Patterns in Retrospective Reports of Marital Transfers

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Abstract

Retrospective reports of marital transfers are widely used to study changes in marriage markets and family institutions, often over periods for which contemporaneous records are unavailable. Because earlier marriage cohorts are observed at longer recall horizons, systematic differences in reporting with temporal distance may complicate the interpretation of cohort change. We examine numerical patterns in reports from more than 100,000 marriages in India, Bangladesh, Egypt, and Tanzania, using digit distributions as comparative diagnostics of reporting patterns. Reports of marriages further in the past exhibit more irregular numerical patterns and greater concentration at salient values. Within households, reporting patterns also differ across kinship categories even after accounting for time elapsed since marriage, while smaller transfers tend to display greater monetary focality. Comparisons across payment forms suggest that these patterns reflect not only reporting conditions but also institutional features and customary payment practices.

Keywords: marital transfers, dowry, bride price, retrospective reporting, Benford's law

JEL codes: C81, C83, J12, O12

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1 Introduction

Marital transfers are an important feature of marriage markets in many low- and middle-income countries. Dowry—transfers from the bride's family to the groom or his family—remains widespread in South Asia, while bride price—transfers from the groom or his family to the bride's family—is common across much of sub-Saharan Africa and parts of Asia (Anderson, 2007, 2026). These transfers can be large relative to household resources and have been linked to marriage timing and spouse choice, investments in children, migration, and women's welfare within marriage (Bloch and Rao, 2002; Alfano, 2017; Lowes and Nunn, 2018; Ashraf et al., 2020; Bhalotra et al., 2020; Corno et al., 2020; Calvi and Keskar, 2021, 2023; Bau et al., 2026). Understanding how these institutions have evolved has therefore become an important part of the study of family formation and demographic change (Desai and Andrist, 2010; Chakraborty and Kim, 2010).

Much of what we know about marital transfers comes from retrospective survey reports. Surveys frequently ask respondents to report payments made many years or even decades earlier, sometimes for the marriages of parents, siblings, or children rather than their own. Respondents may also be asked to assign monetary values to jewelry and other goods exchanged at marriage, or to report transfers that were paid rather than received. These features raise basic questions about the measurement properties of retrospective marital-transfer data. The issue is particularly important when retrospective data are used to reconstruct change across marriage cohorts, because earlier cohorts are mechanically observed at longer recall horizons. Do reporting patterns vary systematically with the time elapsed since marriage, the respondent's relationship to the couple, the form or direction of the transfer, or its size? If so, apparent differences across cohorts may partly reflect changes in how past events are recalled and reported rather than changes in the underlying institution itself.

We study these questions using numerical patterns in reported transfer amounts and survey data from four countries. Our approach builds on Benford's law, which provides a common benchmark for the leading digits of many economic quantities (Newcomb, 1881; Benford, 1938). Importantly, we do not interpret departures from Benford's law as direct evidence that an individual report is inaccurate. Correctly reported transfers need not follow the Benford distribution exactly, and features of the underlying distribution may themselves affect conformity. Instead, we use digit conformity—the extent to which the numerical distribution of reported amounts resembles the Benford benchmark—as a comparative diagnostic. We ask whether reporting patterns move systematically closer to or farther from this common benchmark across different reporting environments.[1]

We organize the analysis around five hypotheses. The first concerns *temporal distance and recall*. If reporting becomes less precise as more time passes since a marriage, particularly because respondents round or anchor on salient monetary values, reports of more distant marriages should exhibit larger departures from the benchmark and greater monetary focality.

The second hypothesis concerns *information about the marriage*. If reporting quality depends

[1] Benford-based diagnostics have previously been used to identify irregularities in economic and survey data (Varian, 1972; de Marchi and Hamilton, 2006; Nye and Moul, 2007; Judge and Schechter, 2009).

on how well informed respondents are about a particular marriage or transfer, numerical reporting patterns should vary across kinship categories even after differences in marriage timing are taken into account. Conversely, if differences across own and parents', siblings', and children's marriages arise primarily because these relatives married in different periods, the kinship gradient should become substantially smaller once marriage timing is held fixed.

The third hypothesis concerns the *valuation and form of the transfer*. If assigning monetary values to jewelry and other in-kind transfers is an important source of measurement error, these transfers should depart more from the benchmark than cash transfers reported by the same respondent for the same marriage. At the same time, differences in digit conformity across payment forms need not reflect differences in reporting quality alone. Cash transfers may themselves be chosen at salient or round monetary values, whereas the value of jewelry and other goods may vary more continuously with characteristics such as quantity, weight, and quality.

The fourth hypothesis concerns the *direction of the transfer*. Payments made and transfers received may differ in salience, documentation, or the information available to respondents, and their numerical distributions may therefore differ even when they refer to the same broad class of marital transactions.

Finally, the fifth hypothesis concerns *transfer size*. Small transfers may be concentrated at a relatively limited number of common or round amounts, whereas larger transfers may span a broader range of values. Size may also affect retrospective reporting itself: larger transfers may be more economically salient and therefore better remembered, while smaller transfers may be more susceptible to rounding or focal reporting. Conversely, large transfers may themselves be rounded if respondents remember their approximate magnitude rather than the exact amount. Differences in digit conformity by transfer size may therefore reflect characteristics of the underlying transactions, differences in reporting behavior, or both.

Our main analysis uses two waves of India's Rural Economic and Demographic Survey (REDS). Together, the surveys provide more than 95,000 reports of marital transfers associated with marriages spanning much of the twentieth century. REDS records transfers for the marriages of the household head and multiple relatives, including parents, siblings, and children. This unusually long retrospective window, together with multiple marriage reports within households and two independently administered survey waves, makes REDS particularly useful for studying how reporting patterns vary with temporal distance, information about the marriage, payment direction, and transfer size. We complement the REDS evidence with the Bangladesh Integrated Household Survey (BIHS), the Kagera Health and Development Survey (KHDS) in Tanzania, and the Egypt Labor Market Panel Survey (ELMPS). Across the four countries, our analysis uses information from more than 100,000 marriages. BIHS and ELMPS separately record cash and noncash components of marital transfers, while KHDS provides information on bride-price payments and distinguishes both the identity of the respondent and the recipient of the transfer. The repeated ELMPS waves also provide an external comparison of reporting patterns across recall horizons.

We first examine how numerical reporting patterns vary with the time elapsed since marriage. In both REDS waves, reports of older marriages depart substantially more from the benchmark than reports of recent marriages. This pattern appears across several measures of digit conformity and is especially pronounced in the prevalence of reports beginning with 5 and of exact values of the form 5×10^k. The same broad relationship appears in ELMPS: pooling the 2006, 2012, 2018, and 2023 survey waves, reports of marriages further in the past tend to exhibit larger departures from the benchmark, although the relationship is noisier than in REDS. The evidence from India and Egypt therefore points to a pronounced relationship between temporal distance and the numerical properties of retrospective marital-transfer reports.

Information about the marriage also matters. In REDS, reports concerning parents' marriages exhibit substantially greater monetary focality than reports concerning siblings and children even after comparing reports within the same household and accounting for the time elapsed since marriage. At the same time, the temporal gradient is broadly similar across kinship groups: reports become more focal as the marriage recedes further into the past regardless of whose marriage is being described. Differences in kinship and differences in temporal distance therefore appear to represent distinct dimensions of retrospective reporting.

Comparisons of cash and noncash components provide little support for a simple valuation-error explanation. In ELMPS, cash *mahr* departs more from the benchmark than *shabka* jewelry reported for the same marriage.[2] KHDS shows a similar pattern in a bride-price setting: cash payments depart more from the benchmark than in-kind goods and are more likely to begin with 5. BIHS leads to the same qualitative conclusion: cash dowry is no closer to the benchmark than gold or jewelry, and cash reports are substantially more likely to begin with 5. Across the three settings, these comparisons provide little support for the view that assigning monetary values to noncash transfers is itself a primary source of irregular reporting. They also illustrate why differences in digit conformity need not correspond directly to differences in reporting quality: cash payments may themselves be chosen at salient or conventional monetary values, whereas the value of jewelry and other goods may vary more continuously.

We also examine whether reporting patterns depend on the direction of the transfer. In REDS, the first-digit distributions of transfers given and received are strikingly similar, with both displaying substantial excess concentration on amounts beginning with 5. BIHS shows a different pattern. Comparing dowry paid and *mahr* received within the same marriage and payment form, received transfers are more focal, particularly for cash. Because dowry and mahr differ in their institutional role as well as their direction, we do not interpret this as a pure effect of giving versus receiving. Instead, the contrast suggests that the institutions governing the transfer can themselves shape its numerical distribution.

Relatedly, transfer size is more strongly related to digit conformity. Relatively small transfers generally exhibit larger departures from the benchmark than larger transfers. Importantly, this pattern remains visible when relative transfer size is defined within narrow elapsed-duration intervals, so it is not simply a consequence of nominally small transfers being associated with older marriage cohorts.

Finally, we examine several additional dimensions. Numerical patterns of retrospective mar-

[2] *Mahr* is a payment promised by the groom to the bride as part of the Muslim marriage contract and may be paid at marriage or deferred. *Shabka* refers to jewelry, typically gold, given by the groom to the bride around the time of engagement or marriage.

ital transfer data are remarkably similar for male and female respondents, and the temporal gradient is visible across respondents' education levels. We also use variation in India's anti-dowry legislation to ask whether greater legal restrictions are associated with more irregular reporting. They are not. If anything, transfers made under more restrictive legal regimes lie closer to the benchmark.

Taken together, the results show that the numerical properties of retrospective marital-transfer reports vary systematically with both the circumstances of reporting and characteristics of the underlying transactions. The strongest and most consistent pattern is temporal: reports become increasingly focal and depart further from the common benchmark as the time since marriage increases. Retrospective data used to reconstruct changes across marriage cohorts may therefore embed a reporting gradient that is itself correlated with cohort. At the same time, the cross-setting evidence cautions against interpreting numerical irregularities as measurement error alone, because institutional features of the transfers themselves also shape their numerical distribution.

Our analysis is related to a literature that uses digit distributions to assess the quality of economic data (Varian, 1972; de Marchi and Hamilton, 2006; Pullum, 2006; Nye and Moul, 2007; Judge and Schechter, 2009; A'Hearn et al., 2009). Most closely related, Judge and Schechter (2009) apply Benford-based diagnostics to household survey data from Paraguay on crops harvested, numbers of animals owned, and land holdings. More broadly, recent work has emphasized that measurement is itself a central part of empirical economic analysis: what researchers measure, and how they measure it, shapes what can be learned from the data (Almås et al., 2024).

We build on this work by focusing on retrospective reports of marital transfers. These data allow us to examine variation in digit patterns along dimensions that are central to retrospective reporting, including the time elapsed since the transaction, the respondent's relationship to the transaction, the form and direction of the transfer, and the size of the payment. Measurement error along these dimensions can affect both the precision of estimates and, when it varies systematically across observations, comparisons across groups or over time. Understanding such variation is particularly important when retrospective marriage histories are used to reconstruct long-run changes in marriage markets and family institutions, since differences across cohorts may otherwise be interpreted as changes in the underlying behavior.

The remainder of this paper is organized as follows. Section 2 provides background on marital transfers and the institutional settings represented in our data. Section 3 describes the empirical approach, introduces the digit-based diagnostics, and develops the hypotheses that guide our empirical analysis. Section 4 describes the data and the construction of the marital-transfer measures. Section 5 presents the results. Section 6 discusses the implications of the findings and concludes.

2 Background on Marital Transfers

Transfers made in connection with marriage are among the most widespread and enduring economic institutions associated with family formation. Although their prevalence has declined in many industrialized societies, they remain common across large parts of Asia, Africa, and the

Middle East (Anderson, 2007, 2026). These transfers vary substantially in their direction, form, magnitude, and in who ultimately owns or controls them.

A useful distinction is among three broad forms of marriage payment. *Bride price* refers to transfers from the groom or his family to the bride's parents or kin. *Dowry* refers to transfers originating with the bride's family. These transfers may be made to the groom or his kin, or may remain the property of the bride, in which case they can function as a pre-mortem bequest. Finally, *dower* refers to transfers from the groom or his family directly to the bride that remain her property; in Muslim marriages, the *mahr* is an important example.

These distinctions reflect the multiple economic roles that marital transfers can play. Marriage payments may help redistribute marital surplus and facilitate matching in the marriage market; transfer wealth across generations; provide financial security or insurance within marriage; or signal family status, prestige, and adherence to social norms (Becker, 1993; Anderson, 2003; Botticini and Siow, 2003; Desai and Andrist, 2010; Bau et al., 2026). These functions need not be mutually exclusive. A transfer observed in survey data may therefore reflect both marriage-market considerations and intergenerational transfers, while its form and recipient may determine who knows its value and how it is remembered. This heterogeneity is directly relevant for the interpretation of reported transfer amounts.

The four countries in our analysis illustrate several of these institutional forms. In India, dowry became a dominant feature of marriage markets over the twentieth century. Using retrospective REDS data, Chiplunkar and Weaver (2023) document a sharp historical increase in both its prevalence and value: the share of marriages involving a positive dowry rose from about 38 percent before 1930 to roughly 88 percent by the mid-1970s, while average real payments increased substantially over the same period. Dowry remained nearly universal thereafter. This historical evidence necessarily relies on retrospective reports, with transfers for the earliest marriage cohorts reported many decades after they occurred. Understanding how reporting patterns change with temporal distance is therefore particularly important in this setting.

Dowry is also common in Bangladesh and may include cash, gold or jewelry, and other in-kind goods (Ambrus et al., 2010). The Bangladesh Integrated Household Survey records these components separately for recent marriages, allowing us to compare their numerical properties within the same marriage. In Tanzania, bride price instead flows from the groom's side to the bride's family or kin; the Kagera Health and Development Survey records itemized bride-price payments and distinguishes amounts received by the bride's parents from those received by other relatives (Beegle et al., 2006; Corno et al., 2020). In Egypt and Bangladesh, relevant transfers also originate on the groom's side. Muslim marriages commonly involve a *mahr*, a transfer owed by the groom to the bride as part of the marriage contract, as well as *shabka*, typically gold jewelry given to the bride around engagement or marriage. The Egypt Labor Market Panel Survey separately records these components and, across multiple survey waves, provides retrospective reports covering marriages observed at different temporal distances (Anderson et al., 2021).

Together, these settings provide variation not only in the timing of marriage, but also in who reports the transfer and in its form, direction, recipient, and size. This variation allows us to assess whether numerical reporting patterns shift along dimensions plausibly related to recall and information, while also accounting for the possibility that differences in digit distributions reflect features of the underlying transactions themselves.

3 Empirical Method

We study numerical patterns in reported marital transfers by comparing them with the distribution implied by Benford's law (Newcomb, 1881; Benford, 1938). Benford's law has been documented in a remarkably wide range of real-world data, including population counts, river lengths, accounting data, and corporate revenues (Miller, 2015). Motivated by this broad empirical regularity, we use the Benford distribution as a common benchmark for comparing reported marital transfers across marriage cohorts and reporting contexts. As discussed below, however, we do not assume that marital transfers should conform to it exactly.

Let FSD denote the first significant digit—that is, the leftmost nonzero digit of a number. Benford's law predicts that

$$P(FSD = f) = \log_{10}\left(1 + \frac{1}{f}\right), \qquad f = 1, \ldots, 9. \tag{1}$$

Under this distribution, lower digits occur more frequently than higher digits: about 30.1% of observations begin with 1, for example, compared with 4.6% beginning with 9.

The first digit captures only part of the numerical information in a reported amount. Benford's law can also be expressed in terms of the full significand. Write any positive amount as $x = S(x)10^k$, where k is an integer and $S(x) \in [1, 10)$. Thus, 5,400 and 54,000 both have significand 5.4. Equivalently, define

$$u = \log_{10}(x) - \lfloor \log_{10}(x) \rfloor,$$

the fractional part of $\log_{10}(x)$. Under Benford's law, u is uniformly distributed on $[0, 1)$ (Berger and Hill, 2021). This transformation therefore turns the question of Benford conformity into a simple comparison between the observed distribution of u and a uniform distribution.

We use two complementary diagnostics. First, we assess the distribution of first significant digits. These distributions are easy to interpret and show which digits account for departures from the benchmark, including whether reports cluster disproportionately on salient leading digits such as 5. First-digit conformity, however, does not fully characterize Benford conformity: two distributions can have similar first-digit shares while differing in the remaining significant digits (Barabesi et al., 2022). We therefore also use the full-significand transformation above.

For the full-significand analysis, we summarize the distance between the empirical distribution of u and the uniform distribution using the Kuiper statistic (Kuiper, 1960). Intuitively, we compare the empirical cumulative distribution of the transformed amounts with the 45-degree line implied by a uniform distribution. The Kuiper statistic is the sum of the largest vertical distance above this line and the largest vertical distance below it. Lower values indicate closer conformity to the benchmark; in the population, a value of zero corresponds to exact uniformity. Because the Kuiper statistic is invariant to a common rescaling of the amounts, it does not depend on the monetary units in which transfers are recorded. Appendix B provides the formal definition and a numerical example.[3]

3.1 Interpreting Digit Deviations and Hypotheses

Departures from the Benford benchmark can arise for several reasons. Some are directly related to reporting. Respondents may recall older transactions less precisely and may round or anchor their answers on salient monetary values. They may also have less information about transfers associated with relatives' marriages than about transfers in which they were more directly involved. Jewelry and other in-kind transfers may be difficult to value in monetary terms, and strategic reporting, interviewer effects, or legal and social concerns may further affect the amounts respondents report.

Other departures need not reflect reporting error. Marital transfers may themselves be concentrated at particular monetary values because of customary payment practices, currency denominations, or prevailing preferences for round numbers. Their numerical distribution may also change over time with inflation or changes in marriage-payment customs. More generally, Benford conformity depends in part on the range and support of the underlying variable. Small transfers, for example, may be concentrated on a relatively limited set of common amounts even when they are reported exactly.

These considerations guide our interpretation of the diagnostics. We do not treat larger departures from the Benford benchmark as evidence of necessarily less accurate reporting. Instead, we use them comparatively, asking whether numerical patterns vary systematically across reporting environments in ways consistent with particular sources of measurement error. This motivates the following five hypotheses.

Hypothesis 1: Temporal distance and recall. If retrospective reports become less precise as more time passes since marriage, reports of more distant marriages should depart more from the benchmark than reports of recent marriages. Recall error may also lead respondents to round or anchor on salient monetary values. We therefore expect reports of older marriages to exhibit both larger departures from the benchmark and greater monetary focality.

Hypothesis 2: Information about the marriage. If reporting patterns depend on how well informed respondents are about a particular marriage or transfer, they should vary across kinship categories even after differences in marriage timing are taken into account. Conversely, if pooled differences across parents, siblings, and children arise mainly because these relatives married in different periods, the kinship gradient should become substantially smaller once elapsed time since marriage is held fixed. This distinction is especially important because kinship category and tem-

[3] ChatGPT (OpenAI; GPT-5.6 Sol) and Codex (OpenAI; GPT-6 Astra) were used to assist with drafting and debugging code for data processing, statistical analysis, and the production of tables and figures. The authors determined all data-construction choices, empirical specifications, and statistical procedures, and reviewed and validated all code and resulting output.

poral distance are strongly correlated in retrospective household surveys.

Hypothesis 3: Valuation and payment form. If assigning monetary values to jewelry and other in-kind transfers is an important source of reporting error, noncash transfers should depart more from the benchmark than cash transfers. Surveys that separately record cash and noncash components of the same marriage allow us to test this prediction while holding the marriage and respondent fixed. At the same time, differences across payment forms need not reflect differences in reporting quality. Cash transfers may themselves be chosen at salient or round monetary values, whereas the value of jewelry and other goods may vary more continuously with characteristics such as quantity and quality.

Hypothesis 4: Direction of the transfer. Reporting patterns may differ depending on whether respondents are describing transfers that were paid or transfers that were received. Payments and receipts may differ in salience, documentation, or the information available to respondents. We therefore test whether amounts given and received exhibit systematically different numerical patterns, without imposing a directional prediction.

Hypothesis 5: Transfer size. Transfer size may affect digit conformity for more than one reason. Small transfers may be concentrated on a narrower set of common or round amounts, leading to larger departures from the benchmark even when they are reported accurately.[4] Size may also affect retrospective reporting itself: larger transfers may be more economically salient and therefore better remembered, while smaller transfers may be more susceptible to rounding or focal reporting. Conversely, large transfers may themselves be rounded if respondents remember their approximate magnitude rather than the exact amount. Differences in digit conformity by transfer size may therefore reflect the support of the underlying distribution, differences in reporting behavior, or both.

4 Data and Measurement

Our main analysis uses two waves of the Rural Economic and Demographic Survey (REDS) from India. We complement the REDS analysis with data from Bangladesh, Egypt, and Tanzania that allow us to examine reporting patterns across different payment forms and recipients. Throughout, transfer amounts are retrospective reports expressed in nominal local currency. The unit of analysis is a reported marital-transfer amount. Depending on the survey and analysis, households may contribute reports for multiple marriages, and some marriages may contribute separate cash and noncash components. Because leading-digit measures are undefined for zero, we restrict attention to positive amounts. We also remove observations above the 99th percentile of each transfer measure to limit the influence of extreme reports.

[4] Benford's law is most commonly observed for quantities that vary over a sufficiently broad range of values (Miller, 2015). The Kuiper distance used below is invariant to a common rescaling of all amounts, but this scale invariance does not eliminate departures arising from a narrow or restricted underlying support.

4.1 Main Data: Rural Economic and Demographic Survey

The Rural Economic and Demographic Survey (REDS) is a household panel administered by the National Council of Applied Economic Research in approximately 250 villages across 17 major Indian states. The survey was designed to be nationally representative of rural India and is unusual among large-scale household surveys in asking directly about transfers made in specific marriages.[5] The combination of direct reports, multiple marriages within households, and marriages occurring over several decades makes REDS particularly well suited to our hypotheses concerning temporal distance, kinship, transfer size, and direction of payment.

The 1999 wave surveyed 7,474 households and records dowry given or received for the household head's own marriage and for the marriages of parents, siblings, children, and the household head's spouse's siblings. Our sample contains 48,110 positive kin-specific transfer reports associated with marriages occurring between 1900 and 1999. The later REDS wave surveyed approximately 9,500 households, with interviews conducted between 2006 and 2009. Rather than recording a single dowry amount, this wave asks about gifts given or received at marriage. Our sample contains 47,151 positive kin-specific transfer reports associated with marriages occurring between 1900 and 2009. Together, the two waves provide nearly 95,000 reports and long retrospective windows in two independently administered surveys.

4.2 Additional Data

We use three additional survey datasets to examine dimensions of reporting that REDS cannot address directly and to assess whether similar patterns appear in other marital-transfer settings.

Bangladesh Integrated Household Survey (BIHS). BIHS 2018–2019 is representative of rural Bangladesh and covers 5,604 households. Its marital-transfer modules cover women younger than 31 who are current household members and women who married out of the household after the 2011 baseline. For each marriage, respondents report dowry paid by the bride's family and *mahr* or *kabin* received by the bride. Both transfers are recorded separately in cash, gold or jewelry, and other in-kind goods. This structure allows us to compare cash and noncash components within the same marriage and, separately, to compare transfers in opposite directions while holding payment form fixed.

Egypt Labor Market Panel Survey (ELMPS) The ELMPS is a nationally representative longitudinal survey of Egyptian households and individuals. We use the 2006, 2012, 2018, and 2023 survey waves. The individual questionnaire separately records cash *mahr*—a payment from the groom or his family to the bride agreed as part of the marriage contract—and *shabka*, jewelry presented to the bride at engagement or marriage. As in BIHS, observing both components for

[5] In particular, REDS records realized marital transfers for the marriages of multiple family members, rather than asking respondents about prevailing marriage expenditures in their community. This distinguishes REDS from the nationally representative India Human Development Survey (IHDS), which elicits marriage-transfer information indirectly by asking respondents how much a family like theirs would typically spend at the time of a marriage. Anukriti et al. (2022) discuss this distinction between REDS and IHDS. In the IHDS, respondents are asked how much money is "usually spent" at marriage by the bride's or groom's family in their community for a family similar to their own.

the same marriage allows us to compare cash and noncash transfers while holding the respondent and marriage fixed.

Kagera Health and Development Survey (KHDS). The KHDS is a longitudinal survey conducted in northwestern Tanzania. We use the 2004 and 2010 waves, which provide complementary measures of bride-price transfers. The 2004 household questionnaire records bride-price receipts during the preceding ten years and distinguishes cash from in-kind payments. The 2010 wedding module covers the first marriages of panel members who were younger than 17 at the 1991–1994 baseline and had married by 2010. For formal marriages, it records bride-price payments item by item and separately identifies amounts received by the bride's parents, specified extended kin, and other recipients.

4.3 Descriptive Statistics

Appendix Tables A1 and A2 summarize the surveys and marital-transfer samples used in our analysis. The REDS provide by far the longest retrospective histories, covering marriages over essentially the entire twentieth century. The surveys span different transfer institutions: direction-specific dowry or marriage gifts in REDS; family-paid dowry and *mahr* in BIHS; *mahr* and *shabka* in ELMPS; and bride-price transfers in KHDS.

Positive transfers are common in all four settings. Among eligible reports, the share with a positive transfer is 62.8 percent in REDS 1999 and 88.3 percent in REDS 2006, 77.4 percent in BIHS, between 71.7 and 83.6 percent across the four ELMPS waves, and 98.2 percent and 58.9 percent in the 2004 and 2010 KHDS samples, respectively. Sample sizes differ substantially across surveys and waves. Missingness varies more substantially across surveys. It is negligible in BIHS and low in KHDS, but ranges from about 12 to 27 percent in REDS and ELMPS.[6] Conditional on a positive transfer, the distributions are strongly right-skewed, with mean amounts exceeding medians in every sample.

Figure A1 in the Appendix plots median nominal transfer amounts by marriage year. Nominal transfers rise substantially over time in all four countries, although the timing and magnitude of these increases differ across settings.

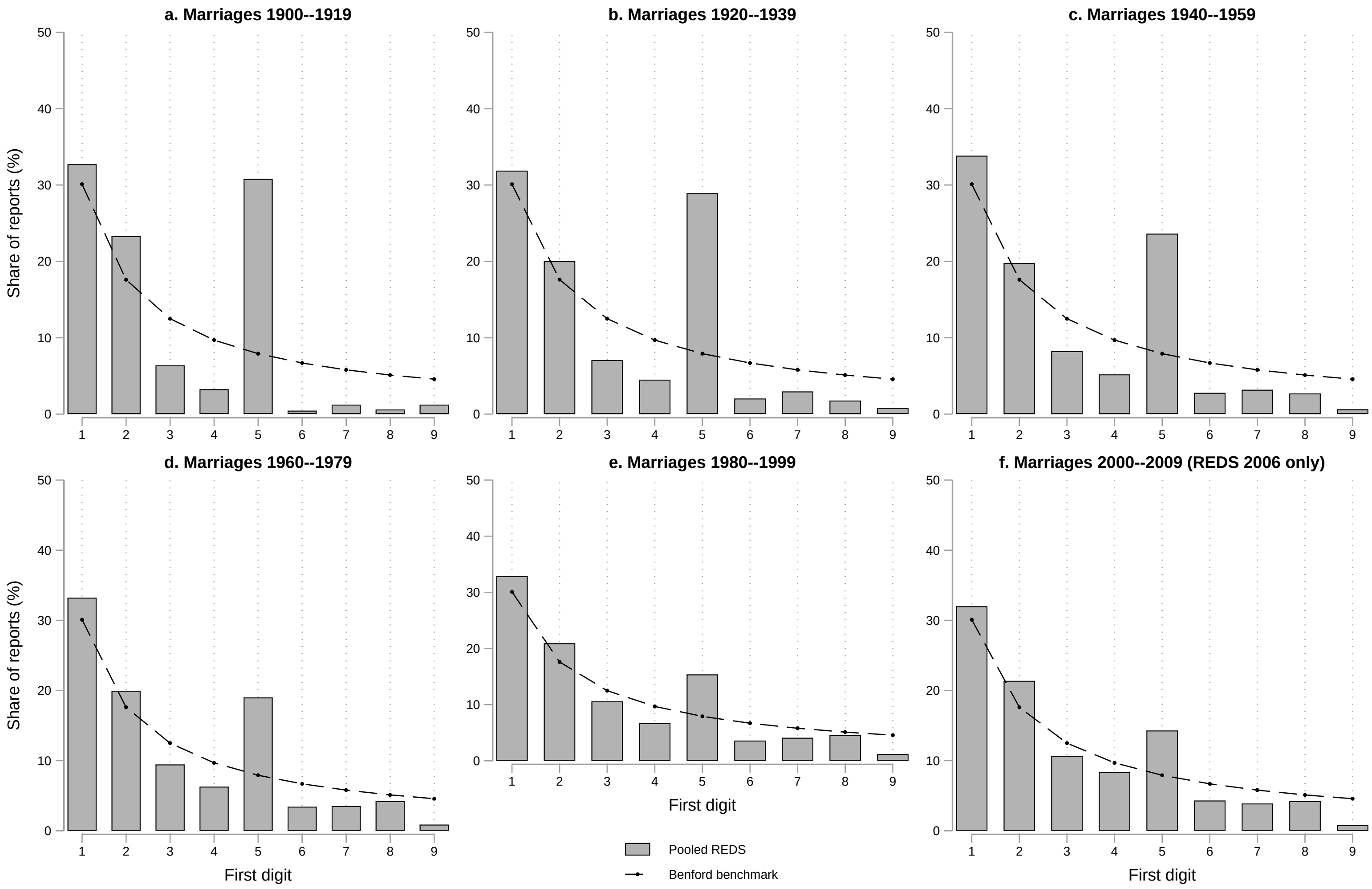
5 Results

5.1 Temporal Distance

We begin with Hypothesis 1, which asks whether reporting patterns deteriorate with temporal distance from marriage. Figure 1 provides a first descriptive view by plotting first-digit distributions

[6]The relatively high missing share reported for REDS 1999 in Table A2 reflects our coding of all unavailable direction-specific transfer amounts as missing across all states. By contrast, Chiplunkar and Weaver (2023) report a missing rate of about 5 percent after excluding the five states with known inconsistencies in the administration of the dowry-amount questions (see Section 5.6 for details). Applying the same restriction to the ten states with consistent coding yields a missing rate of 4.6 percent in our data.

Figure 1: First-Digit Distributions by Marriage Cohort in REDS



Notes: The figure plots the distribution of the first significant digit of reported marital transfers by marriage period. For the first five periods, digit shares are calculated separately within REDS 1999 and REDS 2006 and then averaged, giving the two survey waves equal weight. The 2000–2009 period is observed only in REDS 2006. The dashed line shows the distribution implied by Benford's law.

across six broad marriage cohorts in REDS.[7]

A pronounced cohort gradient is immediately apparent. Reports of earlier marriages depart substantially more from the Benford benchmark than reports of more recent marriages. The clearest feature is the excess concentration on amounts beginning with 5. Among marriages occurring in the first half of the twentieth century, roughly one-quarter to one-third of reported transfers begin with 5, compared with 7.9 percent under the Benford benchmark. This share declines steadily across marriage cohorts, reaching about 15 percent for marriages occurring after 1980. More generally, the entire first-digit distribution moves closer to the benchmark among more recent marriages.

Marriage cohorts, however, do not correspond to the same elapsed duration in the two REDS waves because the surveys were conducted at different dates. Figure 2 therefore examines the relationship more directly, plotting the full-significand Kuiper distance against the number of years between marriage and survey interview, separately for REDS 1999 and REDS 2006. This comparison maps directly into Hypothesis 1: if temporal distance is associated with less precise reporting, departures from the benchmark should increase with years since marriage.

This is what we observe in both waves. Kuiper distance is lowest for marriages reported rela-

[7]For the first five groups, which are observed in both REDS waves, we calculate digit shares separately within REDS 1999 and REDS 2006 and then average the two wave-specific distributions, giving each wave equal weight. The final cohort, 2000–2009, is observed only in REDS 2006.

tively soon after they occurred and rises as marriages recede further into the past. During roughly the first two decades after marriage, distances are generally between 0.15 and 0.20; at longer durations they often reach 0.30 or more. Estimates become noisier as the number of observations declines at long elapsed durations, but the broad upward gradient is visible in both surveys.

The levels of the two series nevertheless differ. At a given elapsed duration, REDS 1999 generally exhibits larger departures than REDS 2006, particularly for more distant marriages. One possible explanation is the difference in how the two surveys elicit marital transfers. REDS 1999 asks directly about the amount of *dowry* given or received, effectively eliciting a summary value for the transaction. The later wave instead asks about the value of *gifts* given or received at marriage, which may prompt respondents to recall or value a broader collection of transfer components. Differences in elicitation may therefore affect the numerical properties of the resulting reports. This possibility motivates Hypothesis 3, where we examine the role of payment form more directly by comparing numerical reports of cash and noncash components. Differences in sample composition or in the underlying distribution of transfers across the two waves may also contribute to the level difference.

Finally, Appendix Figure A3 provides an external check using the Egypt Labor Market Panel Survey. Because individual ELMPS waves are considerably smaller than REDS, we pool the 2006, 2012, 2018, and 2023 waves. The resulting profile is noisier, but it shows the same broad pattern: Kuiper distance is relatively low for marriages reported within the first several years and tends to increase with elapsed duration, with the largest departures concentrated among more distant marriages. Taken together, the REDS and ELMPS evidence is consistent with reporting becoming increasingly irregular as more time passes since marriage.[8]

5.2 Kinship Distance

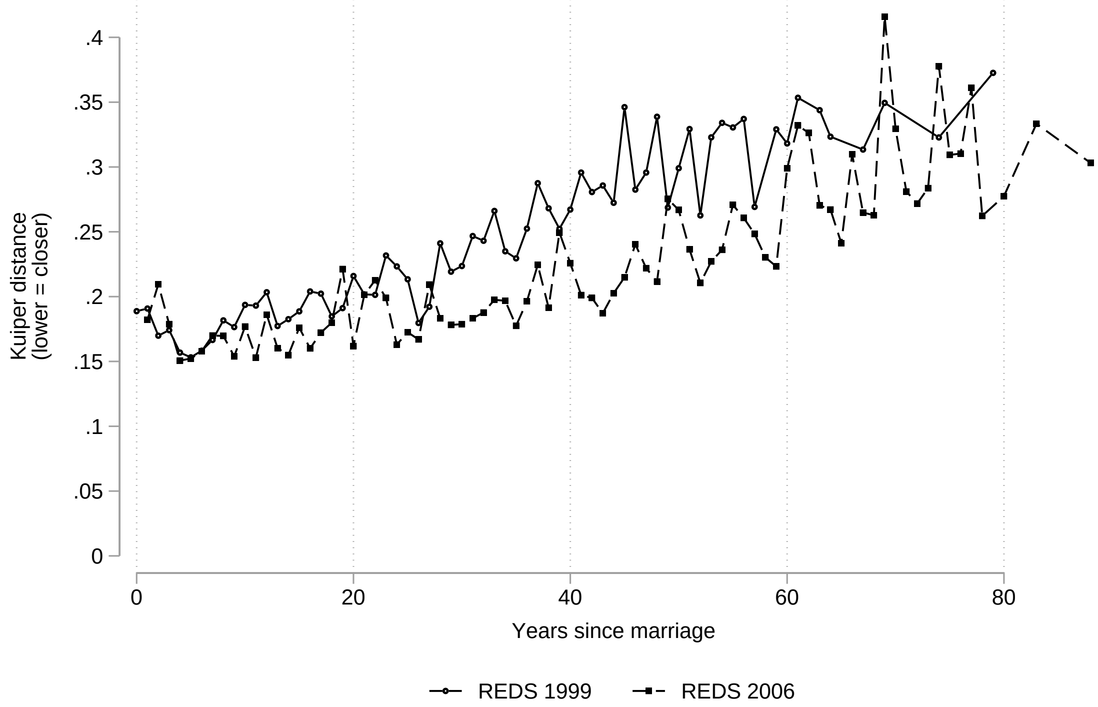
Hypothesis 2 asks whether reporting patterns vary with respondents' information about the marriage, separately from the amount of time that has elapsed since it occurred. The two dimensions are closely related in retrospective household surveys: reports concerning parents' marriages typically refer to substantially earlier marriages than reports concerning closer family members, such as children or siblings. Unconditional differences across kin categories may therefore reflect differences in recall duration rather than differences in information about the marriage itself.

Table 1 examines the two dimensions jointly using linear-probability models with household fixed effects. Identification therefore comes from comparisons across marriage reports within the same household. The omitted category consists of reports concerning the marriages of parents and parents-in-law. In REDS 1999, we distinguish two additional groups: close family, such as children and siblings, and the household head's own marriage. REDS 2006 does not contain a systematic household-head marriage category, so Panel B distinguishes only close-family from parent reports.[9]

[8] For brevity, we do not report the corresponding BIHS and KHDS results, where the retrospective horizon is considerably shorter.

[9] This difference reflects the structure of the survey instruments. In REDS 2006, the marriage-transfer questions are administered in modules covering the household head's parents, siblings, and nonresident sons and daughters; the household roster records the head's marital status but does not include a corresponding set of questions on the year or value of transfers associated with the head's own marriage. The later wave therefore does not provide a household-head marriage category comparable to that available in REDS 1999.

Figure 2: Temporal Distance and Benford Conformity in REDS



Note: The figure reports the full-significand Kuiper distance from the Benford benchmark separately for REDS 1999 and REDS 2006. Lower values indicate closer conformity with the benchmark. Each point is calculated within a five-year bin of years elapsed between marriage and interview. Cells containing fewer than 100 reports are omitted.

Recall duration is measured in decades and centered at the wave-specific mean. The kinship coefficients therefore compare reports at the average recall duration, while the interaction terms allow the relationship between elapsed time and focal reporting to vary across kin categories.

The results show a sizeable kinship gradient even after holding recall duration fixed. In REDS 1999, close-family reports are 6.2 percentage points less likely than parent reports to begin with 5 and 6.0 percentage points less likely to equal an exact 5×10^k value. Reports of the household head's own marriage are also less focal than parent reports. Although the point estimates are smaller in magnitude for the household head's own marriage than for close-family reports, the differences between these two groups are not statistically significant. In REDS 2006, close-family reports are 4.9 percentage points less likely to begin with 5 and 5.2 percentage points less likely to equal an exact 5×10^k value. The close-family differences are statistically significant at the one-percent level in both waves.

In line with our previous results, temporal distance has a separate and consistently positive association with monetary focality. Among parent reports, an additional decade since marriage increases the probability of focal reporting by about 1.8–1.9 percentage points in REDS 1999 and 1.2 percentage points in REDS 2006. The interaction terms are small and statistically insignificant, indicating little evidence that the temporal gradient differs systematically across kin categories. The implied slopes are about 2.0 percentage points per decade for close-family reports in REDS 1999 and 1.7–1.8 percentage points in REDS 2006; for the household head's own marriage in REDS 1999, they are approximately 2.4–2.6 percentage points. All of these implied slopes are statistically different from zero.

Appendix Figure A4 provides a graphical counterpart to these regressions. Pooling the two

Table 1: Recall Duration, Kin Category, and Monetary Focality

	Monetary focality	
	First digit 5	Exact 5×10^k
	(1)	(2)
Panel A. REDS 1999		
Recall duration (decades)	0.019***	0.018***
	(0.006)	(0.005)
Close family, at mean recall	-0.062***	-0.060***
	(0.019)	(0.019)
Recall duration × Close family	0.001	0.002
	(0.006)	(0.006)
Household head's marriage, at mean recall	-0.035*	-0.039**
	(0.020)	(0.020)
Recall duration × household head's marriage	0.007	0.006
	(0.007)	(0.007)
Observations	45,777	45,777
Mean of Dep. Variable	0.195	0.187
Recall slope, close family (Estimate)	0.020	0.020
Recall slope, close family (p-value)	< 0.001	< 0.001
Recall slope, household head's marriage (Estimate)	0.026	0.024
Recall slope, household head's marriage (p-value)	< 0.001	< 0.001
Mean recall duration (years)	26.0	26.0
Households	5,495	5,495
Panel B. REDS 2006		
Recall duration (decades)	0.012**	0.012**
	(0.005)	(0.005)
Close family, at mean recall	-0.049***	-0.052***
	(0.019)	(0.018)
Recall duration × Close family	0.005	0.006
	(0.005)	(0.005)
Observations	49,227	49,227
Mean of Dep. Variable	0.178	0.173
Recall slope, close family (Estimate)	0.017	0.018
Recall slope, close family (p-value)	< 0.001	< 0.001
Mean recall duration (years)	34.4	34.4
Households	7,987	7,987

Note: Each column reports a linear-probability model with household fixed effects. Recall duration is measured in decades and centered at its wave-specific mean. In REDS 1999, close family includes siblings, children, and the household head's spouse's siblings; parents are the reference group, and the household head's own marriage is included separately. In REDS 2006, close family includes brothers, sisters, brothers- and sisters-in-law, sons, and daughters; the reference group includes parents and parents-in-law. The outcomes equal one when the reported amount begins with 5 or equals an exact 5×10^k value. Standard errors in parentheses are clustered at the village level. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

REDS waves, the first-digit distribution of close-family reports lies visibly closer to the Benford benchmark than that of other-family reports, most notably through greater mass on digit 1 and less excess mass on digit 5. Because these distributions do not condition on recall duration or household fixed effects, we view the figure as purely suggestive; the within-household estimates in Table 1 provide our main test of Hypothesis 2.

5.3 Valuation and Payment Form

Hypothesis 3 asks whether reporting patterns differ by the form in which a marital transfer is made. A natural source of measurement error is the need to assign monetary values to noncash transfers. Jewelry and other goods exchanged at marriage may not have an immediately observable monetary value, especially when respondents are recalling transactions that occurred many years earlier. If this valuation problem is important, reported values of jewelry and other in-kind transfers should depart more from the Benford benchmark than cash payments.

The opposite pattern is also possible, however, even in the absence of differences in reporting quality. Cash transfers may themselves be chosen at salient or round monetary values because of customary payment conventions, whereas the value of jewelry and other goods may vary more continuously with characteristics such as quantity, weight, and quality. Thus, if cash transfers depart as much as or more than noncash transfers from the benchmark, this would weigh against a simple valuation-error explanation and could instead reflect differences in the underlying distribution of the transfers.

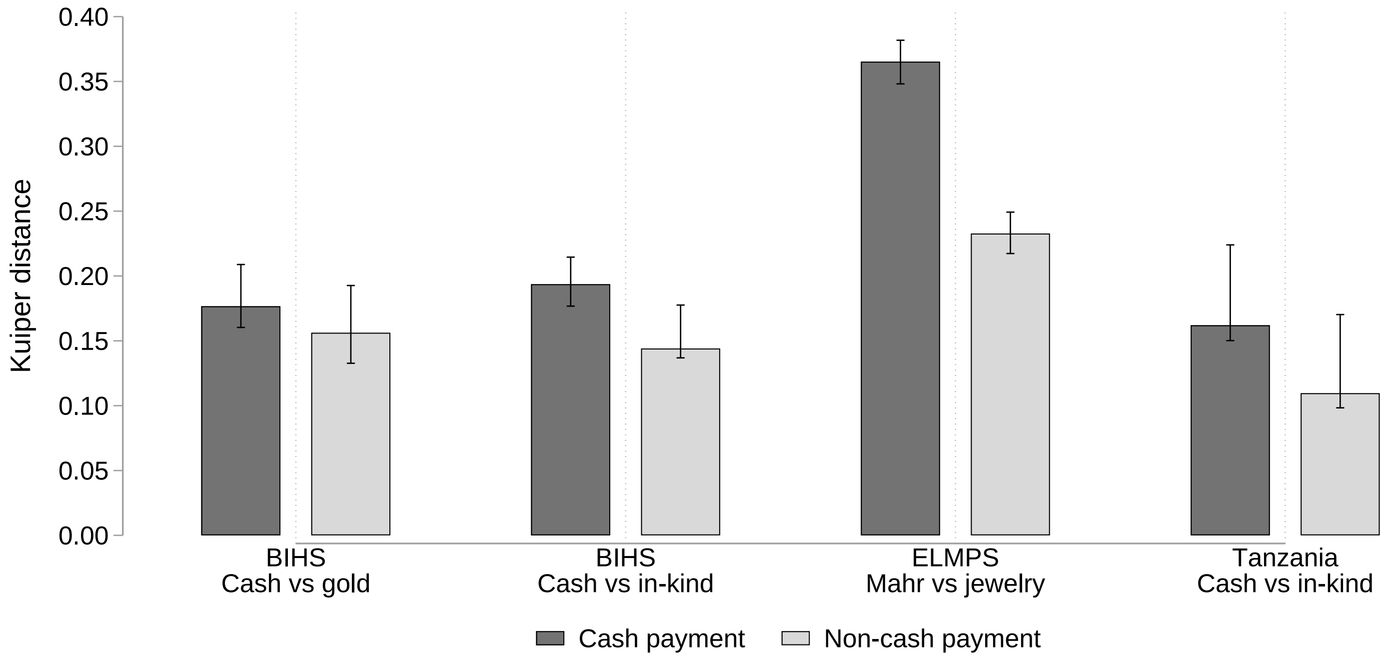
The contrast between the two REDS waves provides some motivation for this hypothesis, although REDS does not permit a direct comparison of cash and noncash components. REDS 1999 asks respondents for the amount of *dowry* given or received, effectively eliciting a summary value for the marital transfer, whereas the later REDS wave asks for the value of *gifts* given or received at marriage. The two waves display noticeably different numerical patterns even at similar elapsed durations. Because they may also differ in sample composition, these differences cannot be attributed to elicitation alone, but they suggest that how marital transfers are defined and valued in the survey may matter for the numerical properties of reported amounts.

The other three surveys allow a more direct test. In BIHS, respondents separately report dowry paid in cash, gold or jewelry, and other in-kind goods. In ELMPS, respondents report cash *mahr* and the value of *shabka*, the jewelry transferred to the bride at engagement or marriage. The KHDS separately records cash and in-kind components of bride-price payments, allowing an analogous comparison in a bride-price setting.

Figure 3 reports the full-significand Kuiper distance for the cash and noncash components of the transfers. Under the simple valuation-error interpretation of Hypothesis 3, the noncash component should lie farther from the benchmark (i.e., exhibit a higher Kuiper distance) than the corresponding cash component.

The data do not show this pattern. The clearest evidence comes from ELMPS (Egypt): cash *mahr* lies farther from the benchmark than *shabka* jewelry, even though the latter requires respondents to assign a monetary value to a noncash transfer. KHDS (Tanzania) shows a similar pattern: cash has a Kuiper distance of 0.162, compared with 0.110 for non-cash goods. Appendix Figure A5 shows similar contrasts in first digits: in Egypt, cash *mahr* is 4.9 percentage points more likely than *shabka* to begin with 5; in Tanzania, cash payments are 5.5 percentage points more likely than non-cash goods to begin with 5. The BIHS evidence leads to the same conclusion, although the differences in Kuiper distance are less pronounced. Cash dowry is no closer to the Benford benchmark than gold or jewelry, providing no indication that valuing the noncash compo-

Figure 3: Digit Conformity for Cash and Non-cash Marital Transfers



Notes: The figure reports full-significand Kuiper distances from the Benford benchmark for cash and non-cash components of marital transfers. The BIHS comparisons distinguish cash dowry from gold or jewelry and from other in-kind goods; the ELMPS comparison distinguishes cash mahr from shabka jewelry. Tanzania pools 192 household receipt reports from KHDS 2004 and 173 formal first-marriage reports from KHDS 2010. Non-cash comprises reported in-kind goods in 2004 (excluding land) and cloth/clothing, blankets, banana beer, livestock, meat and other foods, hand tools, kerosene, and other goods in 2010. The 2010 amounts cover payments to the bride's parents and named other relatives. Both components must be positive and within their wave- and component-specific 99th-percentile cutoffs. Components are paired within the same marriage in BIHS and ELMPS and within the same payment report in KHDS; the pooled KHDS reports need not represent distinct marriages. Lower values indicate closer conformity to the Benford benchmark. Error bars report 95% confidence intervals from 1,000 paired bootstrap replications. BIHS and ELMPS resample marriages. For Tanzania, resampling is clustered by original survey household, including its split-off households and both waves.

nent generates greater departures. The first-digit comparison is more striking: within marriages reporting both components, cash dowry is 6.1 percentage points more likely than gold or jewelry to begin with 5.

Overall, the comparisons provide little support for the idea that assigning monetary values to noncash transfers is an important source of reporting error. Jewelry and other in-kind transfers do not exhibit larger departures from the benchmark than cash transfers reported for the same marriage. In several comparisons, cash reports are instead more focal. This pattern is consistent with differences in the underlying transactions themselves: cash payments may be chosen at conventional or salient monetary amounts, whereas the value of jewelry can vary more continuously with underlying characteristics.

5.4 Direction of Payment

Hypothesis 4 asks whether numerical reporting patterns differ depending on whether a marital transfer is given or received. There is no clear reason to expect one direction to generate more regular reports than the other: transfers given and received may differ in salience, documentation, or the information available to respondents. Moreover, the meaning of direction depends on the transfer being reported. A payment from the groom's side and a payment from the bride's side may be governed by quite different norms and conventions.

REDS provides a direct comparison of transfer direction. Panel (a) of Figure 4 compares first-digit distributions for transfers given and received by the respondent's household, pooling REDS

1999 and REDS 2006. The two distributions are strikingly similar. Both exhibit substantial excess mass on amounts beginning with 5 relative to the Benford benchmark and follow broadly similar patterns across the remaining digits. Received transfers are somewhat more concentrated on 5, but the difference is small relative to the departures shared by both groups. In REDS, therefore, there is little indication that the numerical patterns we document are specific to one side of the transaction.

BIHS offers a different comparison. Bangladesh is predominantly Muslim, and *mahr* (or *kabin*) is a standard obligation from the groom to the bride, distinct from dowry paid by the bride's family.[10] BIHS records both dowry and mahr for the same marriage and separately reports their cash, gold or jewelry, and in-kind components. Panel (b) of Figure 4 therefore compares dowry paid and mahr received within the same marriage and payment form.

The BIHS results show a much sharper difference for cash than for the other payment forms. Cash *mahr* received by the bride is substantially more concentrated on salient first digits than cash dowry paid by her family. For gold or jewelry and for in-kind transfers, the two distributions are much closer, although mahr remains somewhat more focal than dowry.

While insightful, we do not wish to interpret these differences as a pure effect of transfer direction. Dowry and mahr differ not only in who gives and receives them, but also in their role within the marriage transaction. This distinction is especially relevant for cash mahr, whose amount is explicitly agreed upon as part of the marriage contract and may therefore be particularly likely to take conventional or salient monetary values.

Finally, bride-price data from the KHDS allow us to examine whether numerical patterns vary with the recipient of the transfer. Appendix Figure A11 compares first-digit distributions for payments to the bride's parents and to other relatives. Payments to parents appear marginally closer to the Benford benchmark, particularly for the lower first digits, although both recipient groups display noticeable departures.[11]

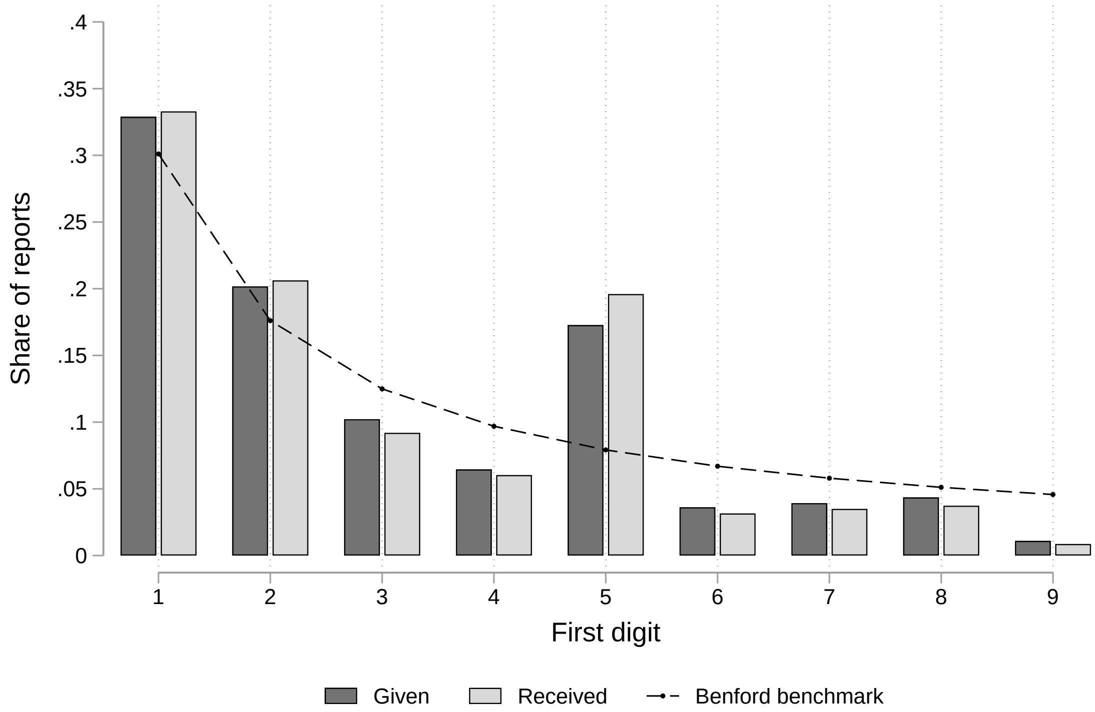
5.5 Transfer Size

Hypothesis 5 considers whether numerical reporting patterns vary with the size of the marital transfer. Transfer size may matter for at least two reasons. First, small transfers may be concentrated at a relatively limited number of common or round amounts, whereas larger transfers may span a broader range of values. Smaller transfers could therefore depart more from the Benford benchmark even if reported accurately. Second, size may affect reporting itself. Larger transfers may be more economically salient and therefore better remembered, while smaller transfers may be more likely to be rounded or recalled at focal values. Conversely, large transfers may themselves be prone to rounding if respondents remember their approximate magnitude rather than the exact amount.

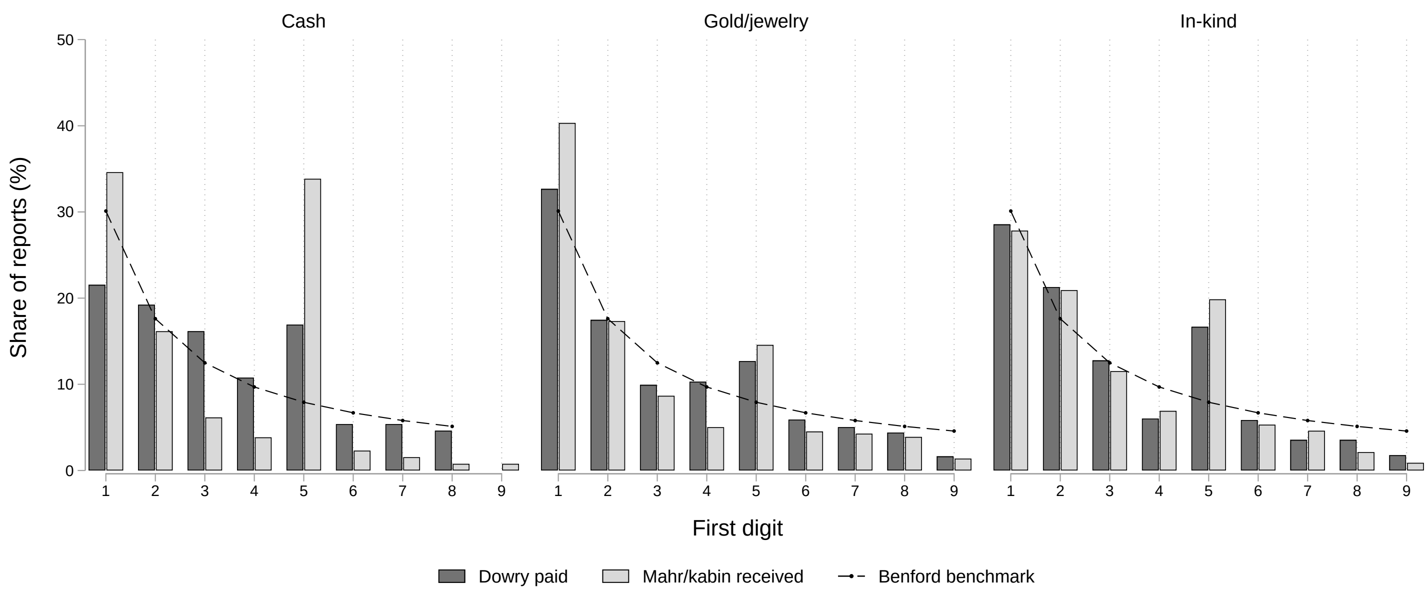
[10] The amount of mahr is typically agreed upon as part of the marriage contract and recorded in the *kabinnama*; neither Islamic nor Bangladeshi law prescribes a single fixed amount.

[11] Because recipient identity is a characteristic of the underlying transaction rather than of the respondent's informational proximity to the marriage, this comparison does not provide a test of Hypothesis 2. Instead, it provides suggestive evidence that features of the transfer itself may be associated with different numerical patterns.

Figure 4: First-Digit Distributions by Direction of Transfer



(a) REDS

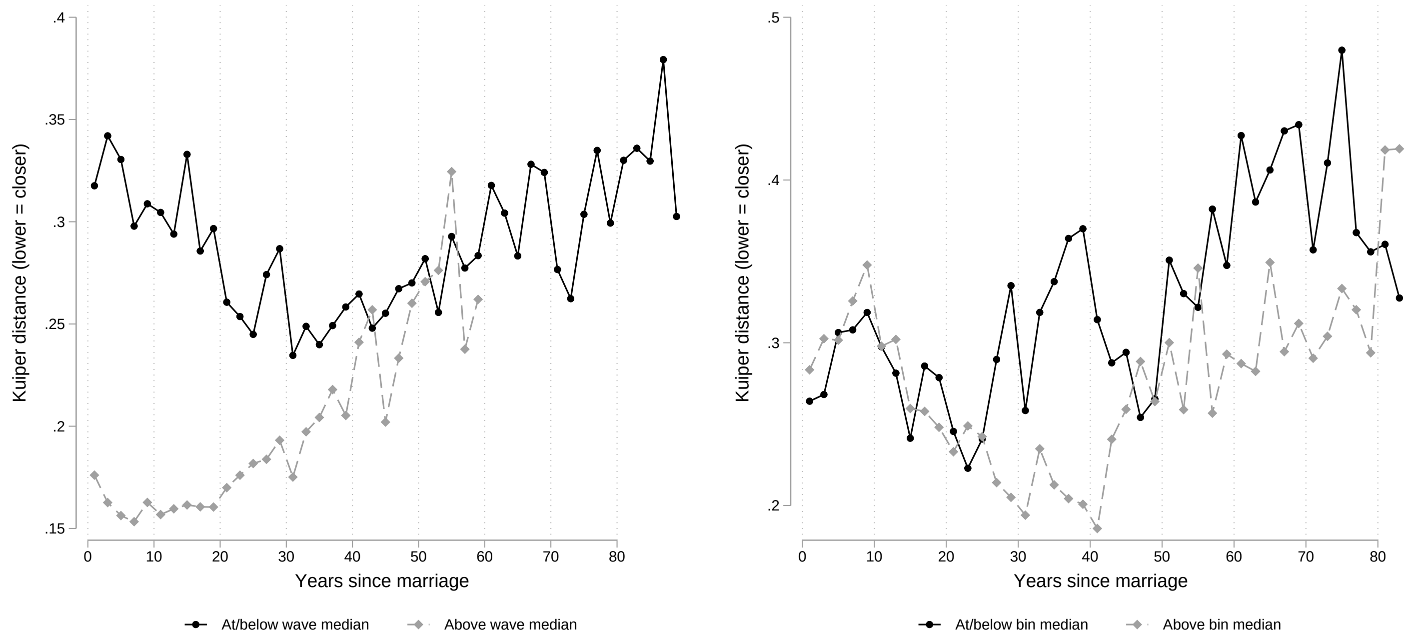


(b) BIHS

Notes: Panel (a) reports first-digit distributions for marital transfers given and received in REDS, pooling the 1999 and 2006 waves. Transfers above the wave-specific 99th percentile are excluded. Panel (b) compares dowry paid by the bride's family with *mahr*/*kabin* received by the bride in BIHS, separately for cash, gold or jewelry, and in-kind transfers. Within each payment form, the sample is restricted to marriages for which both the corresponding dowry and mahr components are positive, and each component is trimmed at its 99th percentile within the matched sample. The dashed line in both panels shows the Benford benchmark.

Figure 5 examines these possibilities in the pooled REDS sample while accounting for the strong relationship between transfer size and marriage timing. Panel (a) classifies transfers relative to the median amount within each REDS wave. We then calculate the full-significand Kuiper distance separately for transfers at or below and above the median at each elapsed-time interval. A substantial size gradient appears at short and intermediate durations: during roughly the first three decades, below-median transfers generally depart much more from the Benford benchmark than above-median transfers. The two series converge and eventually cross at longer durations.

Figure 5: Temporal Distance and Digit Conformity by Transfer Size



Notes: The figure reports full-significand Kuiper distances from the Benford benchmark by years elapsed between marriage and interview, pooling REDS 1999 and REDS 2006. Elapsed duration is grouped into two-year intervals. In Panel (a), transfers are classified as at or below versus above the median within each survey wave. In Panel (b), the median is calculated separately within each survey wave and two-year elapsed-duration interval. Within each elapsed-time–size cell, contributing survey waves receive equal total weight. Transfers above the wave-specific 99th percentile are excluded. Lower values indicate closer conformity to the Benford benchmark.

This comparison, however, does not account for the substantial evolution of nominal marital-transfer amounts over time. A transfer classified as small among recent marriages may occupy a very different part of the relevant distribution from one associated with a marriage several decades earlier. Panel (b) therefore defines relative size locally. Within each survey wave and elapsed-time since marriage, we calculate the median transfer and classify reports as at or below versus above this cell-specific median. This compares relatively smaller and larger transfers observed at approximately the same recall horizon.

The locally defined comparison shows that the size gradient is not simply driven by smaller nominal transfers being associated with more distant marriages. During approximately the first two decades from marriage, the two series are fairly similar and occasionally cross. From roughly 30 years onward, however, transfers at or below the local median generally exhibit larger Kuiper distances than transfers above it, with especially pronounced differences at several medium and long durations.[12]

To better understand what may be driving these patterns, Appendix Figure A6 divides transfers into terciles of real (rather than nominal) value separately within each REDS wave. In both waves, excess concentration on amounts beginning with 5 declines with real transfer size, and the highest tercile has the lowest Kuiper distance. The size gradient therefore does not appear to arise simply because older marriages involve mechanically smaller nominal amounts. Instead, it seems to be related to the economic size of the transfer itself.

[12] The same qualitative pattern appears when relative size is defined separately at each exact year since marriage rather than within two-year intervals.

5.6 Other Dimensions

We close by asking whether the reporting patterns documented above vary with respondent characteristics or with features of the institutional and survey environment.

Appendix Figure A7 shows little difference between male and female respondents. Their first-digit distributions are nearly identical, including the same pronounced excess mass on amounts beginning with 5. Kuiper distance also rises with elapsed time along very similar trajectories.

Differences by education are also modest. Appendix Figure A8 compares respondents with no schooling, one to five years of schooling, and more than five years. First-digit distributions are similar across the three groups. At long recall horizons, reports from respondents with no schooling are somewhat more variable and occasionally farther from the benchmark, but over most of the common support all groups display the same increase in Kuiper distance with elapsed time. Education therefore does not appear to explain the temporal gradient documented in Section 5.1.

We next examine the legal environment surrounding dowry. India prohibited both giving and receiving dowry under the Dowry Prohibition Act of 1961, initially with relatively modest penalties. The regime was strengthened in the mid-1980s: rules introduced in 1985 required records of wedding gifts, and the 1986 amendment increased criminal and financial penalties (see Alfano (2017) and Calvi and Keskar (2023) for details). These provisions did not apply in the same way to transfers governed by Muslim Personal Law.

We classify marriages into three groups: marriages not exposed to the national prohibition, including those before 1961 and Muslim marriages; non-Muslim marriages between 1961 and 1985; and non-Muslim marriages in 1986 or later. Appendix Figure A9 shows that the unexposed group has substantially more excess mass on amounts beginning with 5. This excess is smaller for marriages subject to the 1961 Act and smaller still under the post-1986 regime. The Kuiper profiles show the same broad ordering over the range of common support. Thus, stricter legal restrictions do not seem to be associated with more irregular numerical reporting; if anything, reports from exposed marriages lie closer to the benchmark. This pattern provides little support for the idea that the large departures observed in REDS are driven by respondents' reluctance to report an illegal transaction accurately.

Finally, we consider survey administration. Chiplunkar and Weaver (2023) document inconsistencies in the REDS 1999 recording of dowry questions in five states.[13] This provides a useful comparison between a known enumeration problem and a possible reporting problem.

Appendix Figure A10 shows that the two do not map closely onto one another. Conditional on a positive amount being recorded, reports from the problematic states (Andhra Pradesh, Gujarat, Maharashtra, Orissa, and Tamil Nadu) do not exhibit systematically larger departures from the Benford benchmark. Their first-digit distribution shows less excess mass on amounts beginning with 5, while their Kuiper profile rises with elapsed time in much the same way as in other states. We do not interpret this as evidence of better reporting in those states, because the known admin-

[13] The five states are Andhra Pradesh, Gujarat, Maharashtra, Orissa, and Tamil Nadu. In these states, whether dowry was paid could often be determined even when the corresponding amount was not reliably elicited or recorded. Chiplunkar and Weaver (2023) therefore retain these states when studying dowry prevalence but exclude them from their main analyses of dowry amounts; they show that their results are robust to using the later REDS round for these states instead.

istration problem affects whether an amount is elicited or recorded in the first place. Rather, the comparison suggests that, in this instance, problems in survey administration and irregularities in the numerical values reported conditional on observing an amount are distinct dimensions of data quality.

6 Conclusion

Retrospective reports of marital transfers are widely used to study the evolution of marriage markets and family institutions, often over periods for which contemporaneous records do not exist. Using information from more than 100,000 marriages in India, Bangladesh, Egypt, and Tanzania, we examine how the numerical properties of these reports vary with the circumstances under which the information is elicited. We use digit distributions comparatively: departures from the Benford benchmark are not treated as evidence that individual reports are inaccurate, but as diagnostics for systematic differences across groups of reports.

The clearest result is the relationship with temporal distance. Reports become less conforming as the time elapsed since marriage increases. This matters for research using retrospective marriage histories to study long-run change, because differences across marriage cohorts may reflect both genuine changes in transfers and systematic changes in reporting. Information about the marriage also matters: within households, reports concerning more closely related marriages exhibit greater conformity than reports concerning more distant relatives at similar recall horizons. Larger transfers also tend to lie closer to the benchmark when compared at similar elapsed durations.

At the same time, the cross-survey evidence shows why these patterns cannot be interpreted solely as differences in reporting quality. Across dowry, *mahr*, and bride-price settings, noncash transfers do not systematically depart more from the benchmark than cash transfers. Cash reports are often at least as focal as reports of jewelry or other in-kind goods, and differences by transfer direction depend on the type of payment being reported. These results point to a role for the structure of the underlying transactions themselves in shaping observed digit distributions.

More broadly, our findings underscore the importance of treating measurement as part of empirical analysis rather than as a fixed input into it. The properties of retrospective reported data can vary systematically with how, when, and from whom information is collected, as well as with the nature of the underlying transactions. Understanding these features is therefore important for interpreting empirical patterns, particularly when researchers rely on retrospective reports to study change over long periods.

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Appendix A: Additional Tables and Figures

Table A1: Survey Coverage and Analytic Samples

Dataset	Coverage	Transfer measure	Reporting unit
REDS 1999	India, 1900–1999	Dowry given or received	Kin-specific marriage report
REDS 2006	India, 1900–2009	Gifts given or received	Kin-specific marriage report
BIHS 2018–2019	Bangladesh, 2001–2019	Dowry paid and mahr/kabin received: cash, gold/jewelry, in-kind	Woman–marriage record
ELMPS 2006–2023	Egypt, four survey waves	Cash *mahr*, *shabka* jewelry	Individual–marriage record
KHDS 2004, 2010	Tanzania, two survey waves	Brideprice: cash and in-kind goods	Household receipt (2004); first marriage (2010)

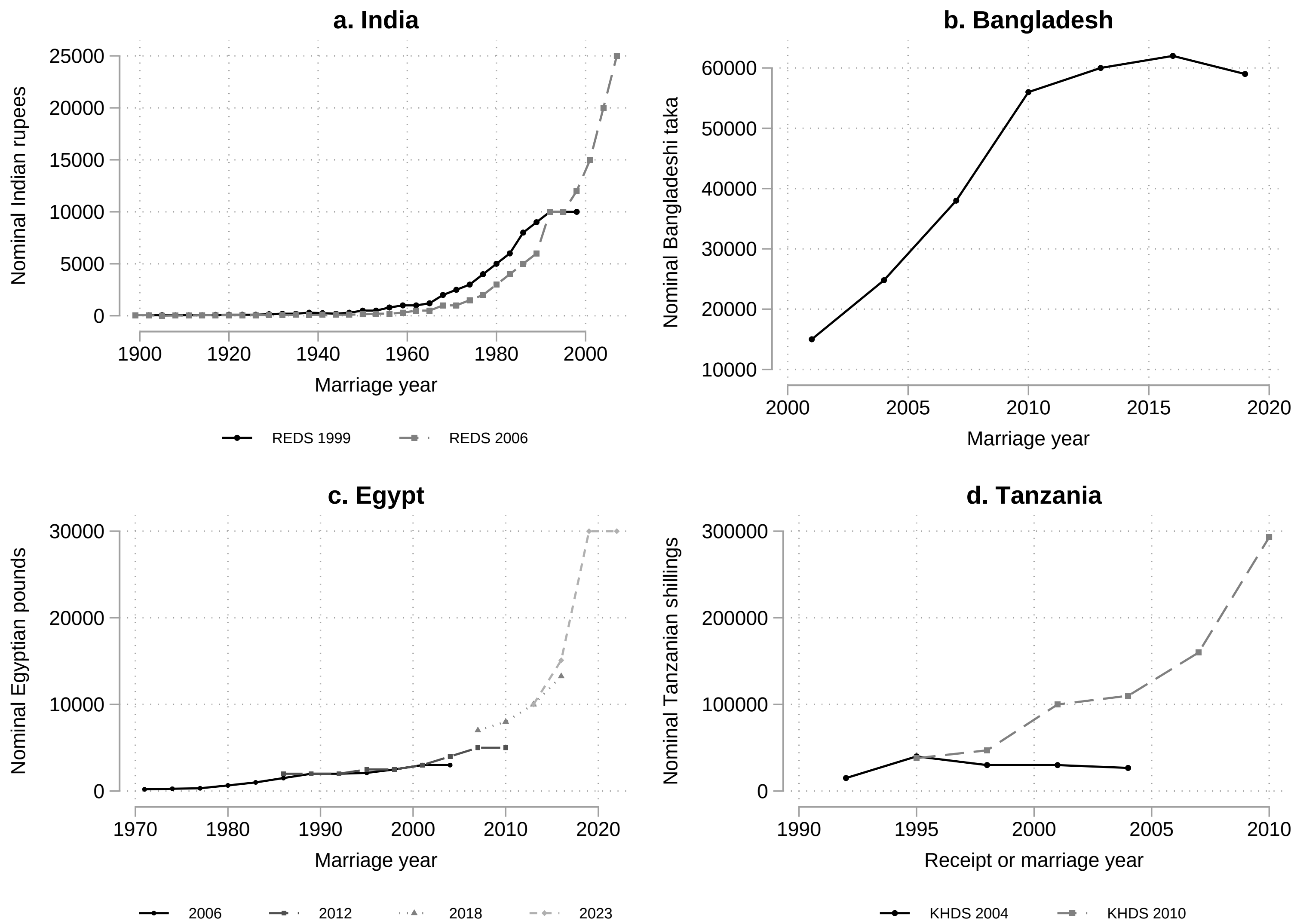
Notes: The table summarizes the surveys and marital-transfer measures used in the analysis. ELMPS uses the 2006, 2012, 2018, and 2023 survey waves.

Table A2: Sample Characteristics and Marital Transfers

			Transfer reports		Nominal local currency		2010 PPP-adjusted USD	
Dataset	Marriage years	Eligible *N*	Positive (%)	Missing (%)	Mean	Median	Mean	Median
REDS 1999	1900–1999	77,375	62.8	21.4	8,371	3,000	6,243	2,519
REDS 2006	1900–2009	53,827	88.3	11.7	7,630	1,800	3,298	1,384
BIHS 2018–19	2001–2019	3,800	77.4	0.3	75,556	50,000	2,591	1,833
ELMPS 2006	1967–2006	6,215	71.7	26.5	2,946	2,000	7,883	4,598
ELMPS 2012	1985–2012	12,294	81.4	16.5	5,254	4,000	5,021	3,771
ELMPS 2018	2008–2018	10,353	83.6	11.9	13,104	10,000	5,941	4,523
ELMPS 2023	2013–2023	10,023	77.8	18.7	25,480	20,000	6,538	5,139
KHDS 2004	1994–2004	386	98.2	1.3	55,654	30,000	221	123
KHDS 2010	1991–2010	606	58.9	0.8	138,567	82,250	443	296

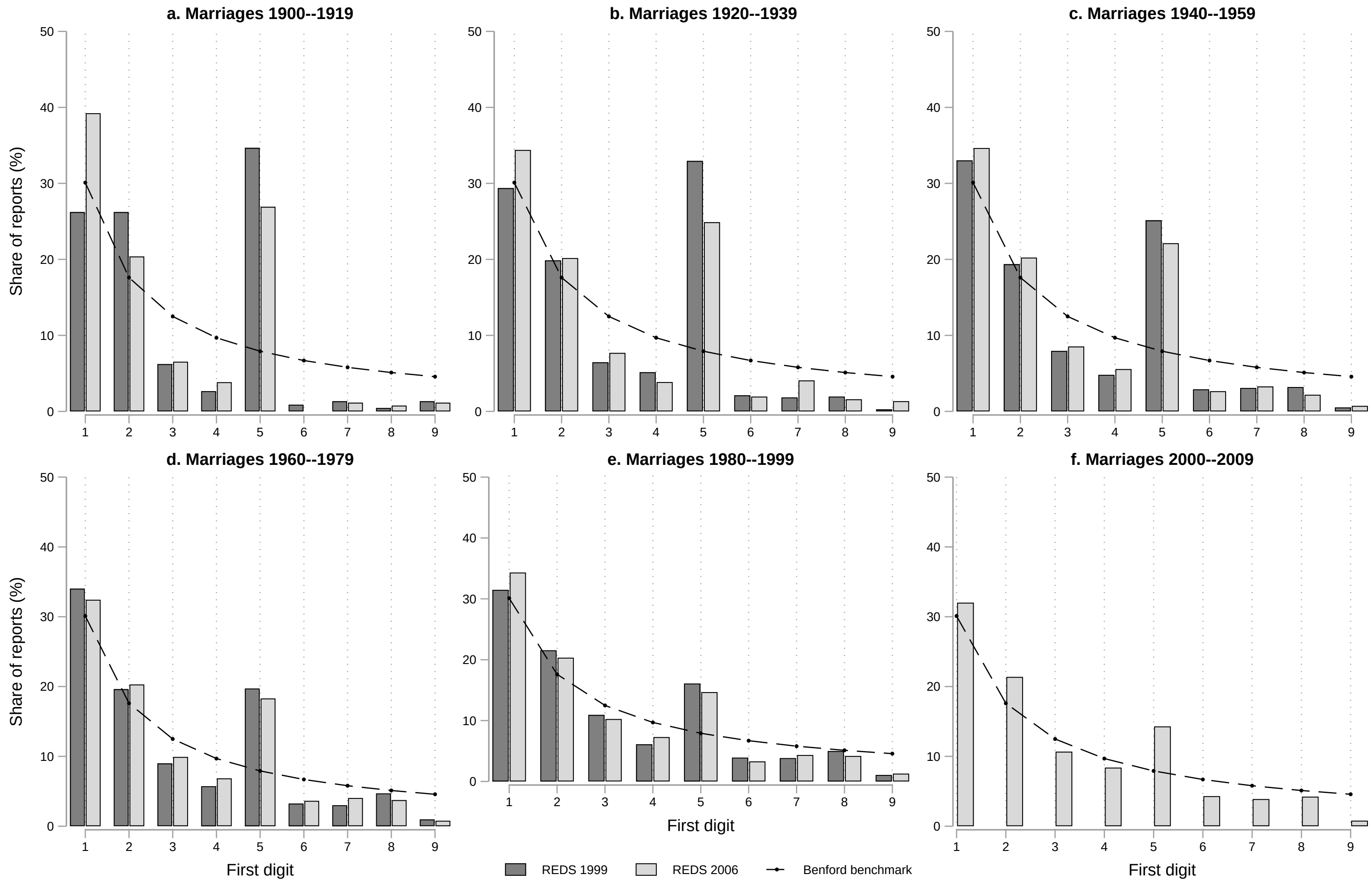
Notes: Eligible *N* counts records in the relevant questionnaire universe. REDS uses the direction-appropriate amount reported for each marriage. BIHS combines married-out women in Module XXA with resident or returned married women in Module XXB and defines total dowry as the sum of cash, gold or jewelry, and other in-kind components. BIHS marriage year is reconstructed from age at marriage and roster age and is available for 3,599 of 3,800 records. ELMPS defines the transfer as the sum of prompt *mahr* and *shabka*. A total is coded as missing when any required component is missing; the remaining nonpositive, nonmissing reports are zeros. We calculate positive and missing shares before trimming. Means and medians are conditional on a positive transfer and exclude values above the relevant dataset- or wave-specific 99th percentile. The final two columns express reported amounts in 2010 local currency and convert them to 2010 US dollars using the World Bank household-consumption PPP conversion factor. Real statistics require a valid dating year and CPI value; the KHDS dating convention is described below. KHDS includes household bride price receipts in 2004 and separate totals for parents and other relatives within each formal first marriage in 2010 (606 records from 303 marriages). Each total sums cash and in-kind goods; the 2004 total excludes land. Zero indicates no recorded payment to that recipient group. Nominal summaries use 376 positive reports in 2004 and 353 in 2010; the latter require satisfactory questionnaire completion. The KHDS 2004 year range and price adjustment use receipt year (1994–2004), assuming goods were valued at receipt; KHDS 2010 uses auxiliary estimated marriage year (Corno et al., 2018).

Figure A1: Median Nominal Marital Transfers by Marriage or Receipt Year



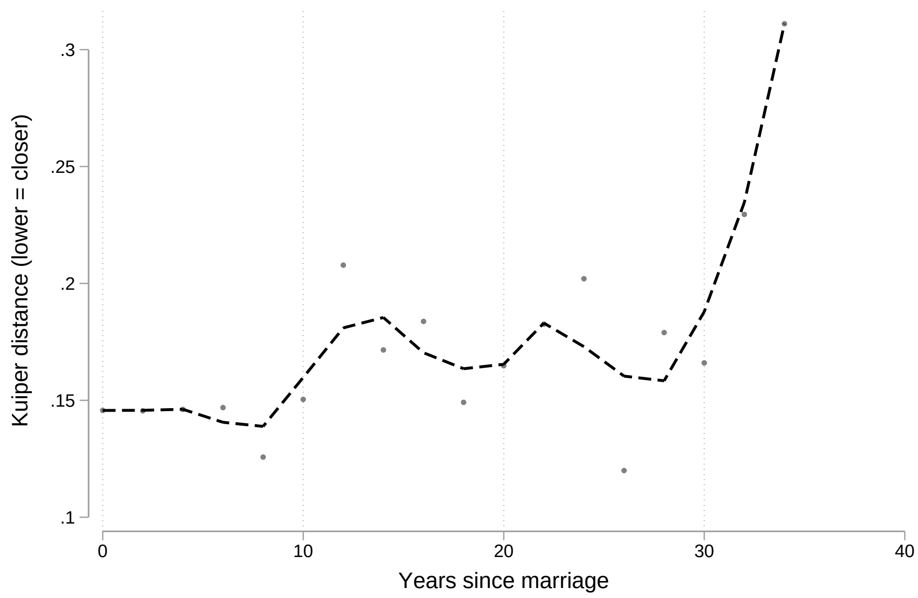
Notes: The figure reports median nominal marital-transfer amounts by marriage year in India, Bangladesh, and Egypt, and by marriage or receipt year in Tanzania. Years are grouped into three-year intervals. The India panel reports REDS 1999 and REDS 2006 separately; the Egypt panel reports the 2006, 2012, 2018, and 2023 ELMPS waves separately. The Tanzania panel reports KHDS 2004 and KHDS 2010 separately, using reported receipt year in 2004 and auxiliary estimated marriage year in 2010 (Corno et al., 2018). Observations are household receipts in 2004 and separate reports for parents and other relatives within each marriage in 2010; amounts sum cash and in-kind goods. Amounts are expressed in nominal local currency: Indian rupees, Bangladeshi taka, Egyptian pounds, and Tanzanian shillings. Calculations are restricted to strictly positive transfers after excluding values above the relevant dataset- or survey-wave-specific 99th percentile.

Figure A2: First-Digit Distributions by Marriage Decade in REDS



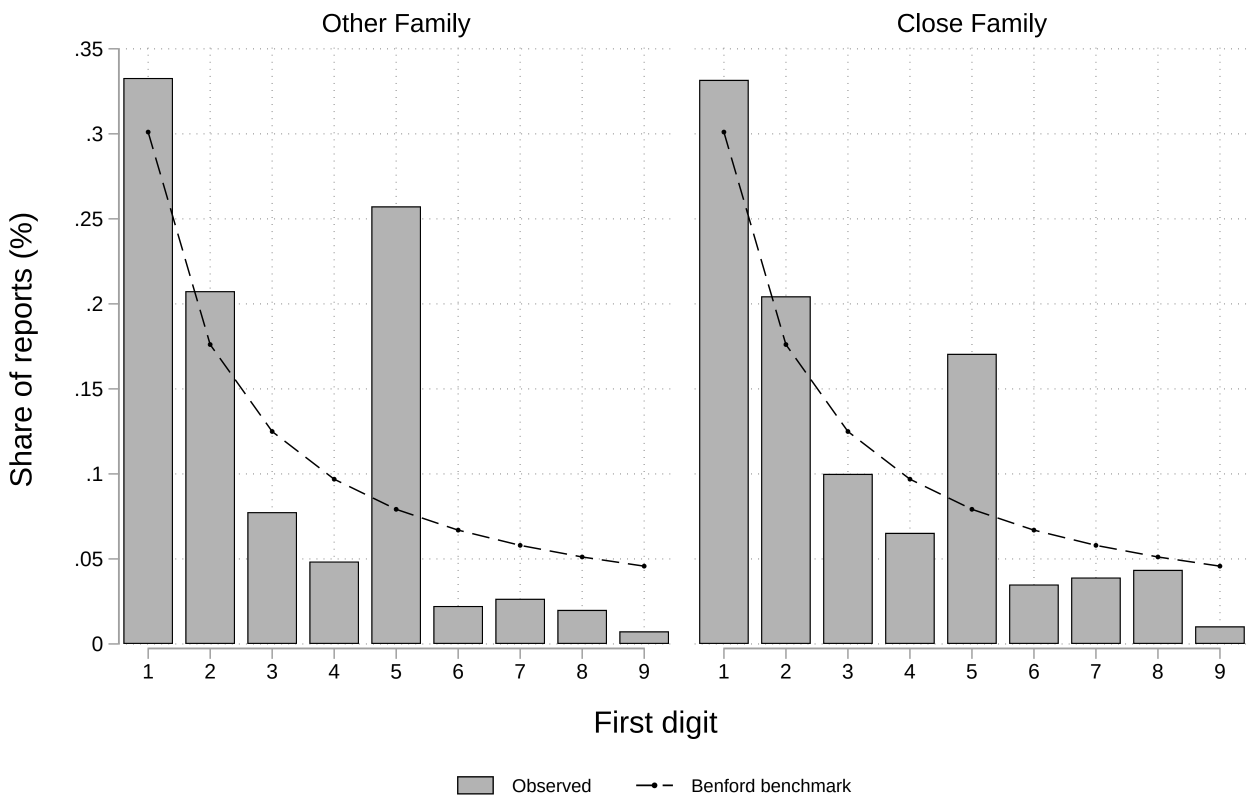
Note: Bars report observed first-digit shares; dashed lines report Benford shares. Dark bars denote REDS 1999 and light bars denote REDS 2006. The 2000–2009 panel contains REDS 2006 only.

Figure A3: Temporal Distance and Digit Conformity in ELMPS



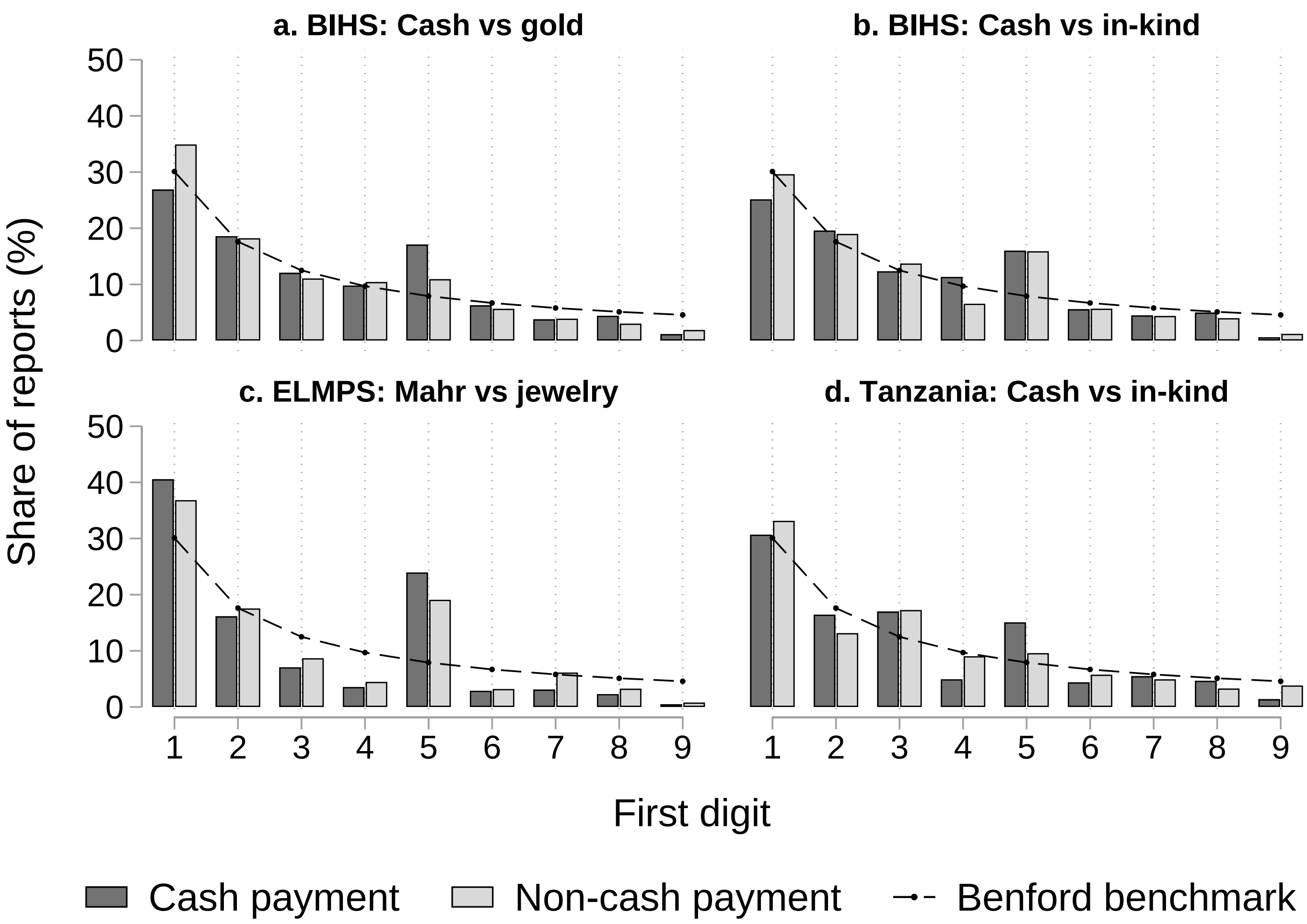
Notes: The figure reports full-significand Kuiper distance by years elapsed between marriage and interview. It pools ELMPS 2006, 2012, 2018, and 2023 and uses the sum of prompt *mahr* and *shabka* jewelry. Elapsed duration is grouped into two-year intervals; contributing waves receive equal total weight within each interval. Dots report interval-specific estimates; the dashed line is a LOWESS curve fitted through those estimates. Wave-by-duration cells with fewer than five observations and pooled cells with fewer than ten observations are excluded. Amounts are positive and below the wave-specific 99th-percentile cutoff. Lower values indicate closer conformity to the benchmark.

Figure A4: First-Digit Distributions by Kin Category



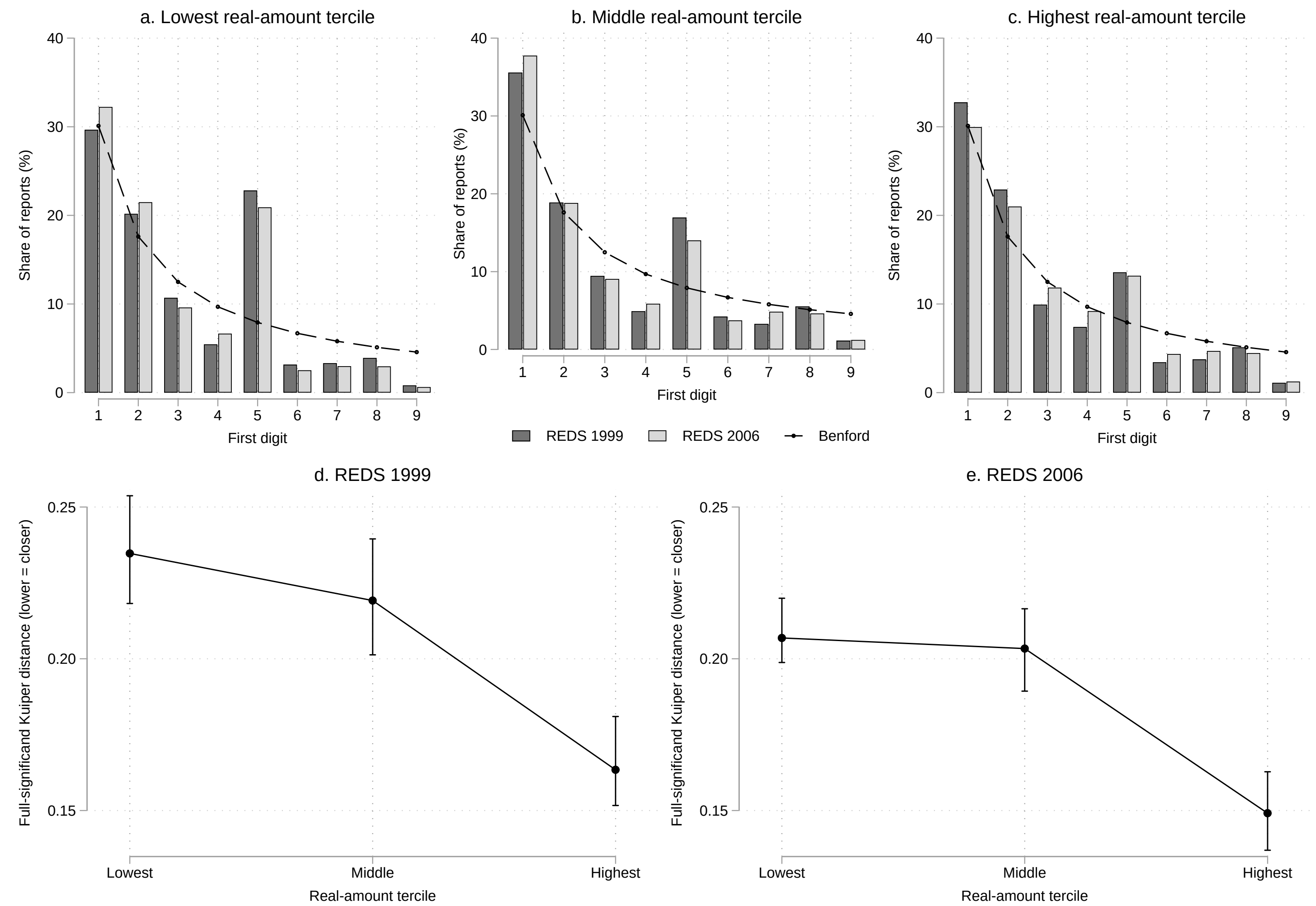
Notes: The figure pools observations from REDS 1999 and REDS 2006 and plots the distribution of the first significant digit separately for close-family and other-family reports. Close-family reports concern siblings or children of the household head; in REDS 1999, this category also includes the household head's spouse's siblings. Other-family reports concern parents. The dashed line shows the Benford benchmark. The figure is descriptive and does not adjust for recall duration or household fixed effects.

Figure A5: First-Digit Distributions of Cash and Non-cash Marital Transfers



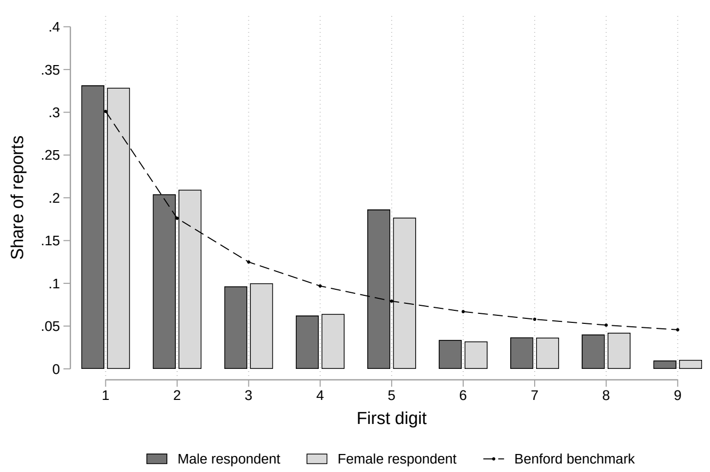
Notes: Bars report observed first-digit shares; dashed lines report Benford shares. Panels (a) and (b) compare cash dowry with gold or jewelry and other in-kind goods in BIhS. Panel (c) compares prompt *mahr* with *shabka* jewelry in ELMPS 2018. These three panels compare components reported for the same marriage and contain 796, 1,006, and 2,913 marriages, respectively. Panel (d) compares cash with non-cash goods in 192 household receipt reports from KHDS 2004 and 173 formal first-marriage reports from KHDS 2010, with both components observed in each report. Non-cash comprises in-kind goods excluding land in 2004 and cloth/clothing, blankets, banana beer, livestock, meat and other foods, hand tools, kerosene, and other goods in 2010. Amounts are positive and below their wave- and component- or form-specific 99th-percentile cutoffs.

Figure A6: Digit Conformity by Transfer Amount in REDS

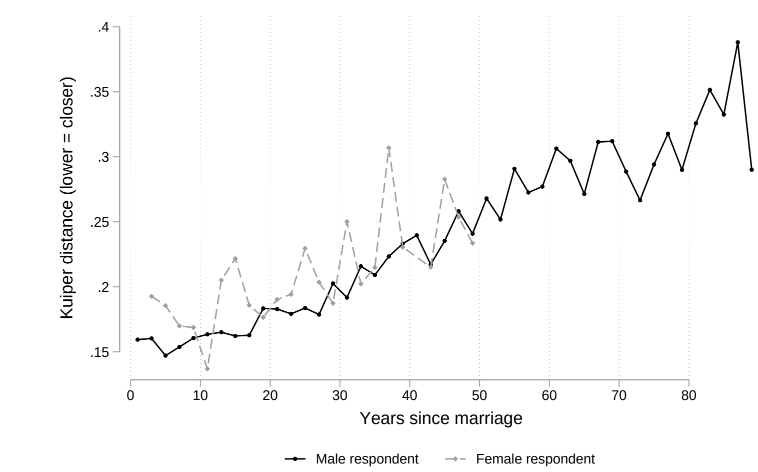


Note: Panels A–C report observed first-digit shares for the lowest, middle, and highest transfer-amount terciles. Dark bars denote REDS 1999, light bars denote REDS 2006, and dashed lines report Benford shares. Panels D and E report the full-significand Kuiper distance for each tercile in REDS 1999 and REDS 2006; lower values indicate closer conformity. Terciles are defined separately within each wave using transfers expressed in 2010 rupees from World Bank consumer-price-index data for marriages in 1960–2009. First-digit shares and Kuiper distances are calculated from the original nominal reports. Bars in Panels D and E are 95% confidence intervals from 1,000 village-clustered bootstrap replications. The lowest, middle, and highest terciles contain 13,002, 13,006, and 12,936 reports in REDS 1999 and 12,022, 12,056, and 11,985 reports in REDS 2006.

Figure A7: Digit Conformity by Respondent Sex



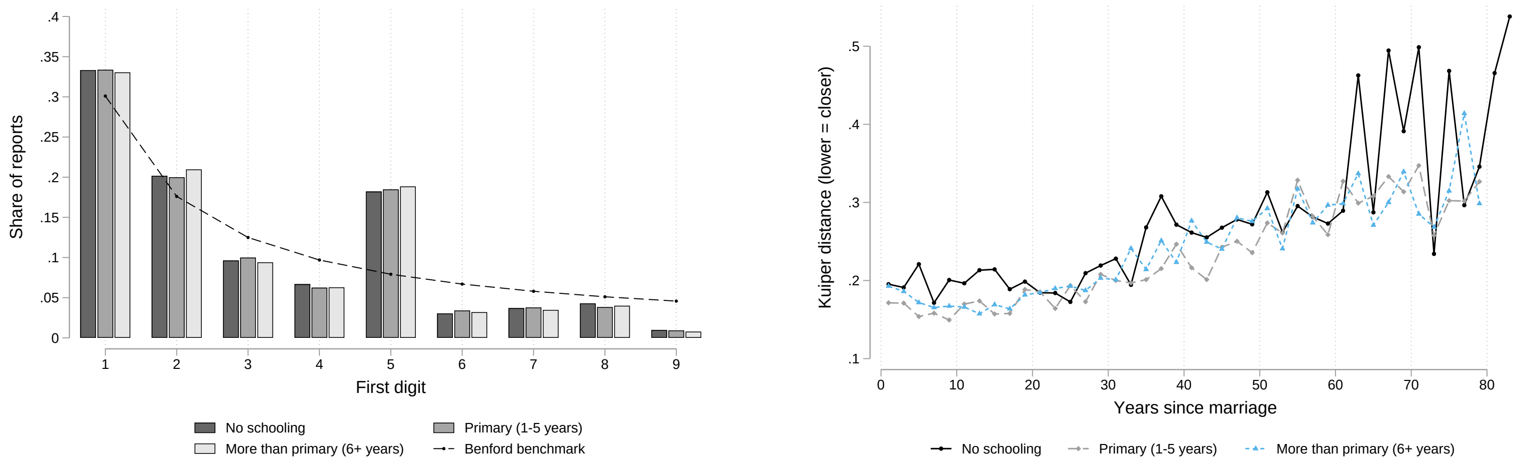
(a) First-digit distribution



(b) Kuiper distance by elapsed time

Notes: The figure pools REDS 1999 and REDS 2006. Panel (a) reports first-digit distributions separately for male and female respondents; first-digit shares are calculated within each survey wave and respondent-sex group and then averaged so that the two REDS waves receive equal weight. The dashed line shows the Benford benchmark. Panel (b) reports full-significand Kuiper distances by years elapsed between marriage and interview, using two-year elapsed-duration intervals. Within each elapsed-time–respondent-sex cell, contributing survey waves receive equal total weight. Cells with fewer than 100 observations are omitted. Transfers above the wave-specific 99th percentile are excluded. Lower Kuiper values indicate closer conformity to the benchmark.

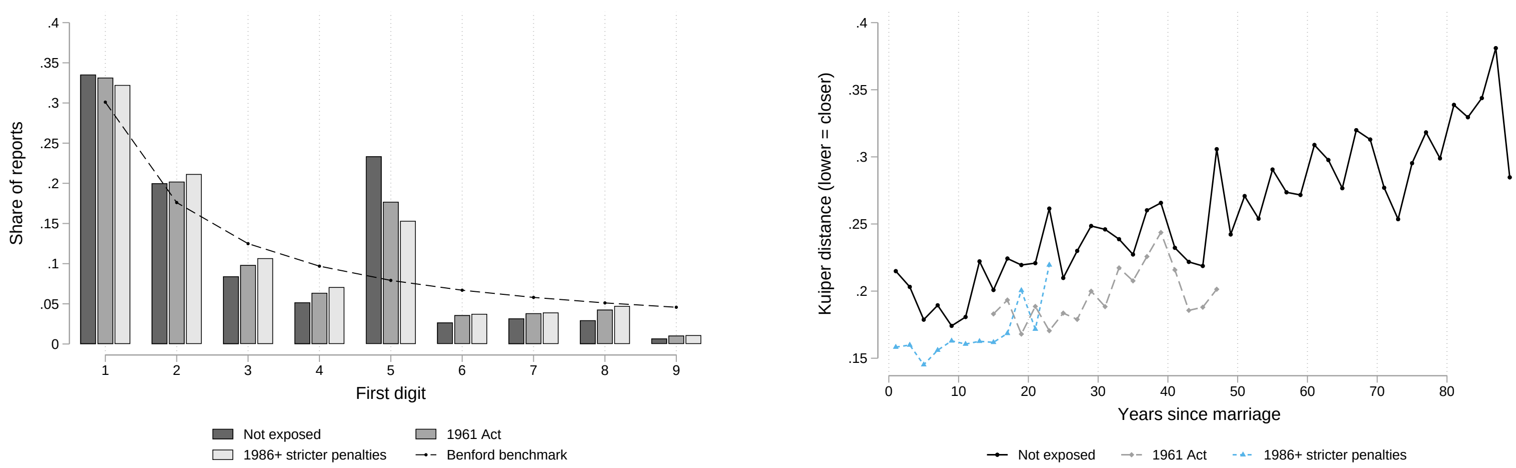
Figure A8: Digit Conformity by Respondent Education



(a) First-digit distribution (b) Kuiper distance by elapsed time

Notes: The figure pools REDS 1999 and REDS 2006. Respondents are classified as having no schooling, one to five years of schooling, or more than five years of schooling. Panel (a) reports first-digit distributions by education group; shares are calculated within each survey wave and education group and then averaged so that the two REDS waves receive equal weight. The dashed line shows the Benford benchmark. Panel (b) reports full-significand Kuiper distances by years elapsed between marriage and interview, using two-year elapsed-duration intervals. Within each elapsed-time–education cell, contributing survey waves receive equal total weight. Cells with fewer than 100 observations are omitted. Transfers above the wave-specific 99th percentile are excluded. Lower Kuiper values indicate closer conformity to the benchmark.

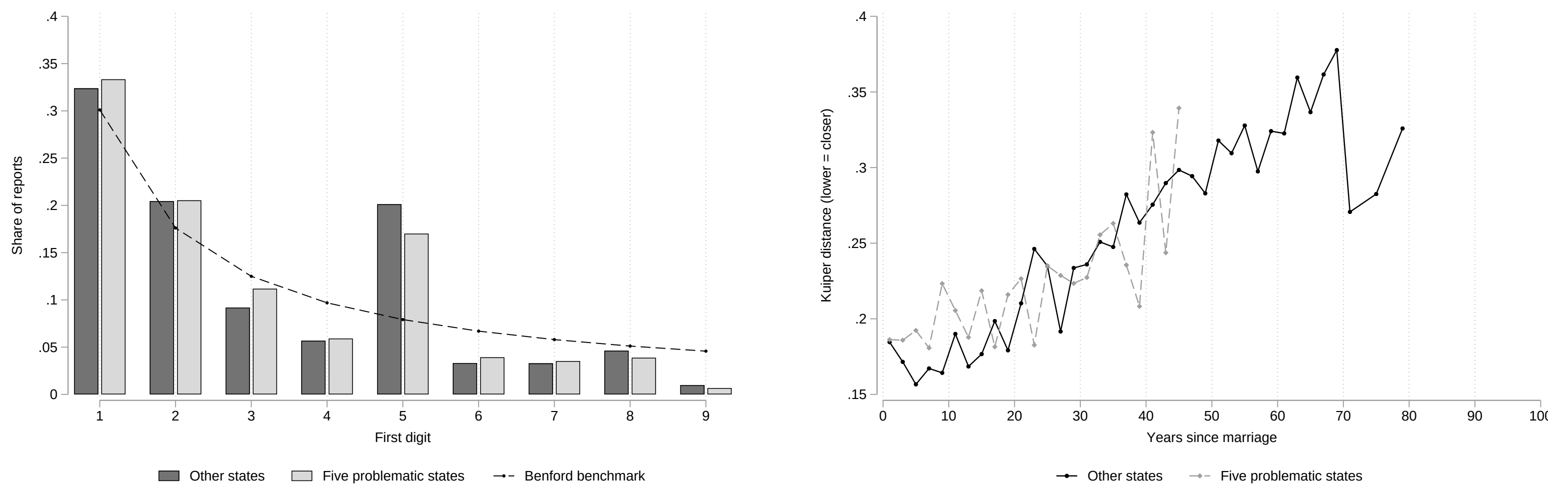
Figure A9: Digit Conformity by Exposure to Anti-Dowry Legislation



(a) First-digit distribution (b) Kuiper distance by elapsed time

Notes: The figure pools REDS 1999 and REDS 2006. Marriages are classified into three legal environments. "Not exposed" includes marriages occurring before 1961 and Muslim marriages, which were not subject to the Dowry Prohibition Act. "1961 Act" includes non-Muslim marriages occurring between 1961 and 1985. "1986+ stricter penalties" includes non-Muslim marriages occurring in 1986 or later, after the substantial tightening of penalties and enforcement. Panel (a) reports first-digit distributions by legal-exposure category; shares are calculated within each survey wave and category and then averaged so that contributing REDS waves receive equal weight. The dashed line shows the Benford benchmark. Panel (b) reports full-significand Kuiper distances by years elapsed between marriage and interview, using two-year elapsed-duration intervals. Within each elapsed-time–legal-exposure cell, contributing survey waves receive equal total weight. Cells with fewer than 100 observations are omitted. Transfers above the wave-specific 99th percentile are excluded. Lower Kuiper values indicate closer conformity to the benchmark.

Figure A10: Digit Conformity in States with Known Enumeration Problems

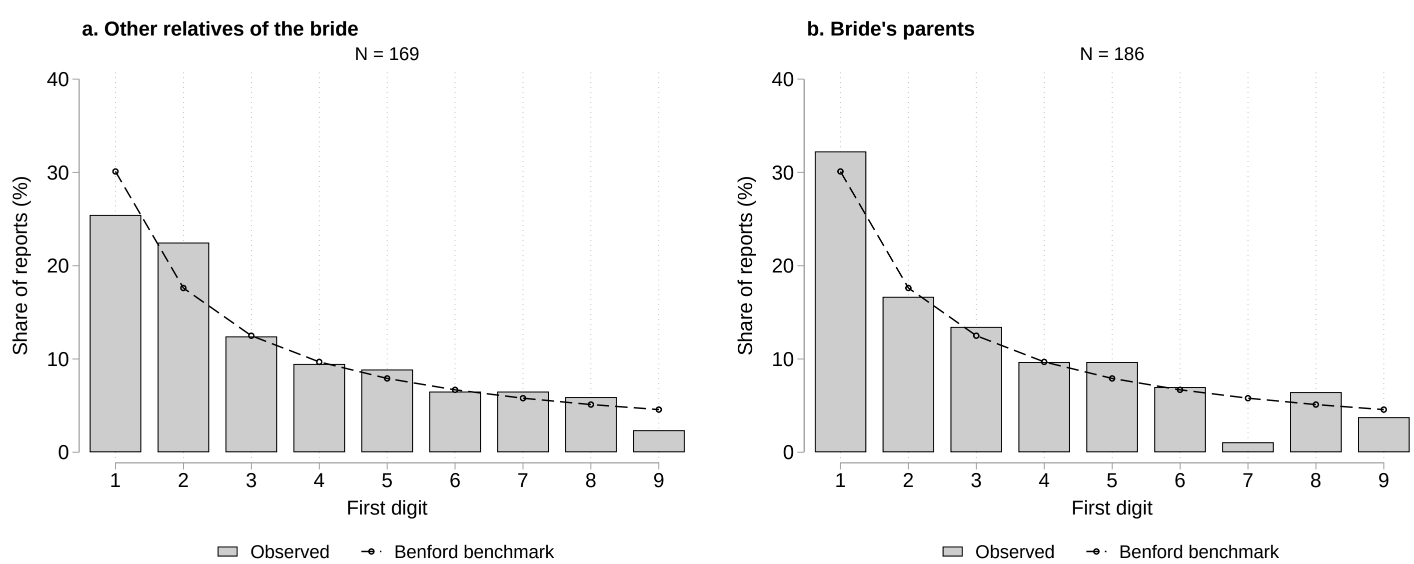


(a) First-digit distribution

(b) Kuiper distance by elapsed time

Notes: The figure uses REDS 1999 only and compares marriages reported in Andhra Pradesh, Gujarat, Maharashtra, Orissa, and Tamil Nadu with marriages reported in all other states. These five states are identified by Chiplunkar and Weaver (2023) as having inconsistencies in the administration of the dowry-amount questions. Panel (a) reports first-digit distributions for positive observed transfer amounts in the two groups; the dashed line shows the Benford benchmark. Panel (b) reports full-significand Kuiper distances by years elapsed between marriage and interview, using two-year elapsed-duration intervals. Cells with fewer than 100 observations are omitted. Transfers above the REDS 1999 99th percentile are excluded. Lower Kuiper values indicate closer conformity to the benchmark.

Figure A11: First-Digit Distributions by Payment Recipient in Tanzania



Notes: Bars report observed first-digit shares; dashed lines report the Benford benchmark. The figure uses KHDS 2010 and sums cash and goods paid to each recipient group in formal marriages. Other relatives are the bride's aunts, uncles, grandparents, and brothers. Each panel includes positive complete reports within its recipient-specific 99th-percentile cutoff. The samples contain 169 reports for other relatives and 186 for parents; 86 marriages appear in both panels. Kinship identifies the payment recipient.

Appendix B: Computing the Kuiper Distance

This appendix provides additional details on the full-significand diagnostic used throughout the paper. For each positive reported amount x_i, define

$$u_i = \log_{10}(x_i) - \lfloor \log_{10}(x_i) \rfloor.$$

The transformation removes powers of ten while retaining the position of the reported amount within its order of magnitude. For example,

$$\log_{10}(5{,}400) = 3 + \log_{10}(5.4),$$

so that $u = \log_{10}(5.4) \simeq 0.732$. The amount 54,000 produces the same value of u, since multiplying an amount by a power of ten changes only the integer part of its logarithm.

Under Benford's law, the transformed variable u follows a uniform distribution on $[0,1)$. We therefore compare its empirical cumulative distribution function, denoted $\widehat{F}(u)$, with the uniform CDF $F_0(u) = u$. For an unweighted sample, order the transformed observations as

$$u_{(1)} \leq u_{(2)} \leq \cdots \leq u_{(n)}.$$

The largest upward and downward discrepancies between the empirical and uniform CDFs are

$$D^+ = \max_{i=1,\ldots,n} \left\{ \frac{i}{n} - u_{(i)} \right\}$$

and

$$D^- = \max_{i=1,\ldots,n} \left\{ u_{(i)} - \frac{i-1}{n} \right\}.$$

The Kuiper distance is

$$V = D^+ + D^-.$$

Thus, rather than recording only the single largest absolute discrepancy, the Kuiper statistic incorporates the largest departure in both directions. A value of zero corresponds to exact conformity with the benchmark; larger values indicate greater departures.

To illustrate the calculation, suppose that five reported amounts produce the following transformed values:

$$0.05, \quad 0.22, \quad 0.52, \quad 0.73, \quad 0.90.$$

The relevant calculations are

i	$u_{(i)}$	$\frac{i}{n} - u_{(i)}$	$u_{(i)} - \frac{i-1}{n}$
1	0.05	0.15	0.05
2	0.22	0.18	0.02
3	0.52	0.08	0.12
4	0.73	0.07	0.13
5	0.90	0.10	0.10

The largest positive discrepancy is therefore $D^+ = 0.18$, while the largest negative discrepancy is $D^- = 0.13$. The Kuiper distance for this illustrative sample is

$$V = 0.18 + 0.13 = 0.31.$$

The value 0.31 does not have a percentage interpretation and does not imply that 31% of the observations are inaccurate. It simply summarizes the distance between the observed full-significand distribution and the Benford benchmark and is primarily useful for comparisons across groups of reports.

Some of our analyses combine observations using non-uniform weights. Let $w_{(i)}$ denote the normalized weight associated with $u_{(i)}$, with $\sum_i w_{(i)} = 1$, and let

$$C_i = \sum_{j=1}^{i} w_{(j)}, \qquad C_0 = 0.$$

The weighted analogues are

$$D_w^+ = \max_i \{C_i - u_{(i)}\}, \qquad D_w^- = \max_i \{u_{(i)} - C_{i-1}\},$$

and

$$V_w = D_w^+ + D_w^-.$$

This is the calculation used when, for example, we give contributing survey waves equal total weight within an elapsed-duration cell.

Finally, the Kuiper distance is invariant to multiplying all observations by a common positive constant. Multiplication by a constant adds the same quantity to each $\log_{10}(x_i)$ and therefore rotates the transformed values around the unit interval. The Kuiper statistic is invariant to such rotations, so its value does not depend on whether, for example, transfers are expressed in rupees or thousands of rupees.