remembrance, especially during specific ceremonies"; see now also Baker 2014. The works in the volume, however, more or less assume the monumentality of associated labor-costs; for instance Ristvet 2007, though eschewing monumentalism as an index of power (p. 198), and even estimating low labor costs likely required for Tell Leilan's wall (pp. 200–201), nevertheless writes that the building of the wall "would have required a massive mobilization of labor" (p. 203).

[4] In this sense, "formal" denotes the econometric use of express values for the analysis of economic practices which may have intersected with the sphere of textuality and accountability (*e.g.*, with tablets, tokens, seals, *etc.*)—or not. The evaluation of irreduceably physical, embodied or socially-embedded economic phenomena (*e.g.*, labor, material, utility) is of course the problem that characterizes the so-called "transformation problem."

sentativeness, or its importance relative to the wider economy. How can we defend or question in economic terms what "a lot" or "a little" really is? Big and small numbers may be big and small numbers, but without context or comparison, their importance is impossible to evalute. Beyond this, inequalities (social, economic, political, and legal), transaction costs,[5] and institutional imperatives[6] lay behind many commercial exchanges without having been specified in the documents themselves. Even assuming that some given contract or administrative document did not obscure socially-embedded conditions—that the text more or less "said what it meant"—our ability to compute the value of one GÍN of silver, one BUR of field, or one GUR of barley is still entirely lost amidst our inability to determine those products' relative value in the context of the volume problem—its place relative to production, exchange, or use. "Values" are not figures we are simply unable to compute for lack of data or ancient systems of valuation—on occasion, there are plenty of comparanda—but they are figures for which we are unable to establish a sense of scale relative to the aggregate of value realized outside of the restricted scope of a formal and usually institutional economy.[7]

For many neo-Classical modern schools, value was identified as the expression of pricing and market mechanisms. For scholars of neo-Marxist and other substantivist schools, on the other hand, the exclusive realization of value through exchange was part of an (ultimately political) deception which deliberately obscured the real and fundamental source of value, which was labor. Substantivists produced a diversity of theoretics, emphasizing "that there is no autonomous category 'economy' as a separate sphere of social life in precapitalist societies,"[8] while classical economics provided more methodologically consistent avenues of research by relying on values derived from exchange contexts.[9] But labor remained difficult to analyze—primarily because most of its economic volume was embedded outside of the formally documented market, but also because where labor *did* appear in texts, it was *de facto* undervalued.[10]

5 North 1984; Michael Smith 2004: 78, 92.
6 Steinkeller 2004a; Jursa 2004.
7 For considerations of the value problem, see Grewal, forthcoming, and Papadopoulos and Urton, eds. 2010.
8 Gledhill and Larsen 1982: 198.
9 *Ibid.*, 197–200, however, point out that even Polanyi imagined socioeconomic integration primarily arising from acts of exchange rather than production.
10 Englund 1991.

The quest for a "substance of value" stretches back to the early modern period. A brief sketch of its importance and theoretical range helps to situate why I privilege labor-time as the critical working method for my study, and what that implies about other approaches and results. The issue of value formed the irreduceable point from which many schools of early modern economic theory argued. The mercantilist ethos of the pre-classical modern period, for instance, privileged commerical trade surpluses and bullion reserves as the substance of value. Quesnay and the physiocrats, meantime, championed agricultural production and land as primary to establishing value. At the later, Neo-classical turn, Smith posited the "natural price" generated by the "invisible hand" of the marketplace as the ideal manifestation of value. A generation later, Ricardo countered with his critical "labor theory of value," which was subsequently renovated by Marx, who identified labor as the "sole substance" of value.

Common to these otherwise opposed conceptions of value was a predisposition to see of labor itself as a disutility or deprivation of other natural goods, *i.e.*, that labor itself was an opportunity or sunk cost relative to value, and *de facto* its opposite. Even Marx only hoped to restore labor's standing as a preeminent index, identifying an "immanent measure" of labor value in addition to a conception of it as value's "sole substance." This remained a thorn in the side of later Marxist theory, and some neo-Marxists found the idea not only logically inconsistent (Boss 1986, Mongin 1989, Smith 1991), but utterly dualistic in not answering the so-called "transformation problem" by which labor-value is revalued in the marketplace. Others, however, chose to see "immanence" as a mere formal articulation of an otherwise immutable essence (Pilling 1986), especially those following Sraffa, committed to the analysis of "equilibrium prices," "value-forms" valid only within particular economic systems (Fine, 1986).

"Value theory" has gone on to have a life of its own in several other disciplines, from sociology to environmental science to philosophy. The term remains as protean as its interlocutors, but we can usefully distinguish between discussions about "moral goods" (*e.g.*, the debate about "personhood" echoing through a half-dozen and more fields) and "natural goods," those which are economic, if in a rather wide sense of the word. Some of the latter conversations consider environmental inputs as the ultimate substances of economic value—from biophysical human energy and work physiology (Giampietro *et al.* 1993, Rappaport 1971), to environment as a "public good" (Holland and Cox 1992, Weaver 1994), even to solar inputs and total embodied energy (*i.e.*, the concept of "emergy," see especially Brown *et al.* 1995, also Garrod and Willis 1999). These econometrics, using the total environment as the delimiting scope (*i.e.*, hereafter meaning the "boundary") of the economy, clearly represent a widespread effort to incorporate substances-of-value well outside the reach of the formal, documented economy.[11]

Despite these continuing efforts to define a substance of value, the study of economic systems remains closely allied in both the academic and public imagination with formal evidence and analysis.[12] To this extent, modernist views about the ancient economy have largely prevailed in Assyriology where research itself is largely defined and bounded by work with documents.[13] "Economies," in this modernist articulation, are nearly the same thing as the documentary systems which represented them. My essentially Sraffan exercise locates "equilibrium prices" in the form of labor-time units, and thus does not have to contend with the transformation problem at all, since its measures are explicitly comparable in original (that is, emic) and equal value-forms.[14] The critical contribution of the methodology is that it avoids the incommensurability of ancient formal and substantial metrics. More optimistically, it may claim—either by dint of being culturally local or, objectively, the true basis of value—to be a more accurate and relevant basis for evaluation than artificial values in silver[15] or barley.[16]

[11] One 1997 study (see Zimmer 2014) was able to estimate the economic value of world ecosystems at $33 trillion—twice the amount of the GNP of every country in the world. On the Roman economy and an excellent statement of the theoretical problem, see Scheidel and Friesen 2009; within ancient Near Eastern studies, the Oriental Institute's MASS project, pioneered by Tony Wilkinson, comes closest to a model of the total environment as the basis for economic life. See now especially Wilkinson et al., eds., 2012.

[12] See Warburton 2006: 15–16 on the tendency to circumscribe what constituted the ancient economy.

[13] Englund 2012.

[14] Labor-time does, however, carry a transformation problem in the valuation of labor by time rather than, say, actual biophysical inputs (see Giampietro, *et al.* 1993) or any external metric of actual work achieved. Nor can there be much doubt that the administrative abstraction of labor-time itself, as Englund 1991 has argued, was created by and for the benefit of institutions. Neither of those factors, however, has much bearing on the labor-day unit's comparability in assessing relative "equilibrium prices."

[15] See van Driel 2002.

[16] *Contra* Walters 1970: xix, who believed that "wages in silver or barley can be converted into work-days, from work-days into volume of earth, and from volume into canal dimensions" (cf. Kozyreva 1988: 204, who argues that the term KAR at Larsa was meant to become a universal conventional valuator).

Concerning antiquity

In ancient Near Eastern studies, the use of the formal economic textual evidence which at first seemed so promising came under fire in two distinct phases. In the 1950s and 1960s, Karl Polanyi among others[17] argued for the primacy of traditional economic forms which relied on value-indices outside the scope of documentation—a substantivist position. Village economies of reciprocity, they argued, were unlikely to have produced any documentary apparatus (and therefore witnesses/precipitates) in the first place, let alone those employing the accounting methods created by urban institutions to maintain their non-egalitarian social orders. Neither these systems nor these standards would have been of much use to the non-urban populations of Mesopotamia, and so the majority of the economic world is quite simply hidden from the eyes of the modern scholar. Critics of the Polanyites, for their part, seized on an early iteration of the theory in which it was asserted that markets were non-existent in Mesopotamia[18]—a position retracted by Polanyi himself more than thirty years ago now.Too often this reductionist view has been used as an excuse to ignore or develop any robust research scheme for the study of the undocumented economy, the central concern of the substantivists.

Both substantivism and its detractors now seem long in the tooth compared to the more recent approaches of scholars who aim their second-phase critiques at the shortcomings of the evidence which *does* exist. These scholars argue that the very ability and intent of texts to represent phenomena external to themselves is fatally hampered (in terms of objectivity) by the conventions of the scribal system itself.[19] It can be doubted, according to this view, whether the accounting system itself was semiologically geared to represent a set of facts so much as an idealized realm of institutional practices and relationships, principally those of domination and subalternity. For example, Englund has noted that institutional

This is too optimistic a view, in my opinion, of what accounting systems can represent of value; such statements confuse “conversions” with the transformations of value which formal systems accomplish. That the sophisticated and consistent mathematical and accounting systems worked in their own terms must be acknowledged (see especially Powell 1990), but this does not mean that they were neutral representations of economic reality.

17 See especially Steinkeller 2004a.

18 *E.g.,* Silver 1983; cf. Kirk 2007: 184–88, with a more nuanced look at Polanyi’s contribution; and see now especially van der Spek *et al.* 2015.

19 *E.g.*, Englund 1991; Glassner 2003; Steinkeller 2004a.

accounting assumed both a 360-day working year and a normal complement of "time off" (U$_4$.DU$_8$.A);[20] and that worker credits were calculated by real performance, whereas debits were produced by performance norms rather than by, say, overdrawals on real goods such as wages or rations.[21] Studying Egyptian texts, Janssen noted that although labor costs were sometimes expressed as part of the value of objects in exchange, the fact that this was not done systematically rendered its expressions enigmatic.[22] Where Polanyi had questioned the scope of writing's accounts of the external world, these scholars questioned the nature of writing itself as a system strictly concerned with accountability.

Of course, substantivists have been particularly at pains to assert their model through research because they work with so little textual data to begin with. These scholars must turn for evidence to anthropological models and ethnoarchaeology comparanda, but their studies remain theory-rich and data-poor. They can suggest, but not prove, especially in the kinds of ways formalists would want to see. Could the purely theoretical observations of substantivists be integrated with formal analyses into a picture of the unified, whole "economy" that we all suspect exists as some external reality?[23] An opportunity arises in returning to uses of "form" and "substance" closer to an Aristotelian meaning, distinct but not exclusive terms connoting *process* and *content*. In such a sense, historians

[20] Englund 1988: 126f. and 1991: 275–77, citing Ur III examples of time off calculated at rates between ⅕ and ⅒.

[21] Englund 1991: 258–59, 263–64, 276, 280; he thus argued that the accounting use of labor-time functioned not as a neutral, value-free system of accountability, but as a site of exploitation since "the expected labor performance was in all likelihood simply beyond the capabilities of the normal worker," and noting that "a very large majority of known Ur III accounts result in a deficit" which compounded over time. I am aware that others disagree with this view (*e.g.*, Robson 1999; Walters 1970: 153, opined that it was unclear whether the chief purpose of the archive he studied was to track labor performance [*i.e.*, the obligations of people] or project management [*i.e.*, the canal work]. My opinion is that that the institutional bias of the accounting system, whether accidental or deliberate, is already evident in the fact that institutions preferred it, and that any system of valuation is inherently arbitrary (and thus its "accuracy" or "neutrality" is impossible). The solution to this argument, however, is simply not relevant to my conclusions which compare two products in terms of the same institutional valuations. If I were to insist on an institutional bias that *was* crucial to my argument, it would be in the geographic dispersal of the majority of value and the concentration of a particular minority of it.

[22] Janssen 1988: 15.

[23] Cumberpatch 2001; see also Hansen 2006, on "shotgun" demography.

of economic antiquity need not choose between "formalism" and "substantivism" as mutually opposed theoretical camps, but must recognize the dual usage of "formal" as referring to both the corpus of economic documentation and the analytic methods used to study them.

Between these two types of criticism, every published analysis based on economic data (outside the protective, almost quasi-magical authority of archival studies) runs the risk of being criticized as either a) documenting only the minority of the economy visible in texts, unintegratable within any wider economic tableau, or b) reproducing and magnifying a series of positivist fallacies about data, even misunderstanding the inner nature of economic documents themselves (which then invariably seem to turn out to be about something other than economics altogether). Thus in ancient Near East studies there arose a long standoff on accepted methodology for economic analysis.[24] The debates of the 1950s–1960s too often cast (consensual) reciprocity and (coerceive) redistribution/markets in early state communities as mutually exclusive systems. The resulting theoretical stalemate produced sometimes cartoonish images of an antiquity populated by either Polanyi-esque networks of harmonious, neighborly small households or a grim succession of increasingly powerful palace estates imposing malign and parasitic economic demands on their host populations, with a few isolated historical episodes of private enterprise. The critiques of the 1980s–1990s then deflated both those stances as reifying tendentious and self-interested economic and administrative genres (yes, "genres": the texts' subject matter do not excempt them from being read as a literature of a kind). Today most scholars see these methodological concerns as responses to different, but overlapping sectors of the ancient economy as it undoubtedly existed: different systems coexisting within segmentary early states, sectors whose relative importance waxed and waned in any given political epoch, though some excellent work has been directed towards breaking past a merely accommodationist position.[25]

[24] *E.g.*, Pearson 1957: 8, arguing that any opposition of an *oikos* to a market system was a false one: "The question is how were these elements of economic life institutionalized to produce the continuous goods and person movements essential to a stable economy?"

[25] *E.g.*, Cumberpatch 2001 and Kirk 2007. See now Grewel (forthcoming) specifically on the analysis of ancient valuation systems outside of exchange and use contexts, including discussions of Douglass North's location of value in institutional contexts. It has otherwise been assumed that the overall trend, from the fourth to first millennia BC, was a gradual marginalization of reciprocal exchange systems and communitarianism.

This tacit and practical compromise arose precisely because no proponents of any perspective were ever able, with even the best-documented ancient economy at hand (undoubtedly that of Mesopotamia between ca. 2500–1500 BC), to support or debunk the substantivist argument through *formal, quantitative analyses*. Thus the debate—long on theories, short on methods—settled into its dotage on a note of methodological insufficiency. And indeed the methodological obstacles are legion: Mesopotamian texts document only a specific subset of economic activities; only elite and urban concerns are recorded; mechanisms for valuation are more absent than present; the accidents of recovery do not permit us to know what fraction of the formal data we possess anyway—the list of problems is seemingly endless.

This study uses an input-output model for a specific, local, and bounded ancient city-state economy, that of Old Babylonian Larsa, in order to define the first-order problem of measuring scope-of-economy (something like GNP). I will reconstruct the relative value of two major economic projects in Larsa—annual barley production and the construction of the city wall—by employing labor-time as the unit of comparative value. Labor-time has several advantages as a metric: for one thing, it is emic to these Babylonian social economies, which routinely used—even preferred—this method of valuation and accounting to prices and wages. Second, where our textual record has gaps, the data is reconstructable from a wealth of other sources, from cuneiform texts to modern biometrics in order to establish dependable *minimum inputs*. Third, since it results in statements of relative value (if this is not already redundant), it renders a true *order of magnitude* for different sectors of the economy, to give a proportional sense of what "social embeddedness" we ought to be looking for in contextualizing the formal economic data we see.

The economic events used in this study privilege labor-inputs as the common valuator for economic products. Since this valuator was, in fact, an central feature of Mesopotamian accountancy—*i.e.*, an explicitly formal economic expression—it is surprising that labor-time has not, as yet, itself been the subject of much theoretical study. We have in labor-time a cliometric tool with the capacity to reveal the determining balances of production, by gross volume-share, in the ancient economy. I do not intend to cast substantivism as "the big picture" and formalism as an overly narrow view, but the results do strongly argue for seeing the undocumented, substantial economy as the locus of most economic value, demonstrating the validity of Polanyite claims about the non-formal rural economy as the overwhelmingly dominant system within which other systems of exchange and use were secondarily formed.

Cliometrics and Case Studies: A First Attempt

This origin of the present project lay in a 1997 student paper about the Neo-Assyrian imperial economy. Though that study depends too much on unsecure data, it still serves to illustrate my larger project, and warrants a brief description here. Wanting to illustrate an argument about the secondary importance of Neo-Assyrian palace-building within the larger fund of labor commanded by the imperial center, I made a thumbnail sketch of the claims of Aššurnaṣirpal II about his Nimrud palace workforce and compared them to subsistence provisioning for all imperial forces.

The claims of royal inscriptions, of course, must be used with utmost caution as any approximation of fact, but we can make a virtue of one of their worst vices by assuming that Assyrian royal rhetoric typically amplified (rather than reduced) the amounts of manpower used for these projects. That is: labor-value estimates made by royal sources were either accurate or inflated, but never minimized. This being the case, we can argue that labor-value estimates are always equal-to-or-greater-than, but never less-than, what such sources claim. Aššurnaṣirpal was relatively specific in his claims about the dates, sizes, and origins of deportee labor forces specifically expropriated to Kalḫu for building work—from the 1,200 Zamuan troops (ERÉN.MEŠ) deported in his Year 3 (881 BC) to the 3,000 captives (*šallātu*) from Bīt-Zamāni and Šubrû in his tenth campaign (probably 866 BC).[26] One could even assume that other deportations in those same fifteen years not specifically earmarked for Kalḫu also ended up there for building work: from the 332 troops of Nirbu in Year 3 to 3,000 captives from the city Udu in the tenth campaign.[27] Assuming that all those people from eleven deportations worked from the time of their deportation to the completion of the Kalḫu palace in Aššurnaṣirpal's Year 18, one would come to a staggering figure of more than 49 million labor-days invested on the building of Kalḫu. That is a big number; but it is an aggregation across a fifteen-year period of time, averaging 3.2 million labor-days per year. That is still a big number of some kind; but what was the scalar value of that number in the wider economy?

What if we compare that value to another product representative of the imperial economy, the labor value of basic subsistence rations for the

26 RIMA 2, *passim*; also: 3,050 from Suḫu and an unknown number from Sirqu (Year 6, 878 BC); 500 form Laqû (Campaign 7, probably 877 BC); 2,500 from Bīt-Adini (Campaign 8, 876 BC); unknown numbers from "Ḫatti" and Patinu (Campaign 9, 875 BC).

27 *Ibid.*; also: 300 troops from Bāru (Year 3); fifty Dirru troops, 2,000 captives from Arbakku, and 2,000 more from Ḫanigalbat (all Year 5).

Assyrian army and other support personnel? Supposing, as has been proposed, that the number of troops Šalmaneser III claimed to have fielded in his fourteenth year was not the actual size of his army, but was instead a number which roughly comprised all Assyrian imperial personnel, from the *turtānu* on down to the youngest groom to curry a donkey in Tušḫan. The minimum annual caloric value required to support a workforce of this size, at a mere (starvation-level) 1,000 kilocalories per man per day, would be 43.8 billion kilocalories. What labor-value was necessary to produce this raw energy? Assuming a surplus production rate of 2,142 kilocalories per man per day (*i.e.*, after subtracting the thousand kilocalories a farmer himself would need), one comes to about 20.5 million labor-days needed simply to sustain Assyrian forces and personnel at the *most* basic subsistence level.

Starvation-level support of Assyrian personnel already required more than six times the labor of palace-building annually. By this sketch, the annual economic cost of symbolic and occasional monumental architecture in the imperial metropole was clearly inferior to the annual and geographically dispersed costs for the most minimal subsistence—provisioning for imperial forces spread throughout the territories of the empire. In terms of gross labor-value, we can say that the imperial economy was primarily concerned with investment and expenditure *throughout the periphery* (perpetuating or promoting inequality and underdevelopment in the periphery, an underdevelopment argument), and only secondarily and for symbolic purposes concerned with draining capital from the periphery to the center (the dependency-theory model). This finding is consonant with a theoretical postulate that high or late (*i.e.*, post-reform) imperial states normally operated for the benefit of their territorial systems as a whole, and not primarily for the benefit of the core, because at some point the gross political inequality of producers to consumers would require readjustment.

Getting to Larsa: A Second Attempt

The results of this first experiment were interesting and promising for the study of value within orders-of-magnitude. But the variables involved were simply too numerous to gain a stable read on precisely *how* inferior investments in monumentality were. In particular, I was uncomfortable in relying on royal inscriptions as an almost exclusive textual data source for building work. It seemed natural in a next phase to think of research targets which offered a broader array of documentary types, and the Ur III and early Old Babylonian periods came quickly to mind for their bountiful quantities and varied types of written records concerning labor. Among many choices, Old Babylonian Larsa eventually presented itself as a superior case study for its coincidence of rich historical, administrative, *and* archaeological evidence on exactly the kinds of products I wished to compare.

Two economic products from the Old Babylonian city-state of Larsa will be my points of comparison in the remainder of this paper: I will make two estimated valuations of labor-value, first in that city's perimeter wall, and second in its annual barley harvest. Several bodies of evidence make such a study feasible and more convincing than the Neo-Assyrian case. On first glance, the most advantageous texts for the Larsa case might also be its royal inscriptions, which recorded several episodes of the rebuilding of the city wall, often in tandem with explicit (if idealized) delineations of wages paid to project workers and/or the prices that set these wages in some economic context. This dataset superficially seems tailor-made for accounting. But a study of those price-and-wage schedules makes it quickly apparent that they reflected neither market conditions nor even economic capacity. These were idealizing documents aimed at political persuasion, not the documentation of economic reality.[28] The royal inscriptions only really become useful in their characterization of the social setting of economic regulation—in their rhetorical equation of standards with public happiness.

But four other lines and aspects of evidence provide opportunities for research and create a set of checks and balances on each other. First, we can first note the basic fact of historical coincidence: that the Larsa city wall and its barley harvest were products created in the same historical environment—in the same population catchment, in the same period (roughly the 19th/18th centuries BC), and that these products were both abundantly documented. While we can point to potentially superior amounts of information for single projects from other Mesopotamian corpora (say, the labor-texts from Umma or GARšana,[29] or the still-standing (in gross terms) ziggurats of Ur, Choga Zanbil, and Babylon,[30] or the better-documented floor plans of Larsa temples and palaces), few such projects are known from both texts *and* surviving physical remains.

28 Richardson 2012; Scheidel 2010.

29 On Garšana, see Owen and Mayr 2007; Kleinerman and Owen 2009; Heimpel 2009. On Umma, see van Driel 2000, Steinkeller 2007a and 2012, Adams 2008.

30 Woolley, 1939; Ghirshman *et al.* 1994; George 1995.

Yet in the case of Larsa, we have some site-specific administrative, historical, art historical and archaeological information about both farming and building at this time and in this place. No one source of data is beyond reproach in its own right, but the diversity of textual genres allow us to check normative figures against real production and vice-versa, the existing fragments of wall permit us to grasp the basic scope of work, and so forth. Also helpful is the fact that Larsa lies squarely within the boundaries of an intensive landscape survey, latterly supplemented by satellite survey, so we have a better-than-average ability to compare textual and archaeological evidence for the city-state's settlement system and thus its productive capacity.

Second, Larsa's wall and barley crop were manifestly the major products of their respective economic sectors, of civic-works and agriculture. This is not to say that other types of products were insignificant: many other buildings, of course, were built and many other canals dug, many other crops grown and animals raised. Taking the correspondence of just one Larsa official—a certain Bēlšunu—as an example, agricultural administrators could be responsible for not only barley, but wood, wine, dung, flour, malt, beer, vegetable oil, ground peas, hides, grapes, leeks, garments, house-building, land claims, sesame, and wool.[31] And building work entailed not only city-walls but canals, temples, gates, fortresses, warehouses, food-processing and -storage facilities, institutional residences for priests and priestesses and, lest we forget, palaces. But the sheer size of barley harvests and city walls establishes their dominance within their respective sectors: no piece of architecture was anywhere near as large as the city wall (consider, for instance, that it was large enough to have kept 40,000 of Hammurabi's troops at bay for six months), and the product focus of state records on barley is overwhelming.[32] In short, we do not really have to wonder whether Larsa's city wall was its largest piece of civic architecture or whether perhaps the city was in fact devoting more labor to animal management or some other form of primary production.

Third, the cuneiform record shows that Larsa's administrators not only had familiarity with, but regularly used labor-time as an accounting tool for both types of work. The administrative apparatus of the city not

[31] AbB IX nos. 20, 28, 51, 58, 85, 99, 103, 137, 142, 274, and 275.

[32] Rothman 1994: 160: "[T]he subject of the state records we actually have is almost always barley seed and returns in barley." Barley formed the backbone of the state's in-kind tax, with quantities of other products lagging far behind. In the case of the wall, the only other piece of civic architecture to receive so much attention in Larsa's royal inscriptions and rebuilding episodes was the Šamaš temple, but this structure was much smaller.

only used these evaluative methods, but the metrics were cross-applicable for individual tasks in each area, *e.g.*, earth-hauling labor rates used to evaluate agricultural canal-digging were similar to those used for building ramparts, *etc*. Crucially, these accounting devices show up in different phases of project management—normative labor-time rates show up in mathematical texts or ideal figures,[33] in projected manpower estimates, in balanced accounts comparing work expected versus work performed (U$_4$ versus U$_4$ ZAL-LA-ŠÈ),[34] even in semi-narrativized form, in almanacs such as the *Farmer's Instructions*.[35] For many types of work represented in these projects, we can actually see the evaluation of labor time proceed from theory to estimate to final accounting in the ancient record, and beyond into the cultural lexicon. Of course, this does not certify the metric as infallible—as Englund has argued, the scribal use of labor-time "acted at once to simplify calculations and, collaterally, to increase the state's demands on labor"[36]—only to say that its application (and degree of error) was roughly isometric across different types and stages of work. Moreover, not only do we have the widespread use of the metric, we also have a large array of data documenting labor-time for most of the same tasks associated with wall-building and farming.

Fourth, we are extremely fortunate in the ancient scribes' choice of labor-time as the primary unit of value because it is naturally bounded at its maximum limit. Not only does labor-time provide methodological consistency over wages or commodities as equivalent forms, and a common framework for theoretical questions about substance-of-value, it has the practical benefit of restricting focus to inputs and outputs with technological and environmental boundaries. This is not to say that intensive production might not, say, temporarily increase ancient labor outputs by some percentage, or that certain organizational dynamics might lessen labor inputs through efficiency measures to some degree. But barley-farming and mud-brick building are types of work which have essentially changed very little over the millennia, especially relative to the mercurial inputs of the market. Labor costs might inflate or deflate by 25 per cent,

[33] *E.g.*, Goetze 1962: 13–15, that the rate of removal of wet earth evaluated by labor-time used in Ur III texts—10 GÍN per man-day—"is exactly [the] figure which is given in Old Babylonian mathematical texts"; also Walters 1970: 148.

[34] Englund 1988: 126–27, suggesting that such figures were typically inflated by modest amounts (ca. 10%), thus reflecting the self-interested nature of accounting by institutions *vis-à-vis* their workers.

[35] Civil 1994.

[36] Englund 1988: 124.

but they would not—could not—do so by 1000 per cent, as prices might. Not only is the metric relatively stable, it permits a reconstructibility through analogy and experimental archaeology[37] that is impossible to carry out for prices, markets, or use contexts.

Thus, though this paper makes every effort to do due diligence to specific accounting data, it is in the end the methodological stability of a labor-time approach, relative to other types of formal analysis, that provides a convincing result. Above all, it is important to bear in mind throughout that this is an experiment of *proportion*:[38] I am not seeking absolute and historically-reconstructable labor figures specific to, say, the 1912 BC building of the Larsa wall by Gungunum—a figure for the sake of a figure. How much work is a "lot" of work, anyway? A comparative model reflects my original contention that values only begin to attain meaning in comparison to other values. In isolation, values are impossible to isolate in economic terms. Many scholars, of course, have made heroic efforts to document the labor, price, or value of individual commodities or projects in antiquity, but though they may establish process and form, such studies cannot define their findings in terms of economic scale or scope. My goal is to assess the proportion of value between two archetypal economic products and consider the broader implications of those relations.

To emphasize another important aspect of my experiment: I will deliberately skew the evaluation in favor of an assumption that monumental architecture represents "a huge amount of work." That is, *for the purposes of argument*, I will consciously inflate the value of labor inputs for the city wall and underestimate the amount of labor invested in barley production; I will assume that construction was as hard as we might imagine, and farming was as easy as we might think. Since (to be clear) my goal is to demonstrate that monumental architecture is actually economically cheap—and therefore ideologically efficient—I want to show that the methodology stands up against interpretive bias. Therefore, countervailing assumptions about end value will be coded into this work

[37] Perhaps the most successful such enterprise recently is documented in the lavishly illustrated and consummately scholarly work of Seeher 2007. This project carried experimental archaeology to its logical conclusion by actually building sixty-five meters of ancient city wall using mostly ancient and native building materials and techniques. Indeed, all of the building steps I mention here and more are discussed in this work; my discussion is stripped down to assess value rather than building as such.

[38] On parametric modeling, see, *e.g.*, Jongman 2000.

to show that, even given the benefit of the doubt, barley farming is in reality a far larger economic product than civic-architecture on an order of magnitude of twenty times or more. I will make explicit as I go along just how and where these assumptions affect my calculations, in the interest of keeping contact with real costs, but absolute numbers are not my real quarry here; magnitude estimates are.

Historical Background

Before we get down to accounting, let us set the historical stage. By the Old Babylonian period, Larsa was already among Mesopotamia's oldest cities. The oldest settlement remains there come from the ʿUbaid period (sixth millennium BC) and continue through the Uruk period and beyond. Larsa's symbol was among the repertoire of the so-called Jemdet Nasr period "city seals," testifying to its political stature at an early date. Large teams of Larsa workers appear on texts from Early Dynastic IIIa Šuruppak, and the city's independent political status may perhaps be implied by its mention in a list of oaths sworn to major gods in the period's most famous monumental text, Eanatum's "Stele of the Vultures." The city's fortunes waned over the succeeding centuries, as Akkad and Ur came to the fore,[39] and Larsa did not re-emerge from relative obscurity until the late 20th century BC under the leadership of Gungunum, the first king to record the construction of the city's wall. Larsa then flourished for more than a century and a half until it fell to Hammurabi's forces in 1763. The city then maintained an uneasy existence as a subject city for a generation until the revolt of Rīm-Sîn II,[40] whereafter evidence for occupation at the site becomes spottier. Some Kassite remains and references testify to the town's continued existence,[41] but Larsa really only re-emerged as a center of any importance towards the middle of the first millennium, when it played some role in the political and military history of imperial states.

Larsa's heyday was clearly the early Old Babylonian period.[42] The first phase of this epoch was characterized by continuous tensions between Isin

[39] Fitzgerald 2002: 6f.

[40] Charpin 2004: 319–24, 337–43; Charpin 1991.

[41] A *kudurru* of Nazimaruttaš (ca. 1300 BC), for instance, seems to refer to Larsa's city wall (Arnaud 1972b: 163–69). Dunham 1990: 350 notes that the neo-Babylonian walls of Larsa's Ebabbar temple were in one area directly atop Kassite and perhaps even Ur III foundations, pointing towards a disposition to re-use older lines; see also Frayne 1990: RIME 4 2.13.19 (p. 238) on the redeposition of foundation tablets at Larsa.

[42] See Steinkeller 2004b on Larsa's political history in this period.

and Larsa, resulting in the gradual expansion of the Larsa state to include about a dozen middle and lower Babylonian cities. Finally, Larsa took control of Isin in 1793, only thirty short years before Larsa itself fell to Babylon.[43] Despite its regional successes, Larsa was hardly internally stable: during this 170-year period, Larsa had seven changes of dynasty, and underwent at least two openly political revolutions, those of Nūr-Adad, who assumed power around sixty-five years after Gungunum came to the throne,[44] and of Kudur-mabuk's sons, Warad-Sîn and Rīm-Sîn, who took the throne thirty years after the Nūr-Adad coup and ushered in a period of political contact with Elam. None of these dynastic shifts may be said to have substantially altered the geographic integrity of the Larsa city-state, an issue which has much to do with the assessment of its productive capacity undertaken below. The state generally grew over time, with few territorial losses, including the development of a kind of second capital at Maškan-šapir. This northern reach of the state was closely tied to the Emutbal tribe, to the Kudur-mabuk "dynasty" (Kudur-mabuk occupied a position at this city while his sons ruled at Larsa), and to Elam.[45]

Perhaps the single-best documented event in the city's history, however, was its siege, conquest, and occupation by Hammurabi of Babylon. Aided by the king of Mari, Hammurabi brought something fewer than 40,000 troops to the walls of Larsa for six months, prevailing over Larsa's apparently superior forces.[46] Word was eventually sent to Zimri-Lim, the king of Mari, that "… the weapon of the wicked and of the enemy is broken. The city of Larsa is fallen."[47] Yet despite the construction of a ramp intended to breach the city walls, it appears that the city primarily

[43] Van De Mieroop 1993: 57, quoting the famous Mari letter that "ten or fifteen kings ... follow Rīm-Sîn of Larsa"; *ibid.*, p. 49, that texts dated to Rīm-Sîn are known from six subject cities (Larsa, Girsu, Kisurra, Kutalla, Nippur, and Ur), while Isin, Umma, Uruk, and Zabalam were probably also under his control.

[44] Van Dijk 1965: 5–7, 13: Nūr-Adad claimed that Larsa had been conquered by an unnamed enemy, and that its canals had been obstructed and its gate blocked; the city revolted against its king (presumably Sumu-El) and elected Nūr-Adad, "taken from amongst the crowded multitude"; he then drove out the strangers and opened the city's great gate; *cf.* Charpin 2004: 103; see also Adams and Nissen 1972: 48–49; Dalton 1983: 82–83.

[45] Steinkeller 2004b; Van De Mieroop 1993: 50.

[46] Charpin in Huot *et al.* 1989: 194.

[47] ARM 26/2 386 and 379 & note d: the reports discuss Hammurabi's troops in terms suggesting it to be "en nombre inférieur" to the 40,000 at Rīm-Sîn's disposal.

fell because it ran out of food;[48] one Mari letter elegaically described the fallen city as prostrate—cast down—a ruined place where people "shelter their cows and sheep within their houses."[49] The wall of Larsa was then systematically demolished (ARM 27 158). The extent of the destruction seems to have been absolute, despite later references to fields located near the city gates and even Middle-Babylonian references to a city-wall; but the nearly complete absence of standing wall in the archaeological record testifies to a fairly thorough destructive event.[50]

Despite the destruction of its wall, however, Larsa was not subjected to the treatment Mari later received—a wholesale destruction of palace and city.[51] Instead, Hammurabi directed the kind of attention to Larsa that made clear his intention to govern it: he carried out restoration work on the Ebabbar temple,[52] made offerings there,[53] and installed himself briefly in its palace;[54] documents from the city in those early post-conquest years bore a new series of Hammurabi's year-names, independent of his Babylonian ones. More importantly, Babylon installed its own officials in Larsa, responsible for the reorganization of taxation and production; their instructions were to "determine the state of the spirit of the population"[55] and proceed with a redistribution of land, probably to reward Babylonian colonists and collaborators with the new regime. There

[48] ARM 27 156, ll. 6–10: people fleeing the city reported "instead of grain, there is (only) straw"; note, however, that some crucial parts of the text have been restored for this translation.

[49] ARM 27 158 and 161.

[50] According to Huot *et al.* 1989: 40, evidence for Larsa's wall is "completely missing today, with the exception of a few rare traces visible above the ground." Against this, see AbB IV no. 1 and Arnaud 1972b: 163–69. References to gates, however, are not inconsistent with the individual baked-brick towers and piers which survived to today.

[51] Hammurabi may have been imitating the magnanimity of Rīm-Sîn, who claimed to have spared the lives of the inhabitants of Isin when he conquered it in his thirtieth year.

[52] Frayne 1990: RIME 4 3.6.13–14 (pp. 349–51); the years of this work are uncertain, however, and unfortunately Hammurabi's inscriptions contain no discussion of prices, wages, workers, or process.

[53] Van De Mieroop 1993: 60, pointing to records dated Hammurabi 31 of sheep offerings to Šamaš of Larsa.

[54] Van De Mieroop 1993: 60, citing ARM 27 158.

[55] Frayne 1990: RIME 4 3.6.13–14 (pp. 349–51), inscriptions of restoration work and 3.6.2017 (p. 369) for a seal of one of his officials; Van De Mieroop 1993: 60 cites texts dated as early as Hammurapi 31 for offerings at the Ebabbar. Birot 1993: 263 (referring to ARM 27 157) specifies that Hammurapi's residence was in the city of Larsa.

is every indication that Hammurabi's intent was to rebuild the city's prosperity. The cornerstone of this effort was his enactment of a debt-annulment edict in the first year following the conquest.[56] The Babylonian king's letters display concern for the restitution of lands of Larsaeans improperly redistributed in the wake of the conquest,[57] mitigating political conflict, and for continuing various maintenance and repair projects to irrigation works which Rīm-Sîn had begun.[58] Ellis and Buccellati have each voiced concerns about the possible "irregularity" of economic information from the immediate post-conquest period (with especial reference to the Šamaš-ḫazir archive), but the former, at least, concluded that Hammurabi's changes "seem to be primarily ... in personnel, and in intensity of organization," rather than in any punitive actions or radical restructuring of the economy.[59]

The Work and the Site

Building Programmes

The political history of the city is more than incidental to the economic forms we wish to study; in that context, let us have a closer look at the types of work under consideration. First, the building: for the most part we can consider Larsa's production of civic architecture to have formed a relatively stable set of obligations, with some expansion in its construction of defensive walls as its territorial power grew. To go by Larsa's year-names recording monumental architecture projects, we can point to fourteen episodes of wall- or fortification-building, twenty episodes of canal-excavation, and seventeen episodes of temple-building carried out within

[56] Charpin 1991: 71; Birot 1993: 263; Ellis 1976: 44–45 followed Kraus in understanding the edict to have honored a pre-existing edict of Rīm-Sîn's, presumably promulgated for the jubilee of his sixtieth year.

[57] *E.g.*, AbB XIII no. 13, in which a man attempts to claim ownership of a "squat" which he has been working on behalf of another person (despite his existing possession already of another tax-field of 5 BÙR); cf. AbB IV no. 1, in which Hammurabi instructs Šamaš-ḫazir to award land to an individual at the gate of Larsa.

[58] AbB IV nos. 3 and 57; no. 80 specifies work needing completion at the "mouth of the canals," the KA ÍD.HI.A— the region of the troublesome villages of Pi-Naratim (KA ÍD.DA.MEŠ), whose conquest was celebrated in Sumuel 8, Sîn-iqišam 2 and Rīm-Sîn 15; see Richardson 2012: 18–20.

[59] Ellis 1976: 12: "our [post-conquest] evidence may be coloured by circumstances arising from that conquest, so that it might not really be representative of the period"; also pp. 21 and 44–45 n. 60 (cf. Buccellati 1972: 151–52).

the 140 years between Gungunum's accession and Rīm-Sîn's thirtieth year, when his year-names left off with the recording of annual events; in all, roughly fifty "major," celebrated projects.[60] In terms of royal building obligations, we are looking at something like a major building project celebrated once every three years by the Larsa kings. Of course this is no more than a heuristic device: more projects were carried out than were celebrated in the year-names alone (including construction episodes of the Larsa city-wall itself, some of which we know from other sources), and some of these projects may have been either re-buildings (*e.g.*, Rīm-Sîn's rebuilding of Larsa's Inanna temple) or partial projects (*e.g.*, Gungunum's construction of a gate at Ur, as against Warad-Sîn's reconstruction of Ur's entire city-wall). Unsurprisingly, the majority of urban building took place in Larsa itself (ten projects), with fewer projects at Ur (four),[61] Maškan-šāpir (three), and Zarbilum (two).[62] About a dozen other places in the kingdom were the focus of single building events, both cities (Adab, Eridu, Kutalla, Zabalam) and non-urban sites (Iškun-Nergal, Iškun-Šamaš, and Ka-Geštinanna).

The balance of the state's city-wall constructions kingdom-wide were at the site of Larsa proper. No fewer than five major building episodes of Larsa's city wall were part of its steady construction program, undoubtedly along with many minor repair and augmentation projects. For military architecture outside of the capital, Larsa first fortified Ur in the very south, and then Dunnum, Šarrakum, and Maškan-šāpir, all along the north-eastern reaches of the Tigris. Only in Rīm-Sîn's time did Larsa give attention to militarizing the western border of the Euphrates, just when that king was opening up the eastern part of his kingdom to new cultivation.

Agricultural production

Larsa's agricultural production seems to have expanded to a greater degree over this same period, through the opening of new canals, the reclamation of old farmlands, and the acquisition of territory through conquest. The area of land in the kingdom under primary production was obviously not all only in the vicinity of Larsa (*i.e.*, in the many villages within its local settlement hierarchy), but also surrounding Larsa's many subject cities, which at various points included Eridu, Ur, Bad-tibira, Uruk, Girsu,

[60] Van De Mieroop 1993: 67 notes that we have virtually no evidence outside the year-names for building at Ur in the second half of Rīm-Sîn's reign, either.

[61] See Frayne 1990: 236–37 (RIME 4.2.13.18) on the size of bricks and bastions.

[62] Dalton 1983: 202–203.

Zabalam, Kisurra, Šarakkum, Adab, and Maškan-šāpir.[63] At Larsa, some portion of land was under institutional control, chiefly by the palace, but also by temples,[64] although the latter are not abundantly documented.

Palace land was sometimes under the control of specific high officials: in Rīm-Sîn's time, this included such men as Ṣilli-Šamaš, Sin-eriš, Nanna-imaḫ and Sin-magir;[65] under Hammurabi, the reins were handed over to officers such as Šamaš-ḫazir and estate supervisors such as Bēlšunu.[66] Crown units are perhaps the best-documented types of land under production, and we are privy to evidence that some of these units produced hundred of thousands of liters of barley every year. It is exactly this body of textual documentation which makes our evaluation of minimum barley production possible. Nor did the work associated with barley end with production: storage and redistribution were also major Crown obligations as barley was collected and expended throughout the kingdom.[67] As Stol concludes in his study of "State and Private Business in Larsa," the central government "was interested in only two commodities: barley and silver";[68] it seems clear that the production of surpluses or reserves of these commodities was an institutional goal.[69]

There were also individual producers, including tenant farmers with either in-kind or service obligations (*i.e.*, *šukussu*- and *ṣibtum*-fiefs). Such holdings were sometimes subsets of the larger Crown estates, but they could also be located elsewhere in the kingdom (and more unevenly documented). We know less of true freeholders, since they came into

[63] Van De Mieroop 1993: 54 Fig. 1 shows thirteen cities under Rīm-Sîn's control; compare with the famous Mari letter (discussed p. 57) which enumerates Rīm-Sîn's vassals as "ten or fifteen kings."

[64] *E.g.* OECT XV 126: 14, locating land in the A.GÀR *a-ḫi-bi* É [d]UTU.

[65] For Ṣilli-Šamaš, see, *e.g.*, AbB I 90, IX 94 (dated Rīm-Sîn 2) and 110, TCL 17, YOS 5 181; Sin-eriš, YOS 5 209; Sin-magir and Nanna-imaḫ, TCL 10 28 and Riftin 54, *etc*. For earlier examples, *e.g.*, see the letters of Nūr-Adad concerning barley deliveries and production, AbB IX 23, 56, and 91. Compare with the men identified in Text No. 9 discussed by Westenholz 2006: 123–29 as the LÚ.GIŠ.GU.ZA.(MEŠ) ("chair-bearers"?).

[66] The correspondence of Šamaš-ḫazir is too voluminous to cite in full here, but see now the newer texts of YOS XV 24–37; for his correspondence with Bēlšunu see, *e.g.* AbB IX 20, 28, 51, 58, 85(?), 99, 103 and note a, 137, 142, 274–75; see also Frayne 1990: RIME 4 3.6.2018 (p. 369), the seal of one of Hammurabi's officials at Larsa.

[67] Goetze 1950b: 94–95.

[68] Stol 1982: 141.

[69] Breckwoldt 1995/96.

contact with the textuality of institutional orders less frequently and systematically. If I am not engaging in circular reasoning, the documentation seems to diminish in direct proportion to lower institutional control and geographic dispersal (on the distribution of cadastral and harvest yield data by toponyms, see below).

Finally, we can point to individual economic actors whose roles were more complex or interstitial than categorical terms such as "private" or "institutional" might suggest—men such as Balmunamḫe, who seemed to have their fingers in every corner of the economy (in immoveables, in staples, in craft production, in tax collection), often profiting by converting commodities through marketing into the silver and barley the palace wanted. Some have preferred to see such actors as fundamentally institutional actors who employed market instruments to achieve their ends;[70] others have cast them as essentially independent profiteers capitalizing on a particular niche in the economy between institutions and markets.[71] I have no interest in claiming at the outset that one or another sector of production was predominant, though my conclusions have necessary implications on the question; here, I only emphasize the diversity and co-existence of institutional and non-institutional mechanisms of production and exchange. This diversity puts in context that barley production and consumption was a larger and more complex economic sector than that of monumental architecture.

Studies of Larsa

Finally, I must very briefly sketch the history of Larsa studies. The city and area of Larsa were first investigated in earnest by Parrot in 1932, whose general description of the urban layout was reproduced in many future campaign reports. To paraphrase: Larsa was an immense oval, roughly 2 km measured North to South and 1.8 km measured East to West, with an occupied area totalling about 190 hectares, rising about 7 meters above the alluvium, with occasional low "buttes" rising as high as 11.5 meters; on the southeast periphery of the site was a mound dubbed the "Chameau" (18.5 meters high), and, most prominently, in the interior, were the ruins of the Ebabbar, with the remains of the ziggurat

[70] *E.g.*, Dyckhoff 1998: 123, on *Palastgeschäfte*.

[71] See Garfinkle 2005; Van De Mieroop 1993: 67 argued that, among other reforms, Rīm-Sîn attempted to put "provinicial entrepreneurs … out of business" in a bid to centralize state power.

standing at 22 meters in height.[72] Parrot did not return for a second campaign until 1967,[73] at which time he decided to concentrate work on the Ebabbar temple, as later described by Huot:

> Larsa is an enormous site, on the scale of the great agglomerations of its neighbors (Ur and Uruk, for example). Without attaining the gigantism of Uruk, the ruins of Larsa measure 1.5 km in diameter. With such a vast surface as this, the urban study required recourse to aerial photography, [the results of] which are at the present time inaccessible. For these reasons, the mission has preferred to concentrate its efforts, for the past ten years, on the exploration of a sole building, the most important in the city, the sanctuary of the god Šamaš .... to trace the history of the Ebabbar is to trace the history of the city.[74]

Aside from this focus on the Ebabbar, only very small forays away from the temple were ever hazarded. Margueron excavated the palace and the ziggurat adjacent to the Ebabbar in the third campaign.[75] In the fifth campaign, he assigned Huot a test trench nearer the center of the mound, and another trench was sunk to the south-west of the Ebabbar, in the "artisanal zone," but these endeavors were never as intensive as the work at the center of the mound.[76] From Calvet's fifth campaign onwards, the Larsa excavation team would focus almost entirely on the temple mound.[77] Only with the full clearance of the temple in the mid-1980s could Huot begin to speak of excavations in the larger *intramuros*—but no subsequent expedition accomplished this due to the changing political situation.[78]

Extramurally, another set of relevant investigations were the areal surveys of Robert McC. Adams; were it not for this mapping of the larger area, any attempt to estimate the size of the city-state's production catchment would be largely theoretical, reconstructed from textual documentation without the hope of linking it to evidence on the ground. Adams'

[72] Parrot 1933; in 1968: 3–4, he worried that "l'immensité de la ville … laisse perplexe lorsqu'on y doit commencer le travail"; see also Frayne 1990: RIME 4 2.9.5–6 (pp. 162–66) on Sîn-iddinam's construction of the Ebabbar.

[73] Parrot, *ibid*., estimated the city circumference at about eight kilometers; a later estimate (Huot *et al.* 1989) made out a perimeter of 5.1 kilometers and an urban area of around 190 hectares, obviously a rather great disparity.

[74] Huot 1985: 309–11.

[75] Parrot 1968: 262, 268.

[76] Margueron 1971: 271, 285–86.

[77] Calvet *et al.* 1976; the campaigns of the late '70s to late '80s focused on later, Neo-Babylonian and Parthian reconstructions of the temple.

[78] Huot 1987b: 37.

survey already identified almost four dozen settlements in Larsa's hinterland (*i.e.*, closer to Larsa than to any other city). These surveys have, a generation later, been confirmed, corrected, and mapped onto sites visible on CORONA and other satellite images of the region, which have added information about numerous small sites. The specific function of these settlements remains unknown, but the range of sizes suggests differentiated use.

Finally, we should make mention of a few crucial works which have contributed to the study of Larsa's economy from cuneiform texts. Several text editions (with commentary) must be included here, such as Grice (1919), Faust (1941), Kozyreva (1988), Arnaud (1994), Dalley (2005), and especially Birot's thoughtful editions of (1969). Ellis' (1976) study of state agricultural practices remains relevant in some respects;[79] Walters' (1970) analysis is still an important consideration of work standards and practices, despite Stol's (1971) determination that the case-study site was Lagaš rather than Larsa; the unpublished dissertation of Tina Breckwoldt (1994) not only took a bold stab at understanding grain production, storage, and distribution at the level of the whole system, but helpfully gathered together many of the relevant documents in transcription and translation; Fitzgerald's (2002) unpublished dissertation on Larsa also stands as a useful background work. From these texts and analyses come many of the working nuts and bolts for this present study. A great deal of supporting evidence has been appendicized to facilitate ease of reading; readers wishing to ground their understanding in the details should avail themselves of the charts and notes following the main text.

Case Study One: The City Wall of Larsa

Dates of construction

To figure out how much labor-value went into the wall, we have to begin with a history of the object. From Larsa, forty-seven year-names record fifty-one separate construction projects; a partially overlapping corpus of about four dozen royal inscriptions also mention building work.[80] From these sources, we can identify five episodes of building or repairing the city wall of Larsa, only three of which appear to have been full-scale building projects.

[79] Mostly for discussion of production processes than for hard facts and figures; cf. Stol 1982.

[80] See especially Frayne 1990: RIME 4 2.5.3 (pp. 117–18), 2.6.2 (pp. 124–25), 2.8.7 (pp. 147–49), 2.9.11–13 (pp. 171–75), and 2.13.18–21 (pp. 236–43); see also CUSAS 17 44–50.

The first claim to have built the Larsa wall was made by Gungunum in 1912 BC, documented in brick-inscriptions and his twenty-first year-name, the former elaborating: "in the course of one year he made the bricks and built the great wall of Larsa named Utu-kibale-sadi ('the god Utu overtakes the rebellious land')."[81] It is impossible to know whether Gungunum meant that he built the wall anew, or merely repaired an existing wall. As Civil has noted, terms describing work often "do not make an explicit distinction between tasks being done for the first time and for subsequent enlargements or reconstructions ….. [for instance] the verb DÙ 'to build' in the royal inscriptions, where it can mean 'to build for the first time,' but also 'to rebuild.'"[82]

It would be hard to believe that Gungunum's wall was entirely new, top to bottom. But even if Gungunum were merely repairing an existing wall, it was probably not very old, and primary construction may have been in the not-too-distant past. Larsa played an exceedingly small role in third millennium political history, with little to suggest that it had ever wielded military power; mostly it was a place with a modest temple establishment and a healthy agricultural capacity.[83] Isin's early year-names do not suggest that Larsa was a military enemy until late in the 20th century BC, when inter-city warfare begain to gain momentum in the region[84]—and Larsa year-names only seem to begin with Gungunum in any event.

[81] Brick-inscriptions: Frayne 1990: RIME 4 2.5.3 (pp. 117–18); Arnaud 1972a: 34 and ns. 2–3, noting that the unusual expression of time taken to both assemble materials and finish building (ŠÀ.MU.DIDLI.KA $\mathrm{SIG_4}$.GA / Ù BÀD.BI MU.DÙ) was reprised by Sîn-iddinam for work on the Ebabbar (Frayne 1990: RIME 4 2.9.6 [pp. 164–66]: "I baked its baked brick in the course of one year"); see also the temporal phrase in Abi-sare's inscription. It is difficult to know if the use of the phrase marks it as an unusual expression of a usual pace of work, or as an unusually fast building episode.

[82] Civil 1994: 110; cf. rarer cases in which walls were said to have been "restored" (BÍ-IN-$\mathrm{GI_4}$-A; Warad-Sîn 11, the city wall of Šarrakum) or a "wall [which] had not been built for a long time" ($\mathrm{U_4}$-NA-ME BÀD-BI NU MU-UN-DÙ-A; Rīm-Sîn 28, the city wall of Zarbilum).

[83] Fitzgerald 2002: 6–14; the only work known to have been done at Larsa by the Ur III dynasty was a renovation of the Ebabbar by Ur-Namma; Huot *et al.* 1989: 32; Frayne 1997 (RIME 3/2.1.1.35, exs. 7–9).

[84] Following the wars fought in the reign of Išbi-Erra (years 4, 8, 16, and 27 = 2015–1992 BC), no Isin year-name again mentioned a military conflict until the year Lipit-Ištar "i," at least 58 years later and roughly coincident with the accession of Gungunum. Išbi-Erra did record the building of Isin's city wall in his twelfth year (2007 BC), however, and this wall was rebuilt five times: by Šu-ilišu (Year 7 = 1979 BC), Išme-Dagan (ca. 1940, Frayne 1990: RIME 4 1.4.5 [pp. 31–32]), Enlil-bani (ca. 1850, *ibid.*, 1.10.2–3 [pp. 78–80]),

The next known episode of work at the Larsa wall probably dates to only a dozen years later, in 1901 BC, when Abi-sare recorded in his fifth year-name that he "dug the ditch of the rampart," [I7]*ḫirītum* BÀD LARSA[ki]-MA BA-BA-AL. This is probably to be connected to a brick inscription in which he stated that, "in the course of one year" he "strengthened" (*eli ša … udannin*) the great wall at Larsa.[85] Indeed, if Gungunum's work on the wall was only a dozen years before Abi-sare's, it seems probable that the latter did not do much more than finish off or maintain recently completed work.[86]

Nūr-Adad made the third claim to building Larsa's city wall in a year-name (year "i") about forty years later. Unfortunately, because this king's year-names remain unordered, we cannot fix an exact date for the work. Excluding his first two years, both identified as accession years (*i.e.*, years 1 and "a"), the work could have been accomplished anytime between 1863 and 1850.[87] The work was also memorialized in a royal inscription. After characterizing the wall as "like a mountain range in a pure place," Nūr-Adad wrote:

> In order to establish my name forever, I determined the holy perimeter of this great wall (and) named it Utu-umani-sa-bindu ('The god Utu had achieved his triumph'). By the true judgement of the god Utu, I counted among the ruins the wall of the city ... with which

Zambija (ca. 1837, *ibid.*, 1.11.1 [p. 92]), and Damiq-ilišu (Year 13 =1804 BC; cf. *ibid.*, 1.15.1 [pp. 102–103). Though Isin's wall seems to have survived the Babylonian assaults celebrated in years Sîn-muballiṭ 17 and Hammurabi 7, it is less clear whether it survived Rīm-Sîn's assault, since Samsuiluna subsequently claimed to have "restored" it (Dalton 1983: 178; she also believes the wall to have predated Išbi-Erra). See also Fitzgerald 2002: 10 on Isin's military record as early as the Sargonic period. Although Isin's record of building seems superior to the Larsa case, virtually no excavation work was undertaken by B. Hrouda to locate that city-wall (see reports in *Iraq* 35, 37, 38, 41, 47, 49, 51 and 53); Hrouda 1973: 192 reported only that no part of the mound was higher than 8 m off the surrounding plain, a fairly low site compared to Larsa with its remaining gates and features such as the "Chameau," at 18.5 m high.

85 Frayne 1990: RIME 4 2.6.2 (pp. 124–25): here the wall is also called Utu-kibale-sadi; Abi-sare also claims in this inscription to have "built the palace of his settlement"; caution is noted as the translation is a conflation of two broken exemplars.

86 Abi-sare's work on the Baba canal, recorded in royal inscriptions, was probably also a continuation of Gungunum's excavation of that canal in his penultimate, twenty-seventh year-name; Dalton 1983: 56, 69; Sigrist 1990: 12.

87 Frayne 1990: 147 has argued that the alternate name for the wall-building year was MU-ÚS-SA É [d]EN-KI; cf. Sigrist 1990: 22–23.

> I had joined battle. I made its (inhabitants) who did not submit bow down at the feet of the god Utu, my lord. I restored there the boundary of the god Utu, my lord.[88]

The inscription does not explicitly mention a wall-rebuilding—only the delineation of its "holy perimeter" (TEMEN-KÙ)[89]—but it seems probable that it alludes to rebuilding work following the revolt through which Nūr-Adad took power. In the course of that revolt, Nūr-Adad had "re-opened" the city gate which had been "barred."[90] If it is correct to associate these events, we should probably see his work taking place closer to 1863 than 1850, soon after his accession; I will use a conventional date of 1860.

Only a generation later, in 1837 BC, Sîn-iqīšam celebrated the rebuilding of the Larsa wall in his third year-name. Unfortunately, although Sîn-iddinam before him left lengthy descriptions of wall-building episodes at Ur and Maškan-šāpir in the previous decade, Sîn-iqīšam left no such detailed commentary—just the brief claim that the work was done.[91] Following this, the only other mention we have of building work at the Larsa wall was made by Kudur-mabuk, who reports having "opened the great gate in the wall of Larsa."[92] Larsa, of course, in subsequent years built city walls at Ur (Warad-Sîn 10), Šarrakum (Warad-Sîn 11), Iškun-Šamaš (Rīm-Sîn 10), Iškun-Nergal (Rīm-Sîn 13), and Zarbilum (Rīm-Sîn 28)—and two large gates at Maškan-šāpir (Rīm-Sîn 7). Still, this was a tepid pace of military preparedness: in the year-names following the last building of the Larsa wall, when Babylon built at least sixteen major fortifications, Larsa had built only six.[93]

88 Frayne 1990: RIME 4 2.8.7 (p. 149); Steinkeller 2007b: 224–26 distinguishes ḪUR.SAG, "mountain range," from KUR, "mountain," against Frayne's translation here and in other cited cases, *passim*. Also against Frayne, see Steinkeller 2004c: 136, where he understands not "I determined the holy perimeter of this great wall," but "I embedded holy foundation inscriptions in that great wall."

89 Frayne 1990: RIME 4 2.5.3 (pp. 117–18), 2.8.7 (p. 149); the significance of the renaming of the wall from Utu-kibale-sadi is unknown; it may have "rebranded" the wall as his work and/or identified an altered or enlarged footprint of the wall. Again, cf. Steinkeller 2004c: 136.

90 Van Dijk 1965: 5–7, 13.

91 Sigrist 1990: 28.

92 Frayne 1990: 209–20 (RIME 4.2.13.6 ll. 10–13); on his building at Ur, see Dalton 1983: 190. Unless the fortifications built in years Rīm-Sîn 10 and 13 were in the immediate neighborhood of Larsa, this is the last we hear of defensive building within the city-state environment altogether.

93 Years Apil-Sîn 1c, 2, 5, 12, 16, Sîn-muballiṭ 1, 7, 10–12, 15, 18 and Hammurabi 19, 21, 23, and 25.

It is more the quality than the quantity of information the Larsa inscriptions provide that makes the site a good case study. In addition to our ability to date the building episodes, Larsa's royal inscriptions sometimes include statements about (idealized) wages and prices, construction methods and schedules, and the relative scale of projects (*e.g.*, "I made it higher than before"). Also, like temples, stele, divine weapons and other sanctified objects, city walls in this period bore names, such as Utu-kibale-sadi or Nanna-suḫuš-mada-ĝenĝen, a practice which alerts us to the perceived status of the walls as agents; they were endowed with both anthropomorphic attributes (*e.g.*, the gates had "heads") and supernatural qualities beyond what mere baked bricks carried.[94] As Steinkeller has pointed out, these attributes are further reflected in the fact that city walls of this period, like temples, were commissioned by the gods themselves, and supplied with foundation deposits and inscriptions.[95]

A variety of epithets also provides a window into both the physical appearance and aesthetic reception of the walls; a sampling of these from Larsa inscriptions includes:

- The great wall, which like a mountain range raised high cannot be touched, which comes forth on its own accord …
- I asked [Nanna about] … reinforcing its supporting wall, about making its foundation greater than it had been previously.
- Like a verdant mountain I caused [the wall] to grow up there in a pure place. I lifted its head … I caused it to shine forth splendidly …
- In the course of that (year) five months had not passed (when) I baked its bricks. I finished that great wall and raised up its parapet.
- I chose the place for my royal foundation inscription in its foundation, (and) raised the head of its gate there. I made its fosse strong, circled it with bricks, (and) dug its moat.[96]

Such descriptions shared the poetics used for temples—they were pure, they shone like silver, lightning, or lapis lazuli, were covered in greenery; city walls were piled up like cloudbanks,[97] rose like mountains, to heaven, untouchably splendid. Their analogs were natural, precious, and uncreated by man. This is hardly the place for a full analysis of such phrases; here it

[94] See further Bretschneider, *et al.* 2007.
[95] Piotr Steinkeller, personal communication.
[96] Frayne 1990: RIME 4 2.13.18–21 (pp. 236–43); Sigrist 1990: 35; Dalton 1983: 200, quoting Warad-Sîn's boast that the wall at Ur "could not be tunneled" (cf. Frayne 1990: RIME 4 2.13.20 [p. 240]).
[97] *E.g.*, Gilgameš and Agga (ETCSL 1.8.1.1, l. 39): BÀD GAL MURU$_9$ ÚS-SA-A-BA.

is enough to point out that the visible and public nature of the structures under examination marks them as qualitatively different from other kinds of economic products, in communitarian and ideological terms. As Steinkeller has remarked, since Larsa was not itself so directly threatened militarily during the "long" nineteenth-century BC, the repeated wall-building "could not have been motivated solely by purely defensive considerations," but must have had much to do with a symbolic project designed to turn people from all over the kingdom "into 'Larsans'" (personal communication).

To sum up, we know of three major building episodes in the life history of the Larsa city wall, in 1912, 1860, and 1837—at intervals of fifty-two and twenty-three years—with smaller projects undertaken around 1901 and sometime in the early 18th century. The last event in the life of the wall was its death at the hands of Hammurabi in 1763 BC, a project which, no less than the building phases, involved some commitment of labor (see nn. 110, 184, below). Any undocumented routine maintenance or rebuilding would, of course, add to any tally of labor-value, but it is impossible to assess this unknown.

Size of the product: how big was the Utu-kibale-sadi?

How big was the wall? What we require first are workable measurements for all three dimensions of the object, to create a schematic plan, section, and elevation. Huot's original assessment of the potential for reconstruction was bleak: "[the wall is] completely missing today, with the exception of a few rare traces visible above the ground."[98] Notwithstanding, enough information remains to permit our particular over-estimate, archaeological, textual, and art historical. My final calculation assumes a wall 5.2 kilometers long, composed of two parts: a rampart of packed earth in the form of a trapezoidal prism, about 12 m high, a little more than 50 m thick at its base tapering to about 10 m thick at its apex, with a total volume of 1,934,400 m^3; and a fortification wall surmounting it, 6 m high and 10 m thick, about 312,000 m^3 of masonry exclusive of the major gates.

98 Huot *et al.* 1989: 40.

99 See Dolce 2000; Charpin, 1993; Heinrich and Seidl 1967; Müller 2001.

100 A tablet published by Arnaud 1994: 11, no. 77 showing something like a city plan is too unlike Larsa to represent it: its area is less than a quarter the size of Larsa and represents more of a regular, rectilinear shape. With the prominent feature of the ramp in the plan, one might suggest it represents a city other than Larsa—perhaps a town, fortress, or *dimtu*-settlement.

How do I arrive at such numbers, inflated as they are? Let us take the dimensions one by one, beginning with the plan. Actual city plans are few and far between in the cuneiform record,[99] and none is known to exist for Larsa. Fortunately, a string of ruined gate piers still stand around about half of the city, from the northwest to southeast corners of the tell. Continuing clockwise, the remains of houses, streets, debitage, and brick scatters align along an arc for the other half, from the southeast back to the northwest corner, enough to provide the rough perimeter of the ancient wall. This reconstruction assumes these traces form the remains of one basic perimeter, though we cannot exclude the possibility that they are the remains of different walls (see, for instance, the above mention of a possible new layout by Nūr-Adad).

The reconstructed plan appears overlaying Huot's site plan in Figure 1a (next page); its segments and vertices are discussed in Appendix 1 (working clockwise from the northwest corner of the tell). The segments lengths tally up to 5,200 meters of wall, not taking into account the gates themselves. We have no way to confirm this estimate,[100] but the enclosed area conforms closely to the edge of the tell; the reconstruction is based on archaeological features found *in situ*, and happens to align very closely with the perimeter estimate of Huot *et al.* 1989 of 5.1 km. By way of comparison, the Middle Bronze city wall of Mari was around 5,970 m in length; Šubat-Enlil's lower town walls were around 3,700 m; Qatna's walls were about 3,980 m long; an unnamed rampart represented in a plan from Mari can be calculated at 4,021.5 m; the wall at Hattuša was 4,500 m.[101] Among Larsa's peer cities, a 5,200 m long wall was by no means unusual.

The width of the fortification walls is more difficult to work out, and the width of the rampart almost impossible. For one thing, we must engage with the knotty problem of distinguishing rampart from glacis from fortification wall.[102] For another thing, different types of fortification wall are represented in the archaeology. Segment A, for instance, with its parallel features, suggests a possible casemate or double wall, but this method of construction is not found among the five other visible segments of wall (C, D, E, F, or I).[103] We must proceed on the assumption that segment A is an anamoly in this regard. Yet another problem: only segment A preserves the full width of any wall feature (10 m thick per wall); thus, though the excavators were able to document the dimensions of the piers of large gates, 10 m is our only datum on a fully-preserved wall. This size

[101] Burke 2008: 175–76, 213; Charpin 1993: 197; see ARM 27 59.
[102] Burke 2008: 48–56.
[103] *Ibid.*, 61–63.

Figure 1a: Plan of Larsa (after Huot *et al*. 1989) showing proposed city wall segments A–I. Permission courtesy of J.-L. Huot; copyright: Mission archéologique de Larsa, DR. Image by Leslie Schramer.

is large, but not really out of keeping with other Middle Bronze walls: the walls at Mari mostly ranged between six and ten meters thick (and as much as seventeen meters, but only at points where the walls joined the gates); at Šubat-Enlil, the walls were generally five meters thick; at Qatna, probably smaller still.[104] We can safely assume that the Larsa walls were nowhere thicker than the city's gate piers (up to 18 m thick), and 10 m

[104] *Ibid*., 173–76, 214.

thick walls already outpace the average width of the Syro-Levantine walls surveyed by Burke (2008: 62–63), generally between two and four meters thick. In the spirit of overestimating, let us assume that the Larsa fortification walls stood ten meters thick at all points. On the subject of the ramps, however, the width dimension must be considered in tandem with the height of the total structure.

So, how high was the wall? Of course few ancient mudbrick structures survive to their original height, and Larsa is no different in this regard. We must distinguish between the heights of natural landscape features (*i.e.*, the buttes), the rampart walls on which the fortification walls sat (on which, more below), and the fortification wall proper. This is a tricky affair. We know that Gates B36 and B17 already sat raised four meters off the plain, and wall segment I two meters—but we cannot reconstruct the total height of the built wall. Conversely, the wall atop the Chameau reached at least 18.5 meters—but it is not clear from the report how much of the footing was butte. Turning again to comparanda (per Burke 2008), Margueron thought the Mari wall eight meters high; Weiss guessed that the Šubat-Enlil wall ranged between five and fifteen meters high depending on the landscape; al-Maqdissi estimated Qatna's wall to have been as high as fifteen to twenty meters off the plain; Schachner that the Hattuša wall was ten meters high. What all this obscures, of course, is how much of that elevation was brick-built, and how much was earthen rampart and footing.

At this point, we must touch on two pieces of art historical evidence which speak to both the height and width of the wall. The first is a clay plaque found at Larsa, depicting Ištar trampling a fallen enemy atop a gated tower.[105] Though the specific form of the merlons cannot be identified, it clearly shows a battlemented (=*samītu*?) wall and a city gate.[106] It is of course in no way clear that the plaque depicts the wall of Larsa or any other specific city, nor can we assume that such a depiction aimed at realism or accuracy. Indeed, the depiction may be good for just one purpose here (see Fig. 1b): as the top of the gate in this depiction sits at the same height as the adjoining section of walls, we may take this image as a jumping-off point for a second maximizing *assumption* about the city wall, *i.e.*, that the height of the wall can be assumed to have been more or less the same height as the gates, or even the highest remaining feature

[105] Parrot 1961: ill. 358c and 1969: 64 and Pl. VIIIa; the glyptic motif may reflect Sumerian tropes, *e.g.*, Šulgi D: "I shall smite on the walls those who lie on the walls" (ETCSL 2.4.2.04 l. 212).
[106] Porada 1967: 2–3 and n. 13.

along the entire circuit, about 18 meters high, though this almost certainly overestimates the average height of the rampart and fortification wall.

Another piece of evidence comes in the form of a beautifully-carved steatite cylinder seal: IM 15218, excavated at Larsa. The seal has been published many times, not only for its fine carving but also for the fact that it bears an inscription of a servant of Abi-sare. Like the plaque discussed above, the seal depicts Nergal trampling a fallen enemy, recumbent against a structure of some kind, identified by both Parrot and others as a "mountain."[107] Unfortunately, the base of the structure is mostly broken away, obscuring most of its decorative composition. Yet a close examination of the subject is still rewarding (see Fig. 1c): the enemy figure lies diagonally against the slope, while the mound-shaped structure against which it lies is surmounted by a rectilinear feature emerging *from* it, perpendicular to the groundline. Just enough of the mound remains to show that it was made up of cobbles—just like the rectilinear feature, which was composed of two vertical rows of five cobbles or bricks. Cobble patterns were a common method of depicting mountains in Mesopotamian art, but the two constituent shapes of this "mountain" differs from other depictions.[108] Once this distinction is noted, the mound and the rectilinear feature resemble a cross-section of a fortification wall atop a rampart too much to ignore.[109] Thus, where site topography preserves an outline of the *plan* of the Larsa wall; and the plaque suggests the *elevation*, this small cylinder seal leaves us a view of the fortification wall and rampart in *section*.

Any attempt to reconstruct the rampart at Larsa must take several features into account, all having to do with the interplay between water and earth. Earthen foundation walls were functionally necessary beneath (brick) fortification walls for several reasons: they acted as a barrier between groundwater and the foundation, both by their magnitude and their relatively salt-free earthen content; they were a cheap and effective way to magnify the height of smaller brickwork structures; and they were all the easier since they were typically byproducts of moat (*ḫirītum*)

[107] Parrot 1933: 179; Parrot 1954: 55–56, 77, and ill. 260; Parrot 1969: 65 and Pl. VIIIc; cf. Arnaud 1994: 12, who does not remark on the structure at all; Porada and Basmachi 1951: 68: "With his right foot, [Nergal] steps on a small human figure which reclines on a mountain." For bibliography, see Frayne 1990: RIME 4 2.6.2 (pp. 124–25).

[108] The "fish-scale" type of patterning, however, is far more common in glyptic; compare the images in Digard 1975: 287, fig. 24.2, "Montagnes."

[109] Compare with Burke 2008: 51 Figure 6 and Gasche 1990.

Fig. 1b: Wall elevation (after Parrot 1961: ill. 358c). Image by Leslie Schramer.

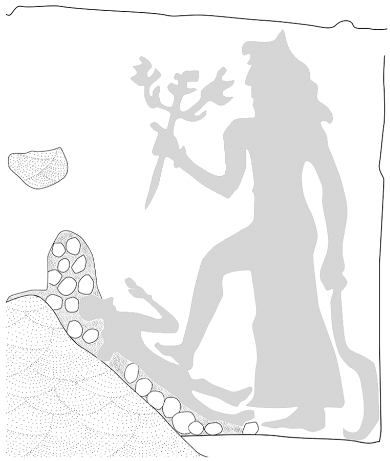

Fig. 1c: Wall section (after IM 15218). Image by Leslie Schramer.

dredging excavations, which piled up masses of low-salinity wet earth precisely along the wall perimeter. The coincidence of work location, optimal building material, and labor efficiency aggregated in architectural forms which differed in degree more than in kind between dikes, levees, ramparts, and glacis.

We have no specific reference to the construction of a rampart at Larsa (though, importantly, there was a *ḫirītum*-moat[110]), but neither does any description of the wall identify its total composition, either. Other wall-building descriptions do seem to point to earthen ramparts in their terminology and metaphors. A 19th-century hymn of Ninšatapada identified Larsa as a "city lofty like a mountain" and derided Uruk as "the heaped-up earth" (or "rubbish heap").[111] Such imagery was common, but Warad-Sîn's description of the wall of Ur was more specific, mentioning a supporting wall (KI-SÁ) set below a foundation (KI-GAR) and above its fosse (E-EK-SUR-RA-BI) which contained a surrounding moat (*ḫirītum*).[112] Hammurabi described the Sippar wall as having a clay foundation, and that the

[110] Dalton 1983: 103; Larsa, Kiš, Nippur, and Ur (among others), all had I_7 or E *ḫirītum*'s; see also Frayne 1990: RIME 4 2.13.21 (p. 243). It is tempting to speculate, in fact, that the reason few remains of the Larsa wall are visible today is that, rather than being dispersed, the earth was simply backfilled into the *ḫiritum* from which it had originally been dug.

[111] Hallo 1991: 387: the latter term was SAḪAR-DUB-BA MU-UN-DÁB-BÉ.

[112] Frayne 1990: RIME 4 2.13.19–21 (pp. 238, 240, 243, respectively).

summit of the wall was raised "with earth like a great mountain."[113] That this earth supported a brick wall explains the otherwise difficult concept that the *foundation* of the wall (*uššī* BÀD) was raised with earth.[114]

This Sippar wall is an important case because the archaeological situation is the opposite of Larsa, preserving heaped-up earthen "walls" without any remaining brickwork. Gasche insisted that the successive layers of built-up earth there were dikes intended to protect against Euphrates flooding, with only ancillary military uses. This accords well with Sippar's particular non-military history, but Gasche further dismissed other earthen walls elsewhere as military on the same basis, including the old third millennium walls at Uruk as "not convincing" fortifications.[115] Such objections had much to do with Gasche's larger arguments about the impact of fluvatile regimes on settlement and economy, however, and did not seriously present evidence disproving the military use of such walls.

The distinction of military versus non-military use on the basis of present evidence seems arbitrary; there is little in the presence or structure of earthen mounds that is inconsistent with defense architecture,[116] and much to support it. Inscriptions of Samsuiluna describing his fortifications of Kiš and Dūr-Samsuiluna, for instance, are quite explicit in distinguishing earthen ramparts from brickwork, with both as integral parts of city walls:

> He built the city of Kiš, dug its moat, surrounded it with a lagoon, made its foundation firm as a mountain with masses of earth, caused its bricks to be moulded, (and) built its wall. In the span of one year he raised its top higher than before.[117]

[113] Dalton 1983: 146: BÀD *ṣiram in ebiri rabutim ša rišašunu kima satîm eliya*, "a lofty wall, with much earth, the top of which reaches as high as a mountain"; also pp. 148–49; see Hammurabi's 43rd year-name, that the wall of Sippar was "made out of great masses of earth" (BÀD-BI SAHAR-GAL-TA IN-GAR-RA; Akkadian: *šanat eper* ZIMBIR^{ki} *iššapku*).

[114] Dalton 1983: 146; Frayne 1990: RIME 4 3.6.2 (p. 335), 3.6.7 (p. 341).

[115] Gasche 1990: 593; the earthen wall at Sippar measures around 1200 m × 800 m, enclosing about 96 hectares. Gasche himself has noted, *ibid.*, 591, that fortification walls were traditionally placed on the shoulders of supporting or buttressing walls, and so it is difficult to understand his insistence on Sippar's walls as (purely) levee walls.

[116] Equally arbitrary, Dalton's election (1983: 150–51) to see the city wall (BÀD *ša* ZIMBIR(^{ki})) and the river wall (KAR *šu-ul-mi-im*) as physically and functionally separate structures ("one (wall) which guarded the city and one which guarded the city's water supply") does not seem grounded in any archaeological evidence.

[117] After *ibid.*, 187.

> He dug its moat, he piled high its embankment, he molded its bricks and he built its wall.[118]

Not only were earthen ramparts known features of defensive walls, they were tied into the ecology of ancient Near Eastern city planning. Earthen ramparts and supporting walls composed of canal mud not only raised brick walls above groundwater and flooding, they were naturally free of the salts which otherwise absorbed water upward and created cracks in the bricks themselves. Excavation texts sometimes distinguished excavated earth (SAḪAR ZI-GA) for building from "salty dirt" (SAḪAR MUN).[119] As Wright noted,

> [Mud bricks were] usually made and dried on a canal bank, a source of relatively salt-free mud and water … [and] used in the foundation, watertable or doors … The lifetime of such a building depends on the speed with which salt is drawn into the foundations by capillary action. This is turn depends on the dampness and salinity of the building site.[120]

The use of canal excavation as a source of building material also vastly reduced labor costs. "Digging a ditch and making an embankment," Civil noted pragmatically, "are, up to a point, complementary activities."[121] Certainly in royal inscriptions the building of walls and moats are frequently paired, spoken of almost as a single act, a merism. As Iaḫdun-Lim

[118] *Ibid.*, 160–61; see also Paulus 1979/81: 131, on traditional Sumerian defensive walls: "The crude walls of rammed and patted clay were superseded by a more solid form of building using sun-dried clay bricks."

[119] Heimpel 2009: 241.

[120] Wright 1969: 17–18, pointing out that salts are filtered out by surrounding moats as water entering from a larger river channel drops its heavier particles near the intake point in the form of silting. See also Oates 1990: 388–89 on the unsuitability of saline earth for brick production. McHenry 1989: 61: "Water from virtually any source will be satisfactory, but it should be low in dissolved salts." The idomatic insistence on "purity" in Mesopotamian building accounts (pure places (KI SIKIL), pure foundations, pure bricks, *etc.*) may allude, among other qualities, to the use of relatively salt-free soil, though no attested useage supports the conjecture.

[121] Civil 1994: 110; see also Burke 2008: 145; cf. Dalton 1983: 133–37, 144, who segregates these types of building activities as different projects, though noting the common nomenclature shared by many walls and canals, and a large number of walls built on the banks of canals and rivers, *e.g.*, Hammurabi's Rapiqum wall, Ammiditana's Kar-Šamaš wall, Ammiṣaduqa's Dūr-Ammiṣadqua wall and Rīm-Sîn's Iškūn-Šamaš wall, all on the banks of the Euphrates, and, on the Tigris, Hammurabi's wall at Dūr-Šamaš and Abi-ešuḫ's at Dūr-Abi-ešuḫ.

wrote: "I built the wall of Mari and dug its moat. I built the wall of Terqa and dug its moat"; Ammiditana's 35th year name was for a fortress wall built alongside (GÚ, on the bank) the canal "Divine-Strength-of-Enlil"; and Anam of Uruk boasted that he "restored the wall of Uruk … in baked bricks in order that water might roar in its surrounding moat."[122] One can see in both textually attested cases of walls "piled up higher than before" and in the multiple strata revealed by cross-sections of ancient levees that the regular heightening of walls was consistent with both canal-dredging and wall reinforcement. Nor need we wonder if canal excavation could produce the needed masses of earth. Levee walls known from Umma tablets in the time of Šulgi and Amar-Sîn include heaped-up embankments as high as nine meters,[123] which agrees with Dalton's assertion that canal dredging could routinely produce earthen walls from "five to eight meters high."[124] Mud walls (IM-DU_8-A) in Ur III work-assignment texts are known in lengths exceeding four kilometers,[125] and one canal-excavation text from Old Babylonian Lagaš records 131 barges of excavated earth (SAḪAR) from a canal with a total volume of 2,358 cubic meters.[126]

Yet even assuming the presence of a rampart or supporting wall at Larsa, how are we to estimate its specific size (especially when nothing is left of it)? And what was the size of the brick-built fortification wall atop *that*? The seal of the wall in cross-section shows a fortification wall around half the height of the mound on which it sits, though again this is not a depiction on which we can rely for accuracy. Still another suggestion comes by way of the famous inscription of Naram-Sîn about the walls of Armanum, describing the height of two ramparts (SA-DU, lit. "hill") and their respective walls (BÀD). Though the numbers are clearly fantastical, they reveal an *expectation of proportion*: the first rampart was said to be 130 cubits (ca. 52 m) high, running up to a wall 44 cubits (17.6 m) high; the second rampart was 180 cubits (72 m) high supporting a wall 30 cubits (12 m) high. The fortification walls described by the

122 Dalton 1983: 51, 65–66; Frayne 1990: RIME 4 4.6.4 (pp. 474–75), 6.8.1 (p. 603).
123 Civil 1987.
124 Dalton 1983: 7.
125 Civil 1987: 70, citing CT 7 43.
126 Walters 1970: 117–19, Text 88; he calculates the labor-value of this excavated earth as 1,935.25 labor-days; cf. Englund 1988: 179, estimating that the labor-value of constructing a pisé wall of 1,791m^3 volume was 1,592 labor-days. Both estimates assume a work rate of around 1.1–1.2 m^3 of earth moved per labor-day.

inscription are one-third and one-sixth, respectively, of the height of the ramparts on which they sit.[127]

My goal is not to find the exact dimensions of the Larsa wall, but to make a reasonable estimate while giving the benefit of the doubt towards maximum size and scope of the wall-building work. On this basis, and on the demonstrable premise (see below) that heaped-earthen ramparts were less labor-intensive than masonry walls, let us assume that the fortification wall was no more than one-third of the assumed height of 18.5 meters (roughly a six-meter fortification wall sitting atop a twelve-meter rampart). Working from the height dimension, we will follow Burke (2008: 50) in assuming that the slope of the rampart was 30°; this leaves us with a form with a section in the form of an isosceles trapezoid. By the dimensions we know (10 m wide at the top, 12 m height, and base angles at 30° each (*q.e.d.*, top angles = 150°)), we can calculate a base of about 52 m (rounding up from 51.56 m), giving us an area of 372 square meters for the section. At a length of 5,200 m, the volume of the Larsa rampart wall comes to 1,934,400 m^3 of packed earth. The fortification wall, meantime, at 5.2 km length, 6 m height and 10 m thick, occupied a volume of 312,000 m^3 of masonry. It cannot be stressed enough, of course, that it is exceedingly unlikely that the Larsa wall was actually this large.[128]

Labor value of the wall

Before we try to account for the building of the Larsa wall task by task, we can take note of some "wholesale" estimates of rates for brickwork construction. An early experiment came from the observation of construction at the Tell Brak dighouse. The dighouse measured roughly 25 m × 5 m × 4 m, built by one master-builder and four laborers in four weeks (with five days

[127] Frayne 1993: RIME 2 1.4.26 (p. 135) iv.20-v.16; later in the same inscription, vi.10–17, Naram-Sîn mentions two other proportions for ramparts: walls as about 10:1 and 5:1. That these proportions are mostly near-exact, it is difficult to tell how much these numbers were being idealized. It is also not impossible to imagine that the inscription refers to height in two different ways: that the "height" of the walls were absolute, while the "height" of the hills referred to the length of the slope. If that is the case, the numbers are not so clearly fantastical. Burke 2008: 50 has estimated the average slope of ramparts to be about 30°, with attested widths of up to 70–90 m — dimensions which are not inconsistent with Naram-Sîn's claims.

[128] Cf. Burke 2008: 144, with estimated rampart volume for Levantine cities averaging around 200,000 m^3 and never exceeding 1,000,000 m^3; and Charpin 1989: 197, who calculates a rampart wall about 80% the length of Larsa's wall (4021.5 m), but only 3% of the volume estimated here (60,322.5 m^3).

of work a week),[129] *i.e.*, 100 labor-days invested for 116 m^3 of brickwork. In crude terms, for all tasks from start to finish, 1.16 m^3 of finished brickwork was produced per labor-day. Extrapolating from this, we could produce other metrics: with Larsa bricks averaging 32 × 32 × 6 cm (*i.e.*, 235 bricks/m^3), the dighouse would have used about 27,260 bricks, or 272.6 bricks per labor-day. A single brick therefore represents something like 0.00367 labor-days (or 0.367 % of a labor-day). In a larger and more recent experiment, Jürgen Seeher's team invested 2,990 man-days in producing 64,000 larger mudbricks (each 45 × 45 × 10 cm) in a partial reconstruction of the Hattuša city wall; this works out to something like 0.43 m^3 of bricks produced per labor-day, quite slow considering it did not include construction.[130] Still, these figures bracket the range of wall-construction rates in other studies, which range between 0.67–0.96 m^3 of finished brickwork produced per labor-day.[131] If we were to take the low end of Burke's rates (*i.e.*, assuming the most labor-intensive rates), this would produce a labor-cost of 465,672 labor-days for the brick wall volume alone (312,000 m^3).

Overall rates may not be accurate enough for us: for instance, masonry building is substantially more complex than rampart-building, while overall rates may not account for labor-costs lying outside the immediate scope of construction. What, for instance of clearing the site? Growing the straw to mix into the bricks? Building the brick-molds to be ready for production? Reed-gathering for interleaving? It is not obvious how much such tasks would substantially add to the labor-value of any given wall—or whether some or all tasks were not already folded in to overall rates[132]—nor that any given work rate is so easily transferable from one specific context to another.[133]

The best way to make a more accurate assessment is to break down the individual tasks required for work and cost them out at known or analogous labor-rates. Having recourse to specialized terminologies and

[129] Oates 1990: 389–90. Total building time was six weeks, but two weeks were for brick-drying, with no labor costs.

[130] Seeher 2007: 47, 219.

[131] Gathered helpfully by Burke 2008: 146, 152; cf. Ristvet 2007: 200 and n. 30, estimating c. 0.32 m^3 per labor-day for finished brickwork.

[132] The overall responsibility for building a wall was not divided by so many individualized functions from the perspective of either worker or institution; texts documenting individual types of work were essentially interesting in accounting, not documentation of work; see Mosely 1975: 194.

[133] See Heimpel 2009: 224 for known work norms for brickmaking at 80, 120, 240 and 250 bricks per day.

the Mesopotamian affinity for taskwork-accounting allows us to check these overall rates against a line-item audit. The GARšana texts discussed by Heimpel (2009) are most helpful for these purposes. These documents discuss more than three dozen separate tasks making up the larger project we think of as "building a brick wall"—everything from site clearing to trimming GISAL-mats for layering into the brickwork.[134] I have particularized the taskwork for the Larsa wall after Heimpel's list, slightly reordering tasks for clarity of process; omitting a few that cannot be meaningfully worked into the calculations,[135] are redundant to other terms,[136] or which are not relevant to city-wall building;[137] and adding a few others that seem not to be represented by that corpus of texts. We have already estimated the largest wall likely to have been situated at Larsa; what gross labor inputs would be necessary to build it, assuming a single-episode building?

Based on taskwork analysis (see Table 1 for the tallied costs, and Appendix 2, p. 299, for notes on individual tasks), we can estimate that the labor value invested in the Larsa wall was just shy of two million labor-days (**1,957,095**). The labor-value in the fortification wall (*i.e.*, without the rampart) comes to 1,312,295 labor-days, almost three times the estimate that would be produced by the Mallowan model (*i.e.*, 465,672 labor-days).[138] I have assumed a wall much larger than what probably existed; estimated some labor rates on the slow side; and, most importantly, employed a model reflecting the idea that the rampart and brickwork were

[134] *Ibid.*, 221–22; see now also Anastasio 2011.

[135] *Ibid.* Several terms fail to specify what actual work was being done, therefore not only are there no rates known, but none can be generated by comparison; this includes 6.1.2, "employed at the brickyard"; 6.1.5 "work on brick stacks"; 6.7.6, "making GI-SAL GI-IR," which Heimpel thinks may be a type of apron to keep water off of the upper wall; and 6.11.1, "moving dirt," which seems redundant to "carrying/hauling earth."

[136] *Ibid.*, 256 concluding, for instance, that "twinning" bricks (SIG$_4$ TAB) was "not descriptive of a particular method of brick laying, but the general designation of building with bricks." His extensive consideration of what differentiates different types of "delivering earth" suggests that "making *duʾum*" (*du-ú-um* AKA) was a task subsumed under what is here calculated as "carrying" and "mixing" earth.

[137] *Ibid.*; tasks not relevant to wall-building are, *e.g.*, 6.2.2, "stripping" (*i.e.*, bitumen from a roof: ZIL) and 6.3.4, "making" (AK in this context would be redundant to DÙ, "constructing").

[138] Of course, Mallowan's (1966) observation of building did not take into account the (enormous) labor costs hidden from on-site building, *e.g.*, straw production or carrying earth to the production site.

Table 1: Tasks for construction of rampart and brick fortification wall

task	material / activity	known day-rate	analog day-rate	Labor Days
RAMPART				
Rampart: excavation and heaping-up	SAḪAR ZI-GA+ KA-ALA SI-GA	10 GÍN	—	644,800
BRICK FORTIFICATION WALL				
Site clearing	IZ-ZI GUL[a]	—	10 SAR	149
Straw harvested*	IN-U	1 GUR	—	124,800
Straw carried	IN-U GA_6-ĞÁ	—	18 m^3	2,080
Dirt work (excavation)	SAḪAR ZI	10 GÍN	—	91,520
Pouring water	A BAL	—	3600 kg	21,667
Carrying earth[b]	IM GA_6-ĞÁ	—	10 GÍN	91,520
Mixing earth	IM LU	—	1.725 m^3	180,870
Molding bricks	SIG_4 DU_8	240 bricks	—	52,000
Baking bricks	$ŠEG_6$[c]	—	[10%]	5,200
Carrying bricks	SIG_4 GA_6-ĞÁ	3.75 GÍN	—	277,333
Building[d]	ŠU DÍM	—	1.16 m^3	268,965
Delivering reeds	GI-SAL GA_6-ĞÁ[e]	26 m^2	—	36,000
Laying reeds[f]	GI-SAL ĞÁ-ĞÁ	6 m^2	—	156,000
Trimming reeds	GI-SAL GUL	—	288 m^2	217
PLASTERING				
Plaster production	SUMUR	—	0.8625 m^3	1,326
Plastering reeds[g]	GI-SAL IM SUMUR AK	—	360 m^2	2,600
Plastering brickwork	IM SUMUR AKA	—	360 m^2	318
TOTAL				**1,957,095**

[a] Lit., "razing walls."

[b] Heimpel 2009: 249–250 theorizes that an alternative term, "hauling earth" (IM GÍD), may have referred to hauling by sledge; that it was used next to IM GA_6-ĞÁ shows that it was considered a separate activity.

[c] *Cf.* Walters' 1970: 125–126 (Text 99), which gives the term DU_8-IGI-NIGIN against DU_8-DÙ-AN, "sun dried."

[d] The task of "construction" (DÙ) was either a subset of "building" (ŠU DÍM) and/ or was differentiated from the skilled labor required of masonry, *i.e.*, for the construction of not just architecture, but reed huts, ovens, mats, *etc.* (Heimpel 2009: 235–237).

[e] Lit., "carrying reeds."

[f] *I.e.*, as lattices or screens.

[g] Heimpel 2009 266–274 distinguishes "plaster" (SUMUR) as the material used for the tops of walls and "stucco" (IM; "stuccoing" = IM SUMUR TAG) as that used for the vertical parts of the walls. For the purposes of estimating labor inputs, such distinctions are mostly unimportant.

built all at once, and not gradually in stages, as was almost certainly the case. These and other factors will be considered again in the conclusion, after we consider the labor-value of the Larsa barley havest.

Case Study Two: Larsa's Barley Production

The scale of barley production

Larsa's agricultural productive capacity was enormous even by the standards of lower Mesopotamia; barley-farming was carried out on a massive scale there as early as the Uruk period. Primary production in Old Babylonian Larsa took place on Crown lands, eponymous estates, temple farms, and small freeholdings, with a diverse textual record reflecting that state of affairs. Accordingly, it is impossible to arrive at anything like a single "snapshot" of land under production close to what, for instance, Steinkeller has been able to determine for Ur III's centralized administration of the Umma province.[139] As far as we can analyze Larsa's lands, we will have to settle for a subset of verified and documented agricultural capacity, well below the total labor investments. Fortunately, such an "under-estimate" is in perfect accordance with my methodology: overvaluing the labor-costs of monumental architecture and undervaluing the labor-costs of agricultural outputs. First, I will report on the scale of land under the plow; and then harness those areas of land to known labor-rates for farming tasks.

We might begin, as we did for wall-building, with a look at some existing templates for the estimating the carrying capacity of Bronze Age city-states in southern Iraq, for instance the model of Robert Hunt (1987). Hunt assumed 29 % of hinterland under production in Lower Mesopotamian environments within a 12.4 km radius for a single-tier environment centered on a dominant urban site.[140] Tweaking this model for Larsa's particular settlement distribution (the shape of an inverted chevron), the 29 % figure produces a "V" shape roughly 7 km thick north to south and 20 km east to west. We are looking at something like an overall area of 318.3 km^2, 29 % of which is 92.31 km^2 under production (= 9,231 hectares). Assuming, for example, barley production of 1,050 liters/hectare

[139] Steinkeller 2007a.

[140] Hunt 1987: 165–66, with another 29% of land in fallow and 42% not under production; cf. Civil 1987: 49–51, who opined that smaller plot-holders would have left less land in fallow than large estates. Wilkinson's 1994 model is much more sophisticated, but is unfortunately too specific to Upper Mesopotamia to do us much good here; this work, however, has guided much of C. Hritz's modeling, discussed below. For an example of Hritz's approach, see her several contributions in Wilkinson *et al.* eds. (2013).

(see below) and Hunt's very conservative estimate that barley production returned only a 9% surplus on invested labor (measured by kilocalorie; *i.e.*, 1 man-day of farming labor = 1.09 liters barley[141]), we would find:

9,231 ha. = 7,408,801 liters barley = 6,797,065 labor-days *per annum*

A model more specific to the Larsa region was devised by Carrie Hritz in support of earlier working versions of this study; it is presented here for heuristic purposes, not as the definitive conclusions of finished research. Hritz's model was based on standards developed by Tony Wilkinson's MASS project at the Oriental Institute of the University of Chicago, which in turn built on Wilkinson's 1994 study. Hritz was also able to correlate topographical and settlement data to both archaeological surveys and declassified Corona satellite imagery of the immediate Larsa area. The results of this estimate assume lower rates than Hunt's model for both population density and barley yields, but expands the overall amount of settled area, partly by identifying dozens of smaller settlements in addition to those identified by Adams and Nissen (see n. 151 below).

Larsa's rank-size based on occupied urban area relative to its neighbors was enormous: at 270 hectares, it was more than twice as large as Bad-Tibira to the east (121 ha.) and almost eight times as large as Uruk (35 ha.). Accordingly, Larsa's productive zone would have intruded beyond the geographical halfway points between these cities, especially to the east, where Larsa's productive zone enveloped Tell Abla, the most sizable second-tier settlement in the area.[142] This population-based subsistence model anticipates not only the productive sphere of its central zone (*i.e.*, a simple radius mapped out from the Larsa tell), but also the numerous small sites lying outside it. Assuming an occupation rate of 150 persons per hectare[143] and known yields of 881 kg grain per hectare, Larsa proper required a

[141] Hunt 1987: 166; his idea was based on the proposal that 9% represented the minimum surplus needed for primary producers to support "non-productive" households.

[142] To judge by the toponymic analysis following, Tell Abla is most likely to be identified as ancient Raḫabum, Ḫanṣipatanu, or Dimat-Kunanim according to rank-size and geographical orientation; further research should be able to identify some of the sites in the Larsa city-state.

[143] Wilkinson 1994: 499 concluded that populations up to 150 pph in urban environments in the Jezirah would produce equilibrium with production, but that 200 pph models would require imported food. Given that southern Mesopotamia could rely on much greater yields of barley per hectare, a 150 pph settlement density model seems quite a minimal and dependable boundary.

minimum of 15,161 ha. productive land,[144] another 2,170 hectares of land supporting its smaller sites, mostly lying along the northwestern edge of the state, and 2,283 belonging to Tell Abla and a few third-tier settlements. This gives a total of 19,614 hectares under production, an estimate obviously much larger than Hunt's. At that size:

19,614 ha. = 17,999,931 liters = 16,513,698 labor-days *per annum*

Hunt's and Hritz's models might be only "eyeball" estimates, but, at three-and-a-half and eight times the size of the city-wall labor value estimate, they begin to suggest the order of magnitude and interpretive problems we are dealing with.[145] But let us check these estimates against the data we have on actual production and normative labor-rates for associated tasks.

Size of the product: how big was the Larsa barley harvest?

As with the city-wall building, our twin tasks are to figure out

a) how big the job was, and
b) how much work would attach to a job that size.

Larsa texts, both published and unpublished, offer excellent information on agricultural production in terms of toponyms, yields, and cadastral measures of productive land. Larsa's storage-and-redistributive economy was also the subject of an important study by Breckwoldt (1995/1996), distilled from her earlier unpublished dissertation. That study focused on some relatively well-known texts reporting on lands and harvests of towns within the local orbit of the Larsa city-state. (Under normal circumstances, "local" means towns close enough to deliver grain to Larsa on a regular basis; my study also assumes this local region is the same population catchment from which corvée labor would have been drawn for city-wall building.) Despite this wealth of information, we must remain conscious of the fact that nothing like a full accounting of agricultural production from cuneiform evidence will be possible to the same degree that it is possible to re-imagine the size of the city wall. All we will ever have in the way of

[144] Incidentally, this estimate matches a "linear zone" model Hritz also produced, which assumed most productive lands lying along visible canal lines rather than in an ordered, tiered settlement system arrayed in neat circles. Estimating the total lands lying along canals and levees, the Larsa state takes on a much more oblong shape, running along a SW-NE axis, with the available land totaling 15,388 hectares—virtually identical to the 15,161 hectare estimate.

[145] Compare with Ur III Girsu, which had at least 24,266 ha. under production (Maekawa 1984: 90–91; cf. Steinkeller 2007a); see also Foster's (1982) discussion of hectarage in Girsu, Umma, Adab, Nippur, and other Sargonic estates.

hard data are subsets of a larger and unknown total capacity. Fortunately, this state of affairs is perfectly consonant with my model: the job is to discover the largest known *minimum* of production and compare that smaller product to the civil-sector work.

There are essentially two ways to build a portrait of Larsa's barley production: one is to get a handle on the size of the productive lands from field accounts; the other is to reconstruct the size of those lands retrospectively from known barley yields. The first method is clearly the more dependable one, doubly so because most labor rates for farming were tied to the area of land being worked, not the barley yielded. But it is not obvious without examining the data whether barley yields would not by their preponderance give us the better information in the end. To date, most scholarly attention has been directed to a few suggestive texts reporting millions of liters of grain (see, *e.g.*, YOS 5 176, a distribution of 5276.1.0,6 ŠE.GUR, more than 1.5 million liters of grain).[146] We will therefore have a look at both the fields and yields of the Larsa city-state.

Toponyms of the Larsa area within the territorial kingdom

More than two hundred toponyms can be associated with the Larsa state; their location on the ground is made problematic, however, partly by the fact that Larsa's territorial ambitions brought it to control a wide swath of places in lower Mesopotamia—from Maškan-šāpir in the north to Ur in the south—many of which did not routinely bring grain to Larsa. This was a sizeable territory that included large cities not in Larsa's immediate ambit, *e.g.*, Lagaš, Umma, Adab, Šarakkum, and portions of Malgium and Emutbal. The precondition for finding measures of either our target lands or yields, then, is establishing a base list of toponyms close to Larsa proper.

This entails two separate stages. The first is to discover the set of toponyms which can be firmly anchored for proximity to Larsa. Breckwoldt's study focused on a few of the best-documented towns in the immediate Larsa region, but we can expand this list to at least twenty-two "anchored" toponyms: Aḫanuta, Abisare, Ašdubba, Dimat-Balmunamhe, Dimat-

[146] It must also be acknowledged that amounts of grain in Larsa texts do not always clearly spell out the connection between distributed/stored amounts of barley, and actual harvested yields. This is a potentially large methodological problem which I unfortunately have to sidestep for the moment. In the main, the routinized administration of large amounts of barley distributed annually speaks against them being reserves, i.e., the stored yields of multiple years; and amounts going into storage were (perhaps obviously) not being brought there *from* storage; thus I feel these quantities probably correlate closely to yields.

Kunanim,[147] Dunnum,[148] lands "harvested by the crown,"[149] Eduru-Šulgi, Ḫanṣipatanu, Ḫašur, Ḫumsirum, Iddi-Uraš, Iškun-Ea, KA.AN, Masabum, MÁŠ.ZI, Pakakaya, Raḫabum, Sin-KAL, Sin-nūr-mātim, Širimtum, and Zarbilum. This list forms the basis for the results seen in Table 2, fifty-two more towns and watering districts which can be correlated to these toponymic anchors.[150] It must be emphasized that I am making no claims about the relative importance of the anchors or the secondarily-correlated toponyms. The table reflects only that the "anchors" can be directly located at Larsa, while the secondary ones are located in turn by the anchors (locational data to be found in the cited texts, among others); they are correlates of adjacency and not rank or size.

In all, seventy-four toponyms can be tied with confidence to the Larsa city-state.[151] Many more toponyms in the Larsa corpus are either certainly not, or not clearly, within the city-state.[152] Some of the borderline cases could potentially add quite serious totals of land to our surveys, but must be disallowed for various reasons: some seem likely to be close, but cannot be definitively proven so;[153] other texts present information about towns

[147] See Koliński 2001: 26–27 and Table 8; his conjecture was that this and other *dimtu* housed "scattered people."

[148] On Dunnum, see Dalton 1983: 90, on a letter of Gungunum he interprets as an order for the army to refortify that site and dredge its canal.

[149] Fourteen watering districts are not individually listed on Table 2, but subsumed under "É.GAL [lands];" these derive from one list, YBC 7238 (RS 3).

[150] Ḫumsirum, which appears in Fig. 2, but not Table 2, is assigned to the Larsa region on the basis of YBC 7248; alone among the "anchors," this town cannot be correlated to Larsa by geographic information, but only by the text's date and format, which it shares with NBC 8161. Note also that the hundred-plus fields of URU.KI Ḫumsirum on YBC 7248 are categorized as under "the hoe of Šamaš-ḫāzir" (GIŠ.AL PN) — in the time of Rīm-Sîn (Year 22). See also Koliński 2001: 28 for possible additional toponyms, including Dimat-Kattim.

[151] Adams and Nissen 1972 identified thirty-four Isin-Larsa period sites within seven kilometers of Senkere, numbered 414–24, 428–430, 433–447, and 457–460.

[152] Several dozen toponyms appearing in Larsa texts cannot be located certainly within the Larsa city-state, either for lack of information by geography (*e.g.*, situation along a known canal or road), prosopography (*e.g.*, by the management of its resources by an official otherwise known to have controlled land or grain in Larsa towns), or adjacency (*e.g.*, by its mention together with another known Larsa town).

[153] The excluded data here is quite substantial. For instance, (Dūr)-Etellum (AbB IV 102 and 108 give 1.0.0.0 IKU land) and Mašmašene (AbB IV 24: 6.0.0 IKU land), both frequent toponyms in Larsa texts, may have been closer to Lagaš (see the PA_5 Etellum in many of the texts from Walters 1970: esp. 197),

Table 2: Toponymic anchors and associates

Anchors	**co-anchors**	***associates***
Aḫanuta (OECT XV 27)	Raḫabum	Kubatum[a] (OECT XV 27)
Abisare[b] (YBC 6663 and 6974)	Ašdubba	*none*
Ašdubba[b,c] (Birot 69; VS 13 100)	Abisare	Enlil-garra (OECT XV 112), Nabrara[c] (TCL 11 158; cf. AbB IX 150), Rakabat (AbB XIV 163)
Dimat-Balmunam-he[c] (YBC 5585)	KA.AN and Širimtum	*none*
Dimat-Kunanim (YOS 8 100; VS 13 104)	KA.AN and Raḫabum	Āl-Kubbukum, Āl-Iddin-Ea, Dimat-Nutuptum, Dimat-Warad-ili, Ewirnum, Til-Ḫatudum, Til-Mer[rik?], Til?-Dukanum (all NBC 8161)
Dunnum[c] (TCL 11 175, VS 13 104)	Ḫanṣipatanu, Raḫabum, and KA.AN	*none*
É.GAL lands (YBC 7238)	Kururu	[comprised of fourteen otherwise unknown *ūgarū*]
Eduru-Šulgi (Birot 69)	*none*	*none*
Ḫanṣipatanu (TCL 11 174)	Dunnum	All *ūgarū* except Kururu (see JCS 11 31b 9): Akulṣi-làl (=Akulim?), Aluratum, Ašdiša, Diḫlani, DUB.SAR, Garubum (= Gabburum/ Gubrum?), Kuštanu, ÍD-UL-SI-TA and Kururu (all OECT XV 80); Ḫupatum and Raḫinuru (both OECT XV 13).
Hašur (OECT XV 18; TEBA 107; Birot 69; on the "kaskal Larsa")	*none*	Zawar (OECT XV 18)
Iddi-Uraš[d] (YOS 5 166)	MÁŠ.ZI	*none*
Iškun-Ea[b] (TCL 10 28)	*none*	*none*

Anchors	**co-anchors**	***associates***
KA.AN[b] (SVD 54; VS 13 104)	Dimat-Balmunamḫe and Dimat-Kunanim	Al-Warad-Sin[a] (VS 13 104), Dūr-Diḫutim[a] (YOS 5 181), Tilla[a] (AbB IV 109, VS 13 104)
Masabum (YOS 5 170 and 185)	*none*	*none*
MÁŠ.ZI[d] (YOS 5 166)	Iddi-Uraš	*none*
Pakakaya (YOS 14 226)	*none*	Ubarriya (YOS 14 226)
Raḫabum[c] (AbB XIV 3; OECT XV 22)	Aḫanuta	Al-Warad-Sin[a], Bela, Tilla, Zibnatu[a] (all VS 13 104); Šunnamu(n)gi(m) (also VS 13 104, but *cf.* AbB IX 150 and OECT XV 121) Erra-UR.SAG, Ki-Utušua (see also SVJAD 137), Sin-māšmāš and A.GÀR Igruru (all OECT XV 76); Nanna-GÚ.GAL (cf. RGTC 2), Ḫarab-kare, Ki-Utuea, Šubat-ilim and the *ūgarū* Kazazanu, Warḫu, and GIŠ.BAR (all OECT XV 22); Mašum and Nūr-libi (both TCL 11 156).
Sin-KAL (YOS 14 223)	*none*	*none*
Sin-nūr-mātim[b] (YBC 7194)	*none*	Dūr-Diḫutim[a] (YOS 5 181)
Širimtum[b,c] (Birot 69)	Dimat-Balmunamḫe	Six fields (A.ŠÀ) from AbB XIV 56: Munḫiatim, Hiššar (also YOS 15 67), IGI.URU, A.GÀR Gula, *ṣerum,* and Pi-ilim
Zarbilum[c] (YOS 5 207)	*none*	*none*

[a]co-associated elsewhere
[b] Breckwoldt 1995/1996: at Larsa.
[c] RGTC 3: at Larsa
[d] independently located

which are probably within the city-state, but in a format which does not permit data to be extracted clearly enough to prevent overlaps and double-counting of land or yields from other places already on the list;[154] a number of toponyms close to Larsa provide amounts of substantial land, but only for the specialized production of dates[155] and sesame[156] instead of barley. What is not possible at this point is to create anything like a map of the Larsa state, nor is this the place for a major study of its historical geography. However, we can sketch the following picture: clusters of villages flanked the northeast and northwest shoulders of the city-state, forming a rough "V" shape, with the probable extension of the state's major canal branch leading from Bad-tibira in the northeast all the way to the Euphrates in the southwest. These are two indications of basic orientation: Ašdubba perhaps lay to the west of Larsa, towards Uruk (per VS 13 100), and Raḫabum lay perhaps to the east, since one of its local villages, Erra-Ursag, lay on the Lagašitum canal.[157]

In addition, we can speculate that the appearance of toponyms under the control of similar officials and/or together in the same accounts of land or grain also suggest their physical adjacency (see Fig. 2). Some of these correlations are more insistent than others, but an adjacency theorem (*i.e.*, that toponyms appearing together in accounts were likely in proximity to one another) cannot really as yet be proven. Still, as a general rule, "account adjacency" and physical adjacency are not *counter*indicated—anchors which correlate to other anchors tend to correlate to them consistently and not to others. At this point, I can identify five "super-clusters" of anchored toponyms with correlated adjacencies:

according to Stol's review (1971: 365–66). OECT XV 1 and 2 account for, respectively, 4.2.1.7.2.2 and 1.1.1.7.5.2 IKU of ÉŠ.GÀR.HI.A lands, 2343 ha. probably within the Larsa state, but do not include any unimpeachably Larsaean toponyms; see also TCL 11 155 and 185.

[154] OECT XV 22 gives 3.0.0.0 IKU of lands in nine places near to and including Raḫabum, all certainly within Larsa, but only two can be localized (Raḫabum itself and Ki-Utuèa), and so only a fraction of the land can be assigned to specific places.

[155] *E.g.*, Nabrara, Dunnum, Ašdubba, Nanna-GÚ.GAL, and Rakabat (TCL 11 167A, 175, 190, 247); such lands could be substantial in size: TCL 11 158 gives 6.2.3 IKU of GIŠ.ŠAR in Nabrara alone.

[156] Although sesame was one of the select commodities regularly tracked by the state (along with dates, barley, and wool), delivery sizes were small relative to those other products.

[157] Unpublished Yale cadasters suggest that Rīm-Sîn ordered a survey of Girsu lands in his Year 21 and Larsa lands in Year 22 (see Richardson 2008).

Figure 2: Super-clusters of anchored Larsa toponyms

Cluster A (all east of Larsa?):

Raḫabum—Aḫanuta—Dimat-Kunanim

Cluster B (all west of Larsa?):

Abisare—Ašdubba[158]—Eduru-Šulgi—Ḫašur—Širimtum

Cluster C:

Dimat-Balmunamḫe[159]—KA.AN—Dimat-Kunanim

Cluster D:

Dunnum—Ḫanṣipatanu

Cluster E:

MÁŠ.ZI—Iddi-Uraš

The anomaly among these fifteen toponyms is Dimat-Kunanim, which correlates sometimes to cluster A and sometimes to cluster C (perhaps as a pivot between those two clusters); otherwise these adjacency principles seem fairly stable. A similar clustering stability occurs among the secondarily classified toponyms as well; of the fifty-two, only six correlate to more than one anchor (though many are also only known from one locating text). As a general statement, most Larsa toponyms appearing with other toponyms do so within a small, fixed range of others; this tends to suggest the clearly tiered settlement system (both geographically and administratively) already predicted by archaeological models and surveys.

Productive lands and known yields in the Larsa city-state

With the known local towns and villages accounted for by name, we can look for known totals of productive land. There are two ways to go about this: by actual statements of productive land; and by harvest yields from which supporting lands can be reconstructed. As mentioned above, the former category of data is more dependable, but the latter is more abudant. Looking to the first, the sizes of large productive tracts come primarily from cadastral texts, though a surprising number come from administrative letters. Just under half (thirty-five of seventy-four) of the located toponyms preserve information about measured land; these total 1.4.0.6.2.2, 60 SAR, about 5,378 hectares (Table 3, col. 3). These represent the largest unique field measurements (that is, within a single cuneiform text, thus avoiding the possible redundance of identical lands

[158] But cf. YOS XV 95, which mentions Ašdubba with Kutalla and Bad-tibira, both to the north-east of Larsa.

[159] Co-anchored to KA.AN, but also Širimtum (*e.g.*, YBC 5585).

added from multiple texts) in each locality, as small as the 1.8 hectares of Nanna-gugal in OECT XV 22, and as large as the 1,263.8 hectares of the "lands harvested by the palace" in YBC 7238.

5,378 hectares is less than what Hunt and Hritz estimated, and a known minimum rather than a projected maximum. Without doubt, the total amount of productive land was much larger: some places with massive harvest yields documented have no preserved information on the size of land (see Table 3: Dimat-Balmunamḫe, Iškun-Ea, Masabum, MÁŠ.ZI, Sin-nūr-mātim, and the Gula, Hiššar, and Munḫiatim fields). In fact the inverse seems to hold true as well: more than two-thirds (twenty-five) of toponyms with lands surveyed have no documented harvest yields. One might speculate on this basis that fields under institutional control were unnecessary to survey because their sizes were known and implied by their real and expected yields, whereas freeholdings and service-lands were documented in terms of size because they were alienable/ transferable and because their dues were calculated on the basis of size.[160]

Nor does any cadastral record indicate that the land for which it accounts represents the total land of that place—perhaps just some of it. For instance, were the town of Abisare to have farmed *only* the 2.0.0 IKU of land mentioned in OECT XV 112, one would have to explain how it those 12.7 hectares could have produced the yield of 415.4.0 ŠE.GUR listed in YOS 5 175; this would require a fantastic yield rate of 9,822 liters per hectare. Nor again is there any reason to believe that the lands documented by the state economy were anything near the total land under production:[161] individual ŠUKU-plots and private non-institutional lands are poorly represented among these documents.[162] In short, we can be very confident that the count of 5,378 hectares is a secure and minimal count of known lands.

So what can yields tell us about the size of their fields? This is more difficult to answer responsibly, since the answer rests on the all-important "x-factor" of what average barley yields were. We already have Hritz's

[160] This conjecture is also supported by the fact that, in the six cases in which both field sizes and yields are known for toponyms *from separate documents*, the barley yields uniformly imply much larger amounts of land than their otherwise documented field sizes (Abisare, KA.AN, Širimtum, A.ŠÀ IGI.URU, A.ŠÀ Pi-ilim, and A.ŠÀ *ṣērim*).

[161] Kozyreva 1988: 203 estimated that only a third of Larsa's cultivated area belonged to the "state economy," though as far as I am aware there is no way to externally confirm this estimate.

[162] Halstead 1990: 192.

working standard of 846 liters/hectare.[163] Figure 3, below, abstracts a number of Larsa texts also give a good idea of actual yields on large estates and farms:[164]

Figure 3: Some documented yields from Larsa fields

text	**land**	(in hectares)	**yield**	(in liters)	**rate** (l./ha.)	**date**
Jacobsen (1982)[165]		(430.47)		(386,132)	897.0	Ha
OECT XV 106: 7–9	2.7.0.4	(172.88)	260.2.4, 6	(78,166)	452.1	Ha 32
OECT XV 106: 11–13	3.2.2	(23.99)	33.1.4	(10,000)	416.8	Ha 32
OECT XV 106: 14–16	1.8.2.2	(119.58)	77.4.4, 8	(23,388)	195.5	Ha 32
YBC 7238:17[166]	3.1.9.0.0	(1,263.85)	2716.0.0	(814,800)	644.7	RS 3
YBC 7238: 23	1.0.0.0.0	(381.06)	1000.0.0	(300,000)	787.3	RS 3
Birot, *Tablettes* 1[167]	6.0.5	(39.87)	110.2.0, 5	(33,125)	830.8	Ha 32
Birot, *Tablettes* 2	5.2.0, 75 SAR	(36.6)	164.4.3, 7	(49,477)	1,351.8	Ha 32
Birot, *Tablettes* 3	8.0.0, 75 SAR	(51.0)	184.4.2, 7	(55,467)	1,087.6	Ha 32
Birot, *Tablettes* 4	8.1.0, 1 UBU	(53.1)	223.1.4	(67,000)	1,261.7	Ha 32
Birot, *Tablettes* 5	1.1.0.1	(70.2)	266.3.2	(55,467)	790.1	Ha 32
Birot, *Tablettes* 6	9.2.3	(62.4)	211.3.2	(63,500)	1,017.6	Ha 32
Birot, *Tablettes* 7	9.0.2, 20 SAR	(57.9)	156.1.0, 7	(46,867)	809.4	Ha 32
Birot, *Tablettes* 8	4.1.2, 1 UBU	(28.4)	38.1.2	(11,480)	404.2	Ha 32
Birot, *Tablettes* 9	1.2.1.4, 1 UBU	(79.9)	201.2.4, 3	(60,463)	756.7	Ha 32
Birot, *Tablettes* 10	1.1.2.4	(75.5)	198.4.3, 5	(59,675)	790.3	Ha 32
Birot, *Tablettes* 11	1.1.4.0.2	(470.6)	1,805.2.4, 7	(541,667)	1,151.0	Ha 32

163 Powell 1985: 28–29 cites modern Iraqi yields from as low as 56 to as high as 121 GUR per BUR.

164 Cf. OECT XV 121 and 134, which report yields on smaller plots, some as small as 15 SAR (1⁄20th of a hectare).

165 This total from Jacobsen 1982: 39, 43 (Appendix 18) combines data from three Larsa texts (n.d., Ha 35 and Ha 39), each of which measures multiple fields, with individual yields ranging from as low as 462 to as high as 2,315 liters per hectare.

166 The yields from this text are conceivably higher: amounts of barley are represented in columns two and three of this text, following a first column giving field size. Column three is headed ŠE NÌ.KU$_5$, but the header for column two is broken. The amounts in column two are consistently twice the amounts in column three, but the relationship between the two amounts is unclear; the neat 2:1 ratio is too ideal to represent expected versus actual yields. For the moment, the only certainty is that the amount called ŠE NÌ.KU$_5$ was an actual amount harvested; see Powell 1985: 32 and n. 94.

167 Birot himself (1969: 44–46) believed that the totals in these eleven texts, from *iššakkum* land, represented either ⅔ of total production, or that they were totals from which a rent or levy was subsequently derived (cf. Ellis 1976: 12–13, 31; p. 28, opining that these tablets might have come from Lagaš and not Larsa; but cf. *ibid*., 30 n. 100).

Table 3: Larsa toponyms with known field-sizes and/or yields with minimum hectare estimates

Toponym		largest known record of land	largest single yield of grain (ŠE.GUR)[a]	minimum land in hectares
Aḫanuta	**1**	NBC 8161: 6.2.3*	*none*	43.4
Kubatum	1.1	AbB IV 35, XI 165: 7.0.0	*none*	44.4
Abisare	**2**	OECT XV 112: 2.0.0	YOS 5 175: 415.4.0	155.4
Ašdubba	**3**	*none*	VS 13 100: 96.0.0	35.8
Dimat-Balmunamḫe	**4**	*none*	YBC 5585: 938.2.0	350.7
Dimat-Kunanim	**5**	NBC 8161: 1.2.6.1.5*	*none*	550
Dimat-Nutuptum	5.3	NBC 8161: 6.1.2	*none*	40.9
Dimat-Warad-ili	5.4	NBC 8161: 1.2.2.1	*none*	80.8
Ewirnum	5.5	NBC 8161: 1.4.0.0	*none*	88.9
Til-Ḫatudum	5.7	NBC 8161: 2.2.6.2.0	*none*	931.4
Til-Mer[rik?]	5.8	NBC 8161: 1.0.3	*none*	7.4
É.GAL **lands**	**7**	YBC 7238: 3.1.9.0.0	[➛ at least 2716.0.0]	1263.8
Eduru-Šulgi	**8**	TCL 11 171: 2.1.5, 75 SAR	[➛ 76.0.3]	16.8
Ḫanṣipatanu	**9**	OECT XV 80: 1.1.0	*none*	8.4
A.GÀR Aluratum	9.2	OECT XV 80: 0.2.0	*none*	4.2
A.GÀR Diḫlani	9.4	OECT XV 80: 1.1.0	*none*	8.4
A.GÀR Ḫupatum	9.7	OECT XV 80: 0.1.0	*none*	2.1
A.GÀR Kuštanu	9.8	OECT XV 80: 1.0.0	*none*	6.3
A.GÀR/URU Kururu	9.9	YBC 7238: 1.0.0.0.0	[➛ at least 1000.0.0]	381
A.GÀR Raḫinuru	9.10	OECT XV 13: 0.2.0	*none*	4.2
Ḫašur	**10**	TCL 11 146: 3.1.1.3	*none*	200
Iddi-Uraš	**11**	*none*	YOS 5 166: 60.0.0	22.4
Iškun-Ea	**12**	*none*	YOS 5 201: 972.0.0	363.3
KA.AN	**13**	TCL 17 5: 5.0.0	YBC 5585: 840.0.0	313.9
Tilla	13.3	AbB IV 109: 2.6.0.0	*none*	165.1
Masabum	**14**	*none*	YOS 5 185: 597.4.0	223.4
MÁŠ.ZI	**15**	*none*	YOS 5 166: 609.0.0	227.6
Raḫabum	**17**	OECT XV 22: 6.0.0	*none*	38.1
Bela	17.2	NBC 8161: 1.6.0.0	*none*	101.6
Ḫarab-kare	17.6	OECT XV 22: 6.0.2	*none*	38.8
Ki-Utuèa	17.8	OECT XV 106: 1.0.2.2.5	[➛ 503.3.1]	399.7
Ki-Utušua	17.9	OECT XV 128: 4.0.0	*none*	25.4
Nanna-gugal	17.10	OECT XV 22: 0.0.5, 15	*none*	1.8
Šunnamungim	17.15	OECT XV 121: 6.2.4, 70 sar	*none*	52.1
Mašum	17.16	TCL 10 133: 4.6.1.1	AbB XI 185: 100.0.0	294.6
Nūr-libi	17.17	TCL 10 133: 1.0.2.2	*none*	68.4
Sin-nūr-mātim	**19**	*none*	YOS 5 181: 922.0.0	344.6
Širimtum	**20**	AbB XIV 49: 6.0.0	AbB XIV 63 (=TCL 17 1): 840.0.0	313.9
A.ŠÀ DU$_6$	20.1	*none*	TCL 17 4: 120.0.0	44.8
A.ŠÀ Gula	20.2	*none*	AbB XIV 56: 110.0.0	41.1
A.ŠÀ Hiššar	20.3	*none*	AbB XIV 64: 160.0.0	59.8
A.ŠÀ IGI.URU	20.4	TCL 17 10: 8.1.0	AbB XIV 56: 174.0.0	65
A.ŠÀ Munḫiatim	20.5	*none*	AbB XIV 58: 504.0.0	188.3
A.ŠÀ Pi-ilim	20.6	AbB XIV 59: 2.0.0	AbB XIV 57: 210.0.0	78.4
A.ŠÀ *ṣērim*	20.7	AbB XIV 59: 3.0.0	AbB XIV 56: 470.0.0	175.6
Ḫumsirum	**22**	YBC 7248: 5.5.0.5	*none*	351
			TOTAL HECTARES:	8223 ha.

[a] Estimated field sizes are reconstructed from the rate of 802 liters/hectare (see below); the 415.4.0 ŠE.GUR of Abisare from YOS 5 175, for instance, gives 124,740 liters of grain, with an implied result of 155.4 hectares, much larger than OECT XV 112's 12.7 hectares (= 2.0.0 IKU A.ŠÀ).

* Indicates that the number is a fragmentary minimum; actual size of field or yield is larger, but the actual total is unreconstructable

➛ Indicates a barley yield reported directly from the same land enumerated in the previous column.

The seventeen figures in Fig. 3 all derive from institutional texts; their average yield is 802.6 liters per hectare, which is unexpectedly close to Hammurabi's famous boast about pocketing "18 GUR per BUR" (ca. 844 liters per hectare) as in-kind levies.[168] We must keep in mind, too, that such rates likely reflect the tax burden on fields rather than total production, with an unspecified portion unaccounted for. Once again, we cannot depend on such numbers to be right in any absolute sense, but they are perfectly dependable as known minimums.

Adopting this 802.6 liters/hectare figure as an estimated *minimal* rate of production, then, what would known yields tell us about the commensurately minimum sizes of the lands producing them? We most often know attested quantities of harvested barley without knowing the size of the land they are grown on (cf. figures for É-GAL lands, Eduru-Šulgi, Kururu, and Ki-Utuea on Table 3, where the opposite situation pertains), and all of the towns for which both types of data exist show yields much larger than known fields could produce. Looking at the known amounts of barley irrespective of documented land, we find 12,257.4.5 ŠE.GUR, some 3,677,390 liters. At the 802.6 liter per hectare rate, this implies 4,581.8 hectares of land under production (Table 3, col. 4), fairly close the known areas of land (5,378 hectares, col. 3).

On present evidence, we cannot really hope to be more substantially accurate by using one type of information over the other, from either field sizes or barley yields. And once again we are setting aside factors that we know would add massive quantities of land to our estimate. Twenty-eight of seventy-four known Larsa toponyms preserve neither production figures

[168] Stated field rental rates of the period put the tax rate at 16–18 GUR per BUR: Ellis 1976: 57 n. 228; Birot 1969: 44–46; cf. Wright 1969: 13–14.

or field sizes, for one thing;[169] and some of the largest documented barley yields come from texts which do not even mention the location of the productive fields at all, only the names of the overseeing officials. And—an overarching problem—many of the documented yields may represent quantities due as taxes, and not statements of entire yields.[170]

Fortunately, this is not a "completist" project. Since we do have these forty-six toponyms with known, unique data for lands and/or yields (see Table 3), I will collate both, avoiding overlaps, to arrive at a known minimum of Larsa land. That is, for any toponym with a statistic of either kind, I will use the larger amount of land reported either in the form of a field size or implied from a harvest yield. This produces a documented area of land of 8,223 hectares (Table 3, col. 5; at 3,528.36 m^2 per IKU, this comes to 23,305 IKU), an estimate about 89 % of what Hunt might have assumed, but only about 42 % of the MASS estimate. I will make my assessment of invested labor-value on that amount of land.

Labor value of the harvest

We find ourselves happily equipped with an even better set of normative work rates for farming than we were for building. (The superior standardization of work rates in the agricultural sector as against the construction sector is by itself suggestive of its greater institutional importance.) With such normative rates in hand, it is a relatively straightforward business to attach them to the land base estimate of 8,223 hectares. But what are the expected tasks of barley farming? We can begin by comparing some of the steps observed in modern barley farming by Hillman, and those found in the didactic Sumerian work called the *Farmer's Instructions* (hereafter, *FI*). Tasks for which accounting rates are known or reconstructable are in bold; tasks for which I have been unable to account labor-values appear in italics.

[169] It is possible that the clustering of data for harvest yields and cadastral field-sizes in particular toponyms reflects a localization of the institutional sector within the Larsa state. That is, toponyms without (or without much) data for these categories (even including such towns as Ašdubba, Nabrara, and Warad-Sîn (but see now Owen 2012: 450-51), often mentioned in other contexts) may reflect a sector of villages and towns in which freeholders predominated, whereas well-documented towns had greater institutional affinities. The distribution may also, however, be purely accidental, a consequence of our uneven recovery of the sources. The question is promising (or troubling) enough to warrant further study.

[170] Powell 1985: 8–10, opined that GÚ-NA-BI "probably means 'its revenue,' not 'its yield'."

Figure 4: Barley farming taskwork

Hillman[171]	Farmer's Instructions[172]
Manuring	**Inspection of Irrigation**
Tilling	**Field-flooding**
Harrowing	**Guarding Crops** (from cattle)
Clearing Irrigation Channels	**Weeding**
Clod-Breaking	**Hoeing / Smoothing**
Hoeing Grooves	*Assemble / Repair Tools*
Sowing	**Plow Once with Oxen**
Covering Seed	**Second Plowing**
Repeated Irrigations	**Harrow 3 Times**
Repeated Weedings	**"Flatten Stubborn Spots"**
Culling Green Crops	**Sowing**
Guarding Ripening Crops	**Clod-Breaking**
Harvesting	**"Pest Control"**
Temporary Field Storage	**3 Irrigations**
Transport to Threshing Floor	**Optional 4^{th} Irrigation**
Preparation of Threshing Floor	**Harvest**
Root Removal	**Lay Down Sheaves**
Threshing	*Rest the Sheaves*
Raking Straw	**Transport Sheaves**
Heaping Grain	*Clean Threshing Room Floor*
Winnowing (Once)	**Thresh**
Re-Threshing and **Winnowing of Straw**	**Winnow**
First Sieving	**"Move Grain Around"**
Second Sieving	*Measure Grain*
Grain-Washing	*"Release the Grain"*
Grain Storage	
Straw Transport and Storage	

Table 4 represents the collation of these two lists, though a few tasks have been lightly re-titled. Indeed, not all of the above steps so clearly correspond to one another, nor do normative rates exist for all of them. What we can do is to pick out the core tasks for which rates exist, set aside those that don't (*e.g.*, root removal, repairing tools, resting sheaves) and

[171] Hillman 1984: *passim*; 1985: 1–11; similarly, see Charles 1990. The situation with these articles is similar to Seeher's work: while they are exhaustive studies of labor processes, they do not offer consistent or actionable econometric data for our purposes.

Table 4: Tasks for Larsa barley farming on 8223.0 hectares (23,305 IKU); expected yield at 802.6 liters/hectare[a]

task	term	known rate[b]	laborers per operation	Labor Days
PREPARATION				
"Trough" clearing	KÁB-KU$_5$	10 GÍN	1 man	54,820
Plowing × 1.5	GEŠ-TÚG-GUR	1 IKU	3 men, 2 oxen[c]	174,787
Harrowing × 3	GEŠ-ÙR-RA	5 IKU	3 men, 2 oxen	69,915
Clod-clearing	NÌ-GUL	20 SAR	1 man	116,525
Smoothing	TÉŠ … SIG$_{10}$	12 SAR	1 man	194,208
PLANTING				
Furrowing / Sowing	GEŠ-APIN	2 IKU	3 men, 1 ox	46,609
Hoeing[d]	AL / AL DÙ	7 SAR	1 man	332,928
MAINTENANCE				
Weeding × 3	Ú ZÉ-A	20 SAR	1 man	116,525
Irrigations × 4	A DÉ	[see notes]	4–5 men	90,561
Guarding Crops × 120	(*FI*, ll. 65–66[e])	—	[1/8 man]	291,312
HARVEST				
Harvesting	ŠE GUR$_{10}$	1 GUR	1 man	21,999
Sheaf-binding	ZAR KÉŠE/SÁ	1 IKU	2 men	46,610
Bringing-in	ŠE DE$_5$	[see notes]	n/a	46,610
Threshing	ŠE GEŠ RÁḪ	4 BARIGA	2 men	54,998
Winnowing × 1.5	ŠE LÁL	2 BARIGA	2 men	164,994
Transport	Á MÁ.ḪI.A *maštitum* & Á LÚ.ŠE.ÍL	[5%]	n/a	91,170
TOTAL labor-days				1,914,571

[a] 23,305 IKU ➛ 6,599,780 liters (= 21,999⁺ GUR). See also Robson 1999: 163–165.
[b] Analogous rates appear in brackets.
[c] Englund 2012: 451–452.
[d] *I.e.*, seed-covering.
[e] ETCSL 5.6.3, ll. 65–66: "After the seedlings break open the ground, perform the rites against the mice. Turn away the teeth of the locusts" (SIZKÚR ^{d}NIN-KILIM-KE$_4$ [*sic*$^{?}$] DUG$_4$-GA-AB / ZÚ BIR$_5$ MUŠEN-RA BAL-E-EB).

build a portrait of the labor-value invested in that subset of tasks. Behind virtually every task listed in Fig. 4 (above) lay also the work of building and maintaining equipment and infrastructure for it—plows, harrows, hoes, mauls, boats, threshing sheds—the labor-value of which cannot be accounted for here. The labor value of animals, on the other hand, can and must be costed into our analysis if only for the reason that they consumed at least as much food as human laborers (and probably a lot more[173]), and directly impacted the source-value of that labor's very object, *i.e.*, grain; each animal will therefore be accounted for here as one person. (See Appendix 3, p. 312, for notes on tasks accounted for in Table 4.)

The estimated labor value of the annual Larsa barley harvest comes to **1,914,571** labor-days, virtually the same as the estimated labor value of the city wall (**1,957,095** labor-days) from a particularized account of taskwork. In crude terms, city-states invested as much labor in producing a barley crop as they did in building a city wall; yet my labor estimate is only a fraction of what the Hunt and Hritz estimates assumed for this city-state (ca. 6.8-8 million labor-days).

Now it is worth recapitulating several premises of this part of the study. This barley-harvest estimate represents only a subset of all barley being grown in the Larsa state; this barley only represents a subset of all agricultural production (dates[174] and sesame[175] in particular were bulk-produced crops well-represented in state documents). Second, I have used, where available, the fastest-known work rates for farming tasks and omitted all labor investments related to infrastructure and tools. Third, it cannot be said strongly enough that the addition of labor-values for the excavation, dredging, and maintenance of the larger irrigation canals would add easily tens if not hundreds of thousands of more labor-days to my estimate for farming.

This study cannot account for important historical questions about farming and building as they were actually done *in process terms—e.g.*, the question of intensified production under Rīm-Sîn and Hammurabi (*i.e.*, adding labor costs), or of institutional abilities to streamline and ease production bottlenecks (*i.e.*, reducing labor costs through efficient allocations of labor). Most importantly, seasonality must be reintroduced to the equation. "Farming versus building" poses a false opposition in terms of opportunity costs or other disutilities: the work slotted into different parts of the year for the most part; the satisfaction of one type of work did not as a rule negatively impact the other. Different types of work were compartmentalized and pursued intensively and sequentially

172 Civil 1994: 28–33.

173 See, *e.g.* YOS 5 184, in which the grain expenses for the plow-teams in Iškun-Ea and Abisare in Rīm-Sîn 7 outstrip (hired) workers' wages by almost 10:1 (see also YOS 5 181).

174 *E.g.*, VS 13 96; TCL 11 153, 158, 160, 180, 182, 192; on labor costs for date versus grain production, see Rothman 1994: 154–56.

175 Goetze 1950b: 83–84.

in different parts of the year, mitigating the accumulation of tasks. The various Babylonian calendars, which were built around the seasonality of the agricultural year, featured such month names as "month of [cutting barley with] the sickle (*i.e.*, harvest),"[176] "the month the brick (is placed in the brick mold)," and so forth.[177] Preparing and tending crops, occupied the ninth through eleventh months, while it was the third month in which bricks were made, late summertime when canalwork was generally undertaken, *etc.*[178]

Administrative texts also used work rotations as an organizational principle,[179] and it is clear that irrigation work was compartmentalized into a fairly narrow section of the year.[180] The division of large projects into multiple phases is even attested in royal inscriptions. Tattanum of Tutub named one year for the making of bricks for a project, and the following year for the building; similarly, Sin-iddinam made the unusual claim for the Ebabbar that he "baked its baked brick in the course of one year;" Warad-Sîn claimed to have baked the bricks for the wall of Ur in only five months of a year;[181] cf. Samsuiluna, who tells us that he rebuilt the brickwork of six fortresses "in two months."[182] As little time as building work took, it is clear that it could be arranged in ways that did not interfere with the larger demands of the argicultural work year.

[176] Cohen 1993: 266.

[177] *Ibid.*, 93, 314–15, noting that *simanu* itself came to mean (simply) "season"; Englund 1988: 127; Jacobsen 1982: 57–60. Despite the fact that these month names are difficult to correlate to absolute seasons of the tropical year, the heuristic value, that different types of work were seasonally-appropriate, remains the same.

[178] Walters 1970: xiii, 103 n. 27, and 112; see also see CAD L s.v. *labānu* v., with references to "the month for making bricks and building houses and cities."

[179] Compare UET 5 866–71 and 875, timetables for scheduled work service; see also AbB IX 264.

[180] Inundations normally were done in January-March, according to Stephanie Rost (personal communication) with an earlier irrigation in October. The heavy work of dredging, however, was generally concentrated just before this, in August/September.

[181] Dalton 1983: 176; note that only one year-name of Tattanum is presently known; Frayne 1990: RIME 4 2.9.6 (pp. 164–165), ll. 35–37, and 2.13.21 (pp. 242–43), ll. 80–95; also note the last year-name of Sîn-iddinam and the first of Sîn-eribam, both named for the building of the wall at Maškan-šapir (Sigrist 1990: 25–26).

[182] Dalton 1983: 165.

Conclusion

The comparison does not pretend to accuracy in absolute terms; yet still the results are telling. I have come to an almost identical estimate of labor-value (ca. 1.9 millon labor-days) for both products under study. Of course, the terms of the study are deliberately skewed: I have imagined an absurdly large city-wall and assumed the slowest work-rates, and set that result against a fancifully small area of farmland worked at fast rates with a good deal of important tasks omitted from the accounting (including the excavation of canals). But let us imagine we *could* establish a level-playing field; what would an honest accounting find? That barley entails twice the labor of the wall? Maybe four times?

No: the truly equalizing condition was that growing the barley crop was an annual affair, while the city-wall was essentially built only once, with a few episodes of rebuildings, repairs, and maintenance. Even if we were to follow our argument to its final, illogical conclusion, and assume that the three major (re-)building episodes we know of between 1912 and 1837 were full and complete rebuildings of the city wall, we would still find (for those seventy-five years) only 5.7 million labor-days spent on wall-building, against 142.5 million labor-days on barley farming. Thus even maintaining the fantastic terms of the study, institutional building work still only comes to something like 4% of the farming work—not more than a week of work compared to six months of farming in any given year—and the real figure would be even smaller (compare to the United States' annual 4.7%-of-GDP spending on its military).

This disparity of value indicates a truth which may seem counter-intuitive or even uncomfortable, but must be stated bluntly: monumental architecture was cheap and easy to build,[183] despite the fact that it clearly had the persuasive ability to convey the opposite because it was visible, public, and durable.[184] Meanwhile, the brutal, back-breaking labor in-

[183] Seeher 2007: 222–24, came to much the same conclusion: "Whether 900, 1000, or 1,100 laborers were at work on the walls is beside the question; what is important here is to demonstrate that the Hittites would not have needed to supply and sustain hoards [sic] of several thousand workmen to build their city walls."

[184] Nor should we be impressed by the many episodes of wall-demolition that took place during this era, *e.g.* Warad-Sîn against Kazallu (Year 2), Iaḫdun-Lim against Samanum (Frayne 1990: RIME 4 6.8.2 [p. 606]), Zimri-Lim against Mišlan and Samanum (Year "i"), Hammurabi against Mari and

vested every day in ancient farming was hidden away by its spatial and social dispersement, and its low-status in terms of political messaging.[185] The shell game of ancient agricultural states was to privilege attention on the monumental, to imply its political and social importance in (false) economic terms, and to re-valorize the community labor it marshalled as a festival of royal largesse put on *by* the state for the benefit of the people. It was a consummate political triple-deception, one we reproduce n scholarship when we attend too closely to the focus and claims of the institutional sources. Old Babylonian kings uniformly attached visible public happiness (rather than safety and use) as the primary value of corvée labor for civic work: "I had my people eat food of all kinds and drink abundant water"; "[I] caused rejoicing in my city"; "My workforce did its work amid plenty"; and so forth. Even if we dismiss this as rank propaganda, we still must take note of the *focus* of that propaganda: public joy rather than public safety or royal prerogative. [186]

The exposure of labor-value disparity and a consideration of seasonality and other process issues makes the point that labor-demands for building were in fact *so* small in comparison to farming that they expose some assumptions about its social and legal contexts as ridiculous. Would it even be *possible* to create a corps of "forced," "unfree" or "semi-free" laborers to toil under adverse conditions—for no more than one week a year? Would workers who had toiled for 150 days of the year in the dirt and mud to grow barley for state and bare survival choose to resent a few days of collective labor, in the company of neighbors and with the prospect of feasting and song? Should we really imagine teams of tens of thousands groaning under the weight of massive building blocks under the stern eyes of whip-wielding overseers, when the average work-

Malgium, Samsuiluna against Ur and Uruk (Year 11), *etc*. Were one to assume that Hammurabi's army was at least half the size of Larsa's 40,000 men, and an accepted 20 GÍN/day rate for earth-movement above ground-level, the entire wall-mass (2,246,400m^3) of both Larsa's rampart and fortification wall could have been dispersed to nothingness—presumably refilling the moat or fosse—in as little as eighteen days by the Babylonian forces.

[185] But note the preponderant use of CAD A/1 s.v. *alāla* interj., the "refrain of a [joyous] work song," in farming rather than building contexts.

[186] On the rhetoric of a visibly happy (working) public, see Richardson 2012: 42; cf. the Sumerian proverb SPC 3.92, É ^{d}EN-LÍL-LA PA$_4$-HAR ADDIR-ÀM: "Enlil's temple is a gathering(?) of wages" (ETCSL 6.1.03).

account text deals with teams of workers numbering four dozen men?[187] These prospects seems ludicrous once we look at them this way.

I can imagine the challenges to such a reconstruction from a number of directions. No doubt there are ancient historians who know more about the types of work I have discussed. From the vantage point of value theory, it could be argued that I have measured one incommensurable against another, that these use-values cannot really be compared, *e.g.*, that city-walls defended the very life of the *polis*, a use for which no "price" could or (morally) should be put.[188] From an econometric view, it could be argued that the unit of labor-time is itself flawed, because basic energy inputs in one human labor hour "can differ up to 100-fold."[189] Or one could make a theoretical objection that labor-time was no more inherently dependeable an index of value than wages or prices.[190] A semantic association of wages with "presents" and "rewards" may also be worth investigating further; what we perceive as work and remuneration may have been considered performances of social responsibility and gratuity. From the perspective of organizational dynamics, it could be maintained that institutionally-directed projects had a unique capacity to aggregate and organize labor to ends that atomistic, non-centrally managed projects could not; or that the efficient allocation of

[187] Fully quantifying this description is beyond the scope of this paper, but see, *e.g.*, Walters' (1970) texts nos. 102, 103, 107, 108, 114 and 115, numbering 65, 45+, 165, 111, 122, and 169 workers, respectively (cf. text 98) — and especially texts 117–118, which cover 27 days of gang-labor averaging 46 men per gang. Walters concluded, *ibid.*, 152, that crews of workers could range from one to 32 men, but that "6 could be regarded as an average." Kienast 1978: 156, listing 90 workers; UET 5 721 (66 workmen in five gangs), and 722 (six gangs averaging 59 men per gang). Though labor-day estimates might run into the thousands (Walters, 1970: 149), we obviously need not imagine this implied thousands of workers.

[188] Frayne 1990: RIME 2.13.20 (p. 240), Warad-Sin on the city-wall of Ur: "… at whose base the black-headed people multiply (and) are able to save their lives — I built its great wall." One could, of course, make the same argument about the use-value of food; in 1763, it was the food-stores of Larsa that saved the lives of its citizens, and not its wall. Conversely, one can note the ironies of the "Lamentation Over the Destruction of Sumer and Ur" which presents the grim scene of breaching forced using the city wall to attack the defenders within, ll. 406–407b: "In Ur (people) were smashed as if they were clay pots / Its refugees were (unable) to flee, they were trapped inside the walls …"

[189] Giampietro *et al.* 1993: 231.

[190] Janssen 1988 14–15 came down heavily in favor of use-value as a determining factor for prices.

resources by bureaucracies could streamline and transform productivity; or that competition between managers had similar effects.[191] On the worker side, it could also be argued that the objectification of both labor and laborer by administrative processes resulted in something very like a change in value itself; as Englund put it, "It is important to realize that these workers, who in the accounts are converted to workdays, really are dealt with in parallel fashion to the material they are to process."[192] All these considerations deserve more study in their own right.

But they cannot erase the fact of a massive disproportion of one type of labor to another. Proportion is by itself determinant of mode of production, with important implications for the social and political meaning of different types of labor. Farming was simply twenty-five times more work for the community than temple-building, palace-building, or city-wall building—and no market condition, no administrative system, no rhetoric would do anything to significantly alter that basic fact.[193] That being the case, a new conceptualization of mass labor must not only be articulated as a performance of polity-building in social terms as is now being done, but in economic terms as well. Given the relatively light demands of building labor, the participation of the community, and the state's efforts to invest such occasions with an atmosphere of feasting and plenty, we have to lay aside the presumption of mass labor as a disutility and consider it something closer to a prebend, an opportunity, a festival of inclusion and identity. It is not at all a necessary deduction that the absence of coercion meant that communitarian consensualism was based on pure altruism and principles of reciprocity, rather that it could be produced by incentives such as feasting, social approbation, and the production of group membership. That being the case, labor itself was perceived

[191] The various authors cited above comment on these organizational dynamics in passing: Walters 1970: 148–49; Hunt 1987: 161–62, 167; Fales and Postgate 1995: 16f.; cf. Wright 1969: 4 on "labor redundancy" in hierarchical/complex systems. An excellent case study of labor-organization is Moseley's (1975), on the pre-Columbian Moche Valley, esp. 191–93.

[192] Englund 1991: 258, 272; Walters 1970: 151–52 also noted that workers could be delivered (MU-TÚM) just like other commodities.

[193] Among other things, power levels in pre-industrial societies were limited to a low range. Giampietro *et al.* 1993: 239–41 point out: "The only process of conversion available … is the physiological conversion of food into applied power by human muscles." Shortages could be coped with only by strategies of changing the population structure, animal power, and a limited range of exosomatic (i.e., technological) instruments.

to have social, political, and economic values (whether they were "worth it" is quite another question), and labor cannot be isolated as a disutility; indeed few ancient sources represent it as such.[194] Beyond this, I have shown that a proportional look at the scope of the economy in its entirety is not a utopian idea, especially when the medium of that analysis maintains fidelity to ancient formal methods; and that substantive approaches need not (indeed, should not!) avoid formal econometric analysis. Nothing like a full formal analysis of the substance of value could be produced for any society, and Mesopotamia is no exception. But it is possible to achieve some perspective in terms of the largest components of the economy by comparing products through equilibrium pricing, through the determination of value-forms valid within their original contexts.

[194] Recent research into the so-called "IKEA Effect" has shown that there is a perceived increase in the valuation of products, both "utilitarian and hedonic," when they are self-made: see, *e.g.*, Norton *et al.*, 2011.

Appendix 1 (for use with Figure 1)

Notes on the reconstructed segments of the Larsa city wall[195]

Feature	Comments
Segment A	Running away to the southwest of Gate B56 are two sections of preserved wall, parallel to one another but spaced apart at 11 m, each no less than 10 m thick. It is proposed that segments A and I probably extended to insect one another at a point to the north of Z42, near the edge of the tell.[196] Length: 500 meters.
Gate B56	Situated atop a butte lying somewhat outside the main tell, composed of two piers of unequal size; the passage is 3.6 m wide and 19 m deep. The bricks in these features appear to match others used in Nūr-Adad's time, and so this feature may date to the 1860 rebuilding; but it also includes some types of bricks found in other structures, including B2, B15, B17, and B53.[197]
Segment B	Hypothetically connects Gates B 56 to Gate B25; of this segment nothing remains on the ground. Length: 350 meters.
Gate B25	A set of double gates at the north-central edge of the tell. The exterior, larger gates were formed by two 7×10 m piers set apart to allow a passage 8 m wide; a smaller "pincer-gate" in the interior was substantially narrower. All parts of this feature were made with baked brick. The gate was clearly one of the main entrances to the city, with two of the longest sections of street running directly to it, one (R1) running more or less directly south to the Ebabbar and the Nūr-Adad palace; the other (R2) running south-easterly through a neighborhood of buildings in the northeast quarter of the city (the "Quartier d'Habitat").[198]

[195] This reconstruction is mostly based on the report of Huot 1989 *et al.*

[196] On feature Z42, see Suire 2003.

[197] *Ibid.*, 42–45, 49; such bricks also match features B50 (in the monumental quarter), Gate B56, and B58, at the southern extremity of the tell. These "Nūr-Adad" bricks (Huot's "group 3" bricks, 34.5 × 36cm) are the smallest but most homogeneous type of brick found at the site. Note Birot's (1969: 47–48) Text 13, dated Hammurabi 38 and provenanced to the Larsa region: the text is an order for pine wood for the construction of a gate ca. 3.5 m wide, which would obviously fit this gate opening rather nicely.

[198] See Calvet 2001 on the layout of Larsa generally.

Segments C–E Few features lie between Gates B25 and B1, but the wall connecting them cannot have been straight, since it would have cut right through the residential neighborhood. Two small sections of wall were found by the excavators at points Z27 (north of building B23 and lying a little outside the tell) and Z10 (due east of B22 at the tell's edge). A crude arc formed by points B25–Z27–Z10–B1 would form about a quarter of the entire city wall, consistent with the assumption of Huot *et al.* 1989 that the wall more or less conformed to the edge of the tell.[199] Lengths: 420, 330, and 680 meters, respectively.

Gate B1[200] Made of the same type of Nūr-Adad-period baked bricks as B56, Gate B1 seems to have been built atop the ruins of a smaller, earlier gate, with an extremely narrow passageway of not more than a meter. The new passage was widened to about four meters between two massive towers each measuring 12×18 m. Presumably this formed the main eastern entrance to the city, although in this case the nearest street (R3) is much smaller than (R1) and (R2), and terminates at a point along the wall about 125 m to the north.[201]

Segment F The most prominent perimeter feature, the "Chameau" was thus built on top of the rampart wall, and so plainly forms the connection between Gates B1 and B 36/17. Length: 690 meters.

Gates B36/17 These twin gates sit just a few meters from each other at the SSE edge of the tell. Gate B36 is formed by two U-shaped towers roughly 5×5.5m each; the passage between them is 2 m wide and 15 m in length. This pincer-gate is situated on a low rise at a height barely higher than the (remnants of the) top of the rampart. Gate B17

199 Huot *et al.* 1989: 40, "a peripheral band … delimited by the zone of construction;" an alternative hypothesis of the excavator, however, was that the wall was actually even bigger here, with some other traces suggesting repaired wall substantially beyond this area, around the so-called "Rue 5," and enclosing more structures. Unfortunately, since this road does not appear on Huot's plan, it is impossible to accommodate this conjecture in my reconstruction.

200 This gate is the same one excavated by Parrot (1933: 177), labeled "QX."

201 Huot *et al.* 1989: 32, 40–41.

	is a much larger affair: here the towers were 16m square, with a grand 10m wide passage, opening onto street (R6). The bricks of B17 differ from the "Nūr-Adad" type, and are similar to features B2, B15, B17, B53, and Gate B56.[202] Smaller wall segments adjacent to the gate likely formed a series of terraces and "anchor walls" that improved the field of fire, with parts of the wall jutting out from these gates to points Z12 and Z29.[203]
Segment G	The building B57 anchors this wall segment by its alignment to the wall at exposure Z12, and Huot guessed that it extended along a number of similarly aligned buildings at least as far as the small structure B58 at the extreme southern tip of the tell.[204] Length: 480 meters.
Segment H	Largely a matter of conjecture: that a wall enclosing the buildings in the southwest corner of the tell, extending westward from near B58, might have passed through feature Z36 to intersect with Segment I.[205] Length: 620 meters.
Segment I	Centered on probable remains of excavated city wall—a segment of butte 20m thick and running for around 50 m in length; the excavators suspect it may locate the remains of a gate (Z43).[206] The position of the wall is also marked by a line of kiln slag.[207] Length: 1,130 meters.

[202] *Ibid.*, 42.
[203] *Ibid.*, 47 fig. 17; Burke 2008: 83 fig. 9.
[204] *Ibid.*, 50.
[205] See Suire 2003: 11 fig. 1.
[206] *Ibid.*, 10–11, 13, and fig. 1.
[207] Huot and Calvet 2003: 10–11; another straight line of slag and ash was also noted to the west of Segment I at feature Z20, but unassociated with any brickwork. It lay further out from the tell, and ran in a NNE-SSW direction less likely to join Segments A and H to any purpose—unless it was to enclose feature 32, a three hectare necropolis, probably in use from the fourth to the first millennium BC (*ibid.*, 13).

Appendix 2 (for use with Table 1)

Notes on wall-building labor costs

- **Rampart excavation and heaping-up**: The normal term for excavation work was SAHAR ZI-GA; its complementary activity was KA-ALA SI-GA, literally only "opening (made by) the hoe" but, in context, the piling-up of the earth produced thereby.[208] Earth-moving rates for moving dirt are among the best-attested and most consistent work-rates in the cuneiform record, usually at 10 GÍN (3 m^3) per man-day for canal excavation work, though rates as fast as 20 GÍN per man-day are known for work at the uppermost-levels of the ground.[209] Unlike brickwork, Syro-Mesopotamian ramparts show no evidence of having required the mixing of earth with straw or stone, or of forming-work as *terre pisée*, *i.e.*, beaten, molded or packed down.[210] Thus "heaping up" was relatively uncomplicated, if heavy, work; consider that at the siege of Larsa, Hammurabi assigned only 450 men to the task of heaping up a siege ramp out of earth;[211] such work could be carried out piecemeal, by relatively small groups of workers over time. The following assumptions are built into the calculation: the proximity of the excavated *ḫirītum* to the rampart (SA-DU), thus no additional transport costs[212] and the binding of the two tasks as one;[213] and that earth for the ram-

[208] Heimpel 2009: 239–40, discussing the difficulty of the term; Wright 1969: 18–19.

[209] *Ibid.*, 285; Goetze 1962: 15; Walters 1970: xix; Englund 1988: 169 n. 42; Burke 2008 144f., with literature; cf. Wright 1969: 20; Charpin 1989: 197, employs a slower metric of 7.5 GÍN per man-day. At a weight of ca. 1202 kg per 3 m^3 earth, the weight of this earth moved is about 3606 kg per man per day.

[210] Englund 1988: 169 n. 42 proposes a rate of 3.75 GÍN of pisée wall construction per man-day, reflecting the rate of actual work in four textual exemplars—but it is archaeologically unattested for city walls. See Burke 2008: 50–51: notwithstanding, many such ramparts have revealed (unmixed) *layers* of material other than earth, *e.g.* gravel, testifying "to the unsuitability of a rampart composed solely of earth or soil."

[211] ARM 26/2 378 and 379.

[212] Heimpel 2009: 285, documents some of the accounting devices used to alter work rate projections when distance (*nazbalum*, "carriage") was at issue.

[213] The combined task probably lies behind ÉG SI-GA, the piling up of levee banks (Civil 1994: 115, 121); it should not be confused with the deeper, heavier work of dredging canals by basket (see *e.g.*, Walters 1970: 96 n. 14, Text 70 on *tupšikkum*, "forced labor"). See also Kingsbury 1977: 15 n. 4, commenting on soldiers guarding workers moving É.DURU$_5$.Ì.SÀ, "wet earth": such work was probably extremely unpleasant and reserved for prisoners or other truly forced laborers.

part was not obtained by digging purposely deep pits: I use an average of 10 GÍN per man-day to arrive at the 644,800 labor-days embedded in 1,934,400 m^3 of heaped-up earthen rampart.

- **Site clearing**: Mostly absent from Old Babylonian records, clearing building sites of old structure and rubble is nevertheless well-attested in Ur III and Neo-Assyrian[214] texts, though without identified work rates. With Heimpel,[215] one could assume a rate comparable to clod-clearing, *i.e.*, 45 SAR (1575 m^2) per day of surface area in agricultural work. Applied to the ca. 10m wide top of the 5.2 km rampart wall, this would produce a labor cost of a mere 33 days. However, I assume that the process included both minor demolition of existing brickwork and clearing, and compared it to clearing rates for more difficult terrain,[216] so I have lowered this rate to 10 SAR/day, to arrive at 149 labor-days.
- **Straw, Earth & Water**: The amounts of straw and earth in molded bricks is crucial to calculating many of the subsequent tasks. Oates was informed that every 100 bricks for the Tell Brak dighouse required 60 kg of straw, *i.e.*, about two standard American bales of hay (total 0.3 m^3). Unfortunately, Oates did not inform us of the size of the dig-house's bricks. We know, however, that the total size of the dighouse was 116m^3. If we assume a standard of 720 bricks/sar (18 m^3), then we can estimate that 100 bricks had a mass of 2.5 m^3, only 0.3 m^3 of which was made up of straw, about 12%.[217] The estimated amount of materials for 312,000 m^3 of brick wall, then comes to 274,560 m^3 of earth (by weight, 330,021 metric tons, at ca. 1,202 kg/m^3) and 37,440 m^3 of straw (by weight, 7,488 metric tons, at ca. 200 kg/m^3). I assume that not more than 25% of mixed earth above the finished (*i.e.*, dried) brick volume would have been water, commensurate with modern adobe brick-making practice. Oates' conjecture that ash was included in the Tell Brak bricks is not corroborated by ancient texts, and is so excluded; likewise, any suggestion of bitumen mixed into the bricks.[218]
- **Straw harvesting**: Englund gives a normative rate of 1 GUR (=.3 m^3) of straw harvested per man-day.[219] The decay of straw was probably

[214] Parpola 1987: 112–13.
[215] Heimpel 2009: 240; Civil 1994: 86.
[216] Goetze 1962: 15–16 cites an Ur III rate for clearing thorn bush at only 10 SAR/day.
[217] Cf. Seeher 2007: 38 who used less than 4 % straw.
[218] Oates 1990: 388–89.
[219] Englund 1988: 171, n. 45.

the single largest reason for the eventual crumbling of brickwork, but the material was necessary to providing matrix to the structure, and its durability was greatly improved by modest amounts of maintenance.[220]

- **Straw transport**: My presumption (see below) is that brickmaking took place at a number of locations both on and offsite; accordingly, straw was carried to a number of local production centers. Both Ur III and Old Babylonian texts show that straw was normally transported by boat, but sometimes hauled overland, perhaps by sledges.[221] It is impossible to know what distances were involved, and no normative rates for these procedures exist. At a minimum, however, we could assume that a worker could portage at least as much straw by weight as he could excavate earth (10 GÍN of straw, or 3606 kg) in a day. At 200 kg/m^3, that works out to the daily rate of about 18m^3 (=1 SAR).
- **Excavation**: This rate is identical to that used for procuring earth for the rampart wall; it assumes earth procurement at the site of brick production.
- **Pouring Water**: It is assumed that it was far easier to either produce bricks near available water or to dig an extension canal to a building site than to haul water to it. Yet it is not clear that the provision of water was not a task already subsumed under the heading of "mixing earth;"[222] nor that the excavated earth was not already wet. Yet it may also be that *duʾʾum* (a term whose etymology Heimpel expressed some puzzlement towards) alludes to the further "darkening" (> *daʾāmu*), as the addition of water to already damp earth changed its color. For our purposes, we will assume that drawing and pouring water was a necessary task. At 25% above finished volume, I assume 78,000 m^3 (78,000,000 liters or kilograms) of water drawn for the bricks of the Larsa fortification wall. I assume that weight was once again the bounding factor for labor inputs,[223] and a worker could be expected to portage about 3600 kg/day at close range (in practical terms, this implies a more or less constant rate of carrying about 7.5 kg/minute through an eight-hour workday).
- **Carrying earth**: The labor costs for this activity more or less reduplicate excavation work. Earth was carried in baskets holding a dry weight of

[220] Oates 1990: 388–89 and Gasche 1981: 44–47 and n. 7; cf. Seeher 2007: 221, who cites a much faster rate of 200–500 kg (1–2.5 m^3) per day.

[221] Heimpel 2009: 304–308; Walters 1970.

[222] Heimpel 2009: 241–42.

[223] Civil 1994: 69 refers to a carrying-jar with a capacity of about 30 liters.

about 13.3 kg or a wet weight of 22.5 kg,[224] apportioned into batches for mixing. Seeher cites a study for carrying earth across a 100 m distance at 0.35 m^3 per hour, or 2.8 m^3 for an eight-hour day.[225]

- **Mixing earth**: Since rates for this task are usually subsumed under brick-making as a single activity, it can be difficult to break it out individually. Research into traditional methods of mixing emphasizes manual mixing (actually, by foot) as preferential because small rocks can be removed and fine consistency achieved. A single worker might effectively process 0.23 m^3 every 90 minutes or so; assuming something like an eight hour workday, we arrive at a working rate of 1.725 m^3 per labor-day.[226] This rate is applied to the full mass of the brick wall (*i.e.*, both straw and earth together).
- **Molding bricks**: Assuming the use of the standard 720 brick per SAR, we anticipate the molding of 12,480,000 bricks total.[227] A number of known rates can be derived from either rations keyed to normative rates[228] or records of actual production,[229] all of which fall between 216–245 bricks molded per man-day. An Old Babylonian text from Kisurra, however, calls for 360 men to mold 10 IKU of bricks in five days.[230] Assuming 72,000 bricks per IKU, this rate comes out substantially higher at 400 bricks/day, but the tone of the letter seems to acknowledge this rate as an accelerated one: "The work of an entire month must be done in five days! You are required not to be indolent!"[231]

[224] Baskets probably also aided in standardizing proportions of ingredients (Powell 1990: 490). Why Heimpel (2009: 250) assumes water was added to earth before it was carried is unclear. Note large deliveries of baskets in UET V (519, 642–663) which may reflect preparations for institutional building activity.

[225] Seeher 2007: 219–20.

[226] Keefe 2005: 62–64; cf. Seeher 2007: 219, citing a faster rate of 0.5 m^3 per hour.

[227] If such numbers seem daunting, compare with a single delivery for a canal wall cited by Dalton (1983: 138), calling for 1.3 million bricks, or Jacobsen's (1982: 62) discussion of hundreds of thousands of liters and millions of bricks used in Early Dynastic building projects. The best-known surviving bricks from Larsa, *i.e.*, those with royal inscriptions, were substantially smaller (c. 2700 bricks/SAR) than the bricks assumed by mathematical and accounting texts (720 bricks/SAR).

[228] Heimpel 2009: 223–24.

[229] Walters 1970: 127–28 (Text 101) and 133 (Text 109).

[230] Kienast 1978: 143–44 (Text 154).

[231] A preceding task, wooden mold-making, is not folded in here. Paulus (1979/81: 130) hazards that molds might have been kept as the property of individual gangs from year to year; cf. Moseley (1975: 194) on Peruvian work-teams: "The association of segments, brick symbols, and soils [in the bricks] implies that makers' marks identified specific groups of individuals who not only produced adobes but transported them to the construction site…"

- **Baking bricks**: It is my assumption that most bricks of the fortification wall were sun-dried, and only a small proportion actually fired; that proportion seems reflected in the survival of only specific features, especially the gates. Certainly no more than 10% of the wall remains (and probably less), and I have assumed this mass for the proportion of fired bricks (*i.e.*, 1,248,000 bricks). It is clear that such quantities of baked brick could be produced at one time: one large inventory related to the construction of a canal wall near contemporary Lagaš, lists 512,640 baked bricks among a total consignment of 1,310,320, roughly 39% of the whole.[232] I will assume that it did not take more labor to fire bricks than to mold them in the first place.
- **Carrying bricks**: Most bricks were not made on the building site. For the Larsa wall, there is significant evidence to suggest brick production both at Larsa[233] and elsewhere,[234] near watercourses, and the numerous brick-delivery texts from the Walters[235] and Heimpel[236] volumes attest

[232] Walters 1970: 125–26 no. 99.

[233] A number of kilns were identified by Huot *et al.* 1989: 34–36, 38 at Larsa; these may have had several purposes (*e.g.*, for ceramics, metalworking, or cooking), but three ovens out on the plain were associated with deformed, cast-off bricks: F10, F11, and F15. Similarly, at Ur, most surviving exemplars of Warad-Sîn Year 10 bricks (Frayne 1990: RIME 4 2.13.18 [pp. 236–37]) were found at the easternmost edge of the tell.

[234] Of two stamped brick exemplars of Gungunum's Year 21 inscription, one was found at Larsa, and one at Umm al-Wawiya, a small site between Larsa and Uruk (Frayne 1990: RIME4 2.5.2 [p. 117]). Adams and Nissen (1972: 54, 217) proposed to identify the site (no. 439) as Enegi, and concluded that, "since traces of defensive systems are rather rare in connection with settlements of this size … we feel that it may be a town on the border between two city states." However, since there is not, in fact, any trace of coherent military architecture here—just ten loose fragmentary bricks of Gungunum and Amar-Sîn—it seems to me to make more sense to think of it as a specialized production site. Compare with other specialized production sites in the Larsa hinterlands, *e.g.* sites 428 and 429 (ceramics production, *ibid.*, p. 236). Frayne (1990: RIME 4 2.5.2 [pp. 117–18]) certifies that the Gungunum inscription is, in fact, the one for his Year 21 building of the Larsa city wall (l. 9: "in the course of one year, I made its bricks"); cf. Birot 1968: 242 col. 2. See also Dalton 1983: 90, on the possibility of brick-production at Dunnum; compare also with Lanfranchi and Parpola 1990: 206–210 and nos. 291 and 296.

[235] *E.g.,* Walters 1970: 96 and nos. 17 and 21 (no. 70); *ibid.*, 135 (no. 112), and 140 (nos. 117–19), specifying men carrying bricks (ERÍN LÚ-SIG$_4$-ÍL-ÍL) and boatmen (ERÍN LÚ-MÁ-LAḪ$_4$-LAḪ$_4$).

[236] Heimpel 2009: 161–62, citing thirteen texts listing the delivery of almost 300,000 bricks (more than 1,500 m^3).

to off-site production as a widespread practice.[237] Unfortunately, the distance and multiplicity of production sites precludes any normative value. In the absence of this, we must rely on an anecdotal example. Walters' texts 112 and 113 provide both a number of men (six) delivering quantities of brick by boat. In addition to the six workers, we must count an overseer (one Mr. Sasiya) and, per Walters' text 118, a boatman. Thus, eight men were required to deliver the (smaller) delivery in text 112 of ½ SAR of bricks, providing our labor rate of 3.75 GÍN/day (or 1.125m^3).[238]

- **Building**: The task of bricklaying and working with mortar (NAGÀ/*esittu*) is subsumed under the rubric ŠU DÍM. Following Heimpel, I understand the term to include associated tasks such as "handing up bricks" (SIG_4 ŠU DÍM-MA SUM) and "lifting earth" (IM Ì-LI-DE_9, *i.e.*, as mortar). It is too difficult to incorporate here a principle the ancient accountants understood, namely that the work pace slowed the higher the work on the wall had to reach. I derive the all-important rate of bricklaying on one simple principle: that, having separated out all other tasks related to preparing the site and the bricks, bricklaying could not have proceeded at a rate *slower* than the overall rate cited by Mallowan for the Tell Brak dighouse.
- **Delivering reeds**: A known rate of 2 bundles of reeds gathered per man-day, each bundle representing about 1m^2 when laid out.[239] As determined below, the total number of reeds required would be 936,000m^2; also known is the consistent makeup of one reed bundle (SA-GI) per 1 m^2 of finished matting.[240] Reed-cutting was almost always accounted for in terms of area cleared rather than bundled product, but TCL 5 5675 (Umma, AS 04) gives two figures averaging 26 SA-GI per day, or 26 m^2 per man-day.

[237] See also Kienast 1978: Bd. 1 1–5, positing that brick production at Kisurra was for Isin, 20 km distant; and examples in CAD L s.v. *labānu* A 1b: "BE 9 51 and Watelin Kish 3 pl. 14." Of course, the actual building of barges is not folded into this calculation; see Englund 1988: 169 n. 42 for a boat-building rate between 10 and 15 workdays per GUR-capacity.

[238] cf. AbB IX no. 132.

[239] Englund 1988: 171, n. 45.

[240] Goetze 1948: 182; Stephanie Rost (personal communication) has directed my attention, however, to Sallaberger 1989 and Waetzoldt 1992, who argue for slower labor rates than Goetze assumed; their observations would tend to inflate some of the labor costs for some of the reed-related tasks discussed here.

- **Laying reeds**: Englund cites an Ur III period rate stating that six 1×1 m reed mats could be produced in one man-day, and Heimpel cites two GARšana texts which reflect exactly that same day-rate (6 m^2/day).[241] Though some excavated structures reveal the use of GISAL-mats every fourteen or eighteen courses interspersed in the brickwork, I will assume the low (*i.e.*, more labor-intensive) rate of every five courses. For a wall 6 m high, and assuming a brick height of 6 cm, that would require a course of reed mats every 30 cm, or 18 courses of reed matting (excluding the very bottom and the very top of the wall). Each course would require 52,000 m^2 of GISAL-mat (for a wall 10 m thick and 5200 m long), *i.e.*, 936,000 m^2 of GISAL-mat at the 6 m^2/day rate.
- **Trimming reeds**: This activity has no known directly-attested work rates, but the slowest rate for trimming (horizontally, one assumes) is about 8 SAR (288 m^2) per day (SNAT 457, Umma ŠS 02), a rate applied here for the inner and outer façade of the wall (total 62,400 m^2).
- **Plaster production**: I assume a layer of plaster 1 cm thick across the façades and the top of the wall, which should come to 1,144 m^3 of required plaster. I assume this work involved processing gypsum: crushing it to powder from its crystalline form; heating it to a low temperature; and combining it with water to form "a material that sets and finally becomes very hard" and water-resistant.[242] I have thus assumed a production rate half as fast as that for mixing earth.
- **Plastering reeds**: We encounter some difficulty in that the activity of "slapping on" plaster, as Heimpel translates it, is neither an attested work rate, nor is it easily likened to some other type of work. For heuristic purposes, however, I cannot imagine that this work went more slowly than the act of weeding, which was carried out at a rate of 10 SAR (360 m^2) per man-day on 936,000 m^2 of interleaved reed mats.
- **Wall plastering**: See above; the same rate would be applied for plastering the inner and outer façades and top of the wall (and area of 114,400m^2).[243]

[241] Englund 1988: 169–70 n. 43; Heimpel 2009: 258–59.
[242] Lucas 1989: 76–79.
[243] Kienast 1978: Text 155.

Appendix 3 (for use with Table 4)

Notes on farming labor costs

- **Canal clearing:** The first task of any season was the clearing of the small canal branches below the level of institutional responsibility[244] in anticipation of a pre-plowing irrigation (the labor cost of which is included below under "Irrigations"). One way to try to measure this is by the assumption that every field was associated with a small ditch regulated by a water-distribution gate (KÁB-KU_5); Hunt shows the volume of the ditches might be around 499 m^3 per one hectare of land to be irrigated.[245] The width and depth of these was relatively stable (ca. 5 m wide and 2.5 m deep), while lengths varied according to the size of the fields, but averaging about 40 m per hectare. I have assumed that exacavation work to dredge 10 cm of silt from them would entail the removal of 20 m^3 per hectare (*i.e.*, 164,460 m^3 in all) at the 10 GÍR (3 m^3)/day rate. Stephanie Rost, however, has pointed out in a personal communication how problematic it would be to associate KÁB-KU_5 (or KUN-ZI-DA) water control devices exclusively with non-institutional use, since much institutional work (including SAḪAR ZI-GA/SI-GA/ŠU-TI-A, and KIN Ú SAḪAR-BA) also used them. Having said that, the resulting costs here assume nothing of maintenance of much larger canals, and is heuristically valid as a *minimum* cost.
- **Plowing:** Some sources suggest three plowings (*FI*, ll. 30-34: once each with the ^{giš}BAR-DILI, ^{giš}APIN-TÚG-$SAGA_{11}$, and TÚG-GUR plows), while others[246] suggest only one. Michael Jursa has suggested to me that second plowings were only necessary to open up new fields (*i.e.*, new to cultivation, coming out of fallow, or with difficult soil); but cf. AbB IX 151, which discusses fields "that have been harrowed, broken up, *ploughed three times* [emphasis mine]; fit for seeder-ploughing and soaked with water." I will split the difference, assuming that half of the fields needed both a "soft-soil" and a preparatory plowing for one reason or another. At least three persons were required for the job.

[244] See especially Rost 2011 on the variability in labor organization for irrigation work. AbB II 147 gives a window onto the delicate line between collective versus state responsibility for labor: an overseer writes requesting more workers after the workmen of a village are unable to clear their local canal; cf. Walters 1970: 14.

[245] Hunt 1988: 195 Chart 2; on the reading KÁB-KU_5, see Selz 1989.

[246] Englund 2012: 451–52.

Ur III documents employed rates of between 75–82 SAR/day,[247] but I have used a faster rate of 1 IKU/day.

- **Harrowing:** This task also required three people, though often one of these was a boy "employed" to sit on the harrow to add weight. The harrow moved much faster than the plow, sometimes as fast as 6 IKU per day, but normally with a rate of 5 IKU /day, sometimes sinking as low as 4.5 IKU;[248] I will use the 5 IKU rate.
- **Clod-clearing:** Rates as low as 8–10 SAR/day are known from Umma documents; most common are 10–20 SAR/day,[249] though rates as fast as 45 SAR/day are also known.[250] I have adopted a quick rate of 20 SAR/day.
- **Smoothing:** The last stage in field preparation would have been to smooth or level the remaining uneven places left by the previous tasks. Field-leveling was a slow, painstaking business, usually at a rate of 10–12 SAR/day;[251] I will use the quicker rate of 12 SAR/day.
- **Furrowing and sowing**: I will assume that all fields were planted with a seeder-plow, though this was likely only available to a minority of cultivators; many would have used a slower and more labor-intensive method of hoe-planting at 10–20 SAR/day. A light seeder-plow would have required either one or two oxen (I have assumed one) and three men working, covering up to 2 IKU/day.[252]
- **Hoeing:** *i.e.*, covering seed. Whatever the availability of seeder-plows, covering seed had to be done by hoe. Attested rates range between ½ and 10 (but most commonly between 5–7) SAR per day.[253] I will assume the fastest known rate of 10 SAR (353 m^2) per day.
- **Weeding:** The growing season for barley lasted four months; weeding is heavily correlated to higher yields. I have assumed three weeding operations at four-week intervals within the four months. Known rates

[247] Civil 1994: 75–77.
[248] *Ibid.*, 77.
[249] Englund 1991: 265; and the CDL Wiki page on attested work rates, in particular here for NÍG-GUL work (hereafter: "CDLI work rates Wiki"): http://128.97.154.151/wiki/doku.php/ur_iii_equivalency_values.
[250] Civil 1994: 86.
[251] *Ibid.*, 78.
[252] Maekawa 1984: 82; Civil 1994: 75–76, 83; Jacobsen 1982: 59–60.
[253] CDLI work rates Wiki; see also Civil 1994: 79–80, adducing 128 examples of hoeing rates, averaging 5.2 SAR/day, and noting the difference between AL DÙ and AL AK work.

range between 10–20 SAR/day, but the faster rate for Ú ZÉ-A is better attested; SIG_7 normally refers to reed.[254]

- **Irrigation:** This task is much less standardized than others and difficult to assess. Central bureaucracies were mostly involved in the construction and maintenance of irrigation works, not in the operation of the small feeder canals used for actual individual inundations.[255] In principle, the inundation of individual plots seems easy work: one opens a sluice, the water pours in, and one closes it. Civil, however, details some of the types of work associated with controlled flooding, and argues against seeing the "workmen as passive spectators": there were berms, dams and outlets to be built, quaternary channels to be prepared, and equipment to be manned.[256] Stephanie Rost (personal communication) has pointed out the continuous vigilance required to guard against levee breaks and the wasteage of water, including during night-time; a commonly-used term associated with inundations, A-DA GUB-BA ("stationed at the water") may refer to this kind of general watchfulness or a more specific task.

  I have used the average of two methods to estimate the labor-value for inundations. First, I followed van Driel in assuming 1.2 ha. as an average-sized plot (6,853 notional "plots"; cf. Rothman, who assumes 5 ha. plots[257]). Each plot required three men working each of three irrigations following weeding, plus a preceding irrigation prior to plowing; a fourth man was necessary to work any relevant equipment (sluice, *shaduf*, *etc*.) and supervise adherance to water-rights procedures.[258] This method gave 109,648 labor-days. Second, I followed Maekawa, who documented five irrigations of (at their largest) 8.15-IKU plots at Lagaš (numbering 2,859 plots); each involved five men, presumably over the course of a growing season; this gives the lower figure of 71,475 labor-days.[259] The figure on Table 4 (p. 294) is the simple average of these two rates.[260] Neither the van Driel nor the Maekawa model includes any labor costs from preparatory canal digging or maintenance.

[254] Englund 2012: 450.
[255] Hunt 1987: 173.
[256] Civil 1994: 68; see Rost and Hamdani 2011 on traditional dam construction.
[257] Rothman 1994: 160, 163, fig. 5; his assumption seems to be drawn from his reading of TCL 10 133, which document institutional plots at Mašum and Nūr-libi.
[258] Van Driel 2002: 86.
[259] Maekawa 1990: 127–28 and 141, Table 6.2.
[260] Incidental evidence might come from Walters 1990: 149, Text 24, which details "irrigation work" involving "60 workers (on every) 2 BUR"—but the

- **Guarding crops:**[261] Characterized by what we might think of as "heavy looking on," it seems difficult to acknowledge these as labor inputs. But crops were subject to predation by birds, infestation by insects, trampling by cattle and, at a certain point, theft by people; certainly the concern is echoed in the ancient texts. Assuming again the average 1.2 ha. plot size and a 120-day growing season, I acknowledge that this was hardly a full-time job, and might have been done by a young boy. Notwithstanding, even assuming that only an hour of the workday (⅛ labor-day) was devoted to this activity by someone over the growing season, the labor-inputs were substantial.
- **Harvesting:** One of the best documented activities of Babylonian antiquity, there were two ways to account for labor inputs: one was by field area, the other by finished harvested amount. Reaping (ŠE-GUR$_{10}$) ranges between ½ and 1½ IKU/day; a volumetric 1 GUR/day rate is also attested.[262] These rates give very similar results in terms of labor-time. At the volumetric rate, we come to 21,999 labor-days; at the areal rate, we get 23,305 labor-days. I will use the quicker rate here.
- **Sheaf-binding:** Working behind the reaper were two other men, a sheaf-binder and a man "to arrange the cut handfuls of grain before the latter" (*FI* ll. 74–80, one man as the sheaf-binder and another to "apportion the sheaves"). Assuming these men kept pace with the reaper, they also worked at a rate of 1 IKU/day.[263]
- **Bringing-in:** No attested rates are known for this activity. I have to assume that the delivery of sheaves to the threshing-room floor could not have entailed any less labor than binding them in the first place, and so I use that estimate as a minimal cost.
- **Threshing**: Attested rates for threshing ran well behind the pace of the bringing-in, at an attested 4 BARIGA (240 liters)/day. Two men were required, one to thresh and another to turn and shift the sheaves (what the *FI* calls "moving the grain around").[264]

nature of the work described is not clearly irrigation (the work is just called KIN; cf. Text 31, where KIN refers to canal excavation, not inundations), and the information is thus undependable.

261 For this and subsequent tasks, as well as others not considered here, see Hillman 1985: 5–11, steps 12–30.

262 Powell 1985: 9 and n. 13; Civil 1994: 90; Englund 2012: 449; CDLI work rates Wiki.

263 Civil 1994: 91 understood a 1 GUR/day rate for "stacking sheaves," but that total is not so different from the first.

264 Englund 2012: 449; Civil 1994: 95.

- **Winnowing:** Unlike other grains, barley requires only one winnowing;[265] an attested rate is the same for threshing, requiring two men for the operation.[266] A second threshing of leftover straw was a normal procedure, but would have gone faster, perhaps at twice the speed, so I count 1.5 operations.
- **Transport:** This is a highly variable labor cost, dependent on both equipment (sledges v. boats) and distance. In bulk, however, transport costs are well represented by manifests documenting the cost of porters, their drinks (*maštītum*), and boat hires. As a sample, six such Larsa manifests (YBC 6231 and YOS 5 168, 169, 182, 185 and 209) together record 3,510 GUR moved to storage. From this "capital" (SAG-NÍG-GUR$_{10}$), 147.4.0 GUR was expended on ship hires, 18.0.2,6 on porters' wages, and 10.0.5,8 on *maštītum*. 52,814 liters of grain was thus the "cost" of moving 1,053,000 liters of grain, a stable 5% rate.[267] I thus apply a 5% labor-cost "tariff" on all labor preceding this final step (*i.e.*, 5% of 1,823,401). This is the only labor-cost in this project reconstructed from an exchange rather than a labor value, but I feel confident of its general accuracy because the expenditures were in-kind and identical to the end-product (*i.e.*, grain was paid for grain).

[265] Hillman 1985.
[266] Civil 1994: 96.
[267] Cf. Breckwoldt 1995/96: 71, citing transport costs between 2.08% and 7.24%.

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Michael Hudson

ISLET
Dresden

COVER ART: A stone relief of the Pre-Sargonic ruler of Lagash named Ur-Nanshe (ca. 2400 BC = ED IIIa). AO 2344.

The upper register of the relief shows the construction of a temple, with Ur-Nanshe carrying a corvée basket (*tupšikku*). In the lower register, a feast culminating the construction is depicted.
Photo by Philipp Bernard. Courtesy of the Louvre Museum.

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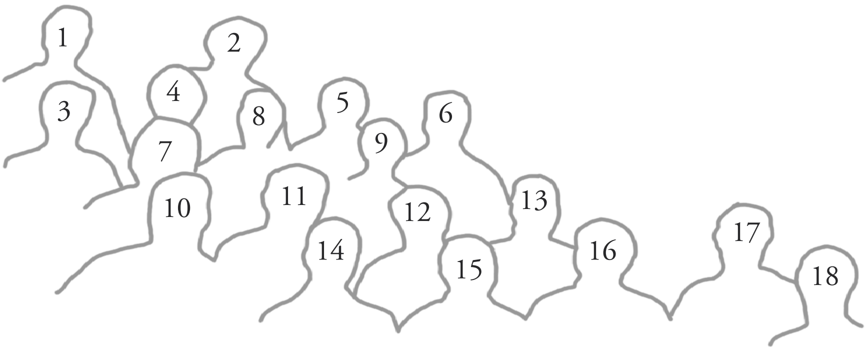

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