

Self-reported reservation wages in high-unemployment contexts

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Abstract

We show that responses to a traditional, open-ended reservation-wage question are susceptible to a high degree of overestimation and response noise when individuals are rarely confronted with actual wage offers. We argue that, for individuals with weak labor market attachment, a sequence of increasing hypothetical wage offers can more reliably elicit individual preferences: it contains more information about future decisions; it is less sensitive to irrelevant priming effects and more responsive to the economic circumstances of respondents. This has implications for a variety of empirical models in labour economics.

KEYWORDS: reservation wages, measurement error, youth unemployment

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1. Introduction

Variables of interest to economists are often difficult to measure with survey data. Different formulations of the same question can trigger different cognitive and non-cognitive processes and hence produce contrasting responses. This applies especially to information obtained through the use of subjective questions. Indeed, the behavioral literature shows that a multitude of factors can influence answers to subjective questions, so much as to raise concerns about the meaningfulness of the information respondents provide (Bertrand and Mullainathan, 2001).²

An established empirical literature in labor economics relies on survey measures of unemployed individuals' reservation wages, where respondents are asked to report the lowest wage they would work for.³ Studies show that self-reported reservation wages have predictive power for a variety of labor market outcomes, including unemployment duration—see Devine and Kiefer (1991), for a review of earlier studies in this literature, and Krueger and Mueller (2016) for recent evidence using high-frequency longitudinal data. At the same time, most contributors to the literature acknowledge the error that may exist in self-reported measures of reservation wages. Krueger and Mueller (2016), for instance, conclude that “for the very long-term unemployed, the reservation wage is [...] a noisier signal of the true underlying reservation wage (p.174).” This echoes earlier work by Brown and Taylor (2011)

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² Sudman et al. (1996) offer a review of the experimental evidence on survey questions. Jahedi and Méndez (2014) provide evidence from laboratory experiments on various cognitive biases of subjective measures.

³ The actual wording of the question varies. Examples are: “What is the lowest amount in take-home pay that you would be prepared to accept from a new job?” (Jones, 1988); “Suppose someone offered you a job today. What is the lowest wage or salary you would accept (before deductions) for the type of work you are looking for? (Krueger and Muller, 2016). “What is the lowest wage or salary you would accept (before deductions) for this type of work?” (Feldstein and Poterba, 1984).

showing that those furthest away from the labor market are the least likely to have a reservation wage in line with the predicted market wage.⁴

There are several reasons why the “traditional”, open-ended, reservation wage question may elicit unreliable responses. Kahnemann and Frederick (2005) explain that the reasons “why thoughts become accessible – why particular ideas come to mind at particular times – ... encompasses notions of stimulus salience, associative activation, selective attention, specific training, and priming” (p. 271). A question about the lowest acceptable wage may prompt selective and limited recall from passive memory (Gennaioli and Shleifer, 2010) about memorable wage values, such as desired, fair or previous wages. Gehlbach and Barge (2012) show that previous survey questions can also act as an anchor. Since adjustments away from this initial thought or anchor towards the true reservation wage require effort (Epley and Gilovich 2006), adjustments tend to be insufficient. Job-seekers with stronger labor market attachment, who have had to contemplate rejecting actual low wage values and hence have “specific training” in thinking about reservation wages, should more easily access memories and thoughts about actual reservation wages instead of other, less relevant wage values.

An alternative way of eliciting reservation wages is to ask individuals to consider whether or not they would reject specific wage offers. There are at least two reasons why this type of question could provide more reliable responses than an open-ended wage question. First, instructing individuals to consider specific wage offers may generate accessibility of anchor-inconsistent knowledge. This could lead to new insights about own preferences and thus debias reservation wage responses. This is to some extent related to the debias technique of “consider-the-opposite”, which requires individuals to think of reasons why an anchor is inappropriate (Mussweiler et al., 2000). Second, individuals may be less inclined to carefully scrutinize their preferences when presented with a large number of choices, such as the range of all monetary values. Studies of “choice overload” effects show that they are particularly strong for individuals who lack familiarity with or prior preferences for the choice domain (e.g. Scheibehenne et al., 2010).

In this paper, we argue that the traditional self-reported reservation wage measure may be relatively unreliable in contexts where weak and/or occasional attachment to the labor market is the norm. Prevalent joblessness implies that many individuals have few opportunities to evaluate specific wage offers and may therefore be less knowledgeable about their own reservation wages. Such individuals may also be more prone to provide reservation wage responses that are sensitive to priming effects and other irrelevant factors. Holzer (1986), for

⁴ These patterns are also consistent with evidence from a number of European studies (e.g. Boeri and Garibaldi (2002), Sestito and Viviano (2011)) documenting that in high unemployment areas (e.g. southern parts of Italy and Spain), reservation wages are higher on average than in low unemployment regions, conditional on productivity.

instance, shows that responses to an open-ended question about the lowest acceptable wage for the sought job are frequently contradicted by responses to whether or not the individual would accept a specific low-wage offer as well as by subsequently accepted wage offers. This inconsistency appears to be more severe for black respondents and particularly those from the U.S. South.⁵

We investigate whether formulating a question that more accurately mimics the way in which wage offers are made in the labor market could elicit more reliable reservation wage responses when posed to a group of individuals with relatively weak attachment to (and knowledge of) the labor market. We explore this idea using data from South Africa, a country characterized by high and persistent unemployment. We use a series of survey questions on whether individuals would accept specific hypothetical wage offers, each of which is associated with an occupation, and compare the responses to those from the traditional question on the lowest acceptable wages. It is possible that when responding to hypothetical wage questions individuals are required to carefully probe their preferences in a way that is not needed when providing an answer to the traditional open-ended question. We will therefore refer to this measure as the “probed” reservation wage measure to distinguish it from the “traditional” measure. Both types of questions were asked to a cohort of young South Africans in the Cape Area Panel Study (CAPS, 2002-2009) with the view of obtaining a more comprehensive picture of the lowest wage respondents would truly accept (see Lam et al. 2013).⁶

There are, of course, also reasons to doubt the reliability of responses to a series of hypothetical wage offers. First, the resulting reservation wage variable will consist of interval data, which is necessarily less informative than point data. Secondly, even though associating different hypothetical wage offers with specific occupations adds context and realism to these offers, it may also affect responses through the individuals’ evaluations of the non-wage attributes (e.g. safety, prestige or gender norms) of these occupations. Finally, the series of wage offer questions used are only hypothetical offers, so that survey responses may still differ from how individuals would react to actual job offers. Although we will not attempt to argue that the reservation wage implied by the responses to these hypothetical offers are entirely accurate or reliable, we provide evidence that reservation wages derived from such

⁵ Holzer suggests that one explanation may be that open-ended reservation wage questions allow individuals to confound wage expectations with reservation wages, and that black job-seekers are either more likely to misinterpret the question than whites or have a “greater degree of expectational error” (p.43). Similarly, Petterson (1997) finds that responses to self-reported reservation wages are less revealing for black respondents and that their answers are primarily a reflection of aspirations or perceptions of self-worth rather than a prediction of actual labor market behavior.

⁶ CAPS is a collaborative project of the University of Michigan and the University of Cape Town. More information is available on the CAPS website: www.caps.uct.ac.za.

responses are preferable to those obtained from the traditional question, particularly for individuals with weak labor market attachment.

Our empirical argument proceeds in three steps. First, we show that self-reports on the lowest acceptable wage appear to be conflated with perceptions about expected, fair or desired wages, and are more frequently contradicted by subsequently accepted wages. These inconsistencies are particularly severe for those with weak labor market attachment. Moreover, we show that the traditional reservation wage measure is more sensitive to irrelevant priming effects in the survey questionnaire than the probed measure.

In a second step, we regress the reservation wage measures on a number of standard explanatory variables in empirical labor economics (e.g. non-labor assets, predicted wages, transportation costs). The estimated regression coefficients confirm that these variables have more explanatory power for the probed than the traditional reservation wage measure. We also include in these regressions proxies representing labor market attachment. Having weaker labor market attachment should be negatively correlated to the true reservation wage (via the decreased wage offer arrival rate), but we show that it simultaneously provides fewer opportunities for young job-seekers to downwardly adjust their unrealistic wage expectation, which upwardly biases the traditional reservation wage measure.

In the final empirical step, we rely on the presumed theoretical relationship between the true reservation wage and a variety of labor market outcomes to analyze the relative reliability of the two measures available in our survey. First, we show that the probed reservation wage is negatively associated with probability of employment (conditional on observable productivity), as predicted by standard search models, while the traditional measure is not. Moreover, the probed measure is a stronger predictor of future accepted wages. We then show that a combined variable that uses information from both measures is more informative than either measure on its own. While both measures are imperfect reflections of true reservation wages, a weighted average of the two variables allows us to estimate their relative informational content (i.e. relative reliability). We find that the difference in the relative reliability of the two measures is remarkable for individuals with weak labor market attachment, with the probed measure carrying significantly more information.

Overall, the results presented in the paper suggest that empirical analyses of employment and wage determination in high-unemployment contexts may need to account for the low reliability of self-reported reservation wages. In addition, the paper motivates novel investigations of the differentials in reservation wages across population groups and/or regions documented in a variety of contexts (e.g. Black/White in the U.S. or North/South in some European countries). In particular, our analysis renders less plausible the suggestion that unemployed youth belonging to certain groups/regions may be more likely to price

themselves out of employment (due to a combination of cultural or historical factors). We suggest a simpler explanation for these patterns: self-reported reservation wages in traditional survey questions are susceptible to a higher degree of overestimation when individuals are rarely confronted with actual wage offers.

The rest of the paper is organized as follows. Section 2 provides background information on labor markets in South Africa. Section 3 and 4 describe the data and the reservation wage measures, respectively. Section 5 and 6 report and discuss the empirical results. Section 7 concludes.

2. Reservation wages in South Africa

The South African literature on reservation wages is surprisingly limited given the extent of the unemployment problem in the country. The strict unemployment rate is 26.4%, and it is even higher amongst the youth, at 36.9% (Statistics South Africa, 2015).

The few existing studies of reservation wages obtain predictions of the remuneration unemployed respondents could expect given their characteristics and compare it to self-reported reservation wages in an attempt to assess whether or not these are unrealistically high. Using the PSLSD (1993) and the October Household Survey (1994), Kingdon and Knight (2001) find that most unemployed respondents have higher reservation wages than their ‘predicted’ wage. The authors draw no further conclusions about this relationship as they consider the answers to the reservation wage question in the surveys to be unreliable. Nattrass and Walker (2005) use a dataset from Cape Town, which was explicitly designed to obtain more reliable reservation wage data. The authors estimate Heckman-corrected predicted wages and use this information to generate a variable that equals one for individuals whose reservation wage was greater than the predicted wage (and zero otherwise). Using this as an explanatory variable in an employment regression, they find that high reservation wages are positively associated with employment. Nattrass and Walker (2005) then conclude that workers appear to have realistic wage expectations. In a more recent study, based on the South African Young Persons Survey (SAYPS), Rankin and Roberts (2011) show instead that young labor market participants overestimate their wage prospects. Reservation wages for their sample of young respondents decline until the age of 30 and following the first labor market experiences. The authors suggest a number of potential factors that could explain high youth reservation wages; these include transportation costs,⁷ social grants, and the hope of finding high-paying jobs in large rather than small firms.

⁷ In South Africa, many unemployed live in locations far away from potential workplaces. This is one of the legacies of Apartheid-era forced removals.

Banerjee et al. (2008) list a few features of the South African institutional context that could bring reservation wages to levels firms are unwilling to pay. First, although unemployment benefits are only given to a small proportion of the unemployed, state pensions and other government transfers are very generous by middle-income country standards (Case and Deaton, 1998). For example, much attention in the literature has been given to the effect of the old age pension (OAP) on labor market outcomes because of its unique combination of high coverage and value.⁸ Banerjee et al. (2008) also suggest that the political transformation could have led to unrealistic expectations of wage prospects amongst black South Africans.

3. The Cape Area Panel Study

This paper uses data from the Cape Area Panel Study (CAPS). The CAPS is a longitudinal survey of a representative sample of youth in the Cape Town metropolitan area. The first wave was conducted in 2002, interviewing 4,752 young people between the ages of 14 and 22 living in 3,304 households. CAPS originated from a collaboration between the University of Cape Town and the University of Michigan and it constitutes an important source of information for the study of youth in post-apartheid South Africa. Lam et al. (2013) offer an overview of the data as well as detailed information on study design, enumeration areas and sample selection in each wave.

The sample clusters were taken from the 1996 Census enumeration areas with the aim to achieve equal sub-samples of African and Coloured youths. Individual weights are provided to adjust for over-sampling as well as for individual non-responses. The original sample was followed over five waves during the period 2002 to 2009. Wave 2 of the survey took place in two distinct phases in 2003 and 2004 (Waves 2a and 2b). Waves 3 and 4 were conducted in 2005 and 2006, respectively. The last round of CAPS, Wave 5, re-interviewed the sample and their households for a fifth time in 2009.

Young men and women in South Africa face very different labor supply decisions due to gendered social norms and fertility decisions, so our empirical analysis of reservation wages is simplified by restricting our sample to young males. The number of male observations and sample characteristics in each wave are reported in Table A1 in the Appendix. Since the set of job offer questions were not asked in Wave 1, most of our analysis will be based on the panel sample from Waves 2 to 5. The total attrition rate between these waves (2003-2009) is 26.3%.⁹ Despite non-negligible attrition, we have at least two consecutive panel observations for 85.7% of the sample (see Table A2 in the Appendix). Having longitudinal information for

⁸ For example, in 2012, the OAP paid out about 175% of the national median per-capita income. The vast majority of black South Africans were eligible to receive the grant once they turned 60 years. Given that only 7 percent of pensioners live without a prime-age household member (Sienaert 2008), the literature has found significant intra-household resource transfers (e.g. Duflo, 2003, Ardington et al., 2009).

⁹ The overall attrition rate between Waves 1 and 5 (2002-2009) is about 38%.

most of our sample allows us to observe transitions into the labor market and variation in reservation wages over time. As shown in Table A1, 38% of the sampled male youth were employed and 43% in school in Wave 2. By the fifth wave, only 9% were still studying and 63% of the sample was working.

4. Two measures of reservation wages

Crucially for our purposes, the CAPS surveys asked two sets of questions that allow us to infer the respondents' reservation wages. These questions were posed to all respondents independent of their employment status. The first (and traditional) question was: "*What is the absolute lowest take-home wage that you would accept for any permanent, full-time work?*". The second is a series of questions about whether or not respondents would accept a sequence of increasing hypothetical wage offers, e.g. "*Would you accept a job as general worker for a monthly wage of R1438?*", "*Would you accept a job as machine operator for a monthly wage of R1619?*".¹⁰ Individuals who respond that they would accept a job offer of R1619 but would decline a job offer of R1438 are therefore interpreted to have a reservation wage in the (R1438, R1619] interval. Respondents who would decline all hypothetical job offers (this share ranges between 5% of the sample in wave 4 and 35% in wave 5) have reservation wages that exceed the highest wage offer.

For the second reservation wage measure, we use an interval regression to impute the most likely point values that would have produced the observed categorical responses. This approach assigns to each categorical response (including the open interval) the expected value of the reservation wage conditional on being within the specified interval (and the underlying reservation wage being log-normally distributed). Since the (unobservable) exact reservation wage value is almost certainly different from the conditional expectation, this approach necessarily introduces noise into our measure. This issue notwithstanding, if the series of hypothetical wage offer questions are able to elicit the correct reservation wage interval from survey respondents, then the (noisy) point estimate will have relatively accurate bounds and may still be less imprecise and biased than responses to the traditional reservation wage question.

We hypothesize that many individuals do not spend extensive time thinking about the absolute lowest wage they would accept, unless they are explicitly confronted with a low wage offer that needs to be rejected or accepted. This is particularly true for people with weak labor market attachment, who infrequently encounter offers that require them to probe

¹⁰ Across the different waves of CAPS, there have been up to 7 different job options, as well as various wage steps attached to these offers (see Appendix Table A3). As a comparison, monthly median wages in South Africa in the early 2000s were in the order of R1400 (Wittenberg, forthcoming). In all waves, the traditional reservation wage question was asked before the hypothetical job offers (in some waves, immediately before).

their preferences in this regard. When suddenly asked to report their lowest acceptable wage, some individuals may therefore start this mental process by thinking of some other memorable wage amount and then adjust their response towards the true reservation wage. It is often speculated that such reference wages will be higher than the reservation wages – respondents may think of desired, fair or past wages, for example – in which case the mental process would need to downwardly adjust this amount in order to reach the true reservation wage.¹¹ If this adjustment is incomplete, then responses to the traditional reservation wage question may be upwardly biased on average. Furthermore, if respondents are more heterogeneous in their reference wage anchors than in their actual reservation wages, then traditional self-reported reservation wages would have a higher variance than actual reservation wages.

On the other hand, when asked whether they would accept or reject a wage offer to work in a specific occupation, this question may trigger a cognitive process that more closely resembles the one they use to evaluate actual job offers in the labor market. The crucial difference, we suspect, is that the traditional reservation question does not require the respondent to explicitly consider whether or not specific offers are actually acceptable and hence they may report values that are inconsistent with their subsequent behavior in the market. Conversely, the set of hypothetical wage offers forces individuals to probe their preferences, and may therefore elicit more reliable response.

The hypothetical wage offers in the survey are all attached to specific job titles, and the non-wage attributes of these jobs may be evaluated differently across respondents and occupations (i.e. compensating wage differentials). In extreme cases, where a higher wage offer is associated with an occupation that some individuals perceive as having very unattractive non-wage attributes, this may lead them to accept wage offers that are lower than other rejected offers. For example, in wave 2, 3.9% of the sample would work as a domestic worker for R864 but would not work as a security guard for R1,300; in wave 3, 6.8% of males would work as a machine operator for R1,619 but not as a cashier for R2,000. Restricting our sample to males helps remove the effect of gendered occupation-specific non-wage attributes, but 13% of the sample still provided responses that violated the transitivity property. In these cases, the upper bound of the reservation wage is set at the lower amount.

Our model can be expressed more formally by defining the traditional reservation wage measure as rw_1 , the probed measure as rw_2 and the true reservation wage – the value that determines whether or not a wage offer is accepted – as rw^* . The traditional reservation wage

¹¹ Using different South African data, Natrass and Walker (2005) and Rankin and Roberts (2011) suggest that respondents may report a reservation wage they regard as fair and not the lowest wage they would accept in a job offer.

measure may be affected by a variety of mental biases that cause this measure to differ from the true reservation wage. Formally, we can express this as

$$rw_1 = rw^* + v_1 \quad (1)$$

where v_1 represents the traditional measurement error term. Studies in the literature have suggested that most of the mental biases or anchors will upwardly bias this measure so that $E(v_1) > 0$. Furthermore, we hypothesize that these mental biases ought to be less severe for individuals who have a stronger attachment to the labor market and who regularly have to consider whether or not they would accept certain job offers.

The probed reservation wage measure is also likely to differ from the true reservation wage. Respondents may provide incorrect responses because they are tired or distracted, because they misunderstood the question or because they choose to misrepresent their behavior. Moreover, the fact that this measure needs to be inferred from discretized interval data will also make it less accurate. Formally, we can express this measure as

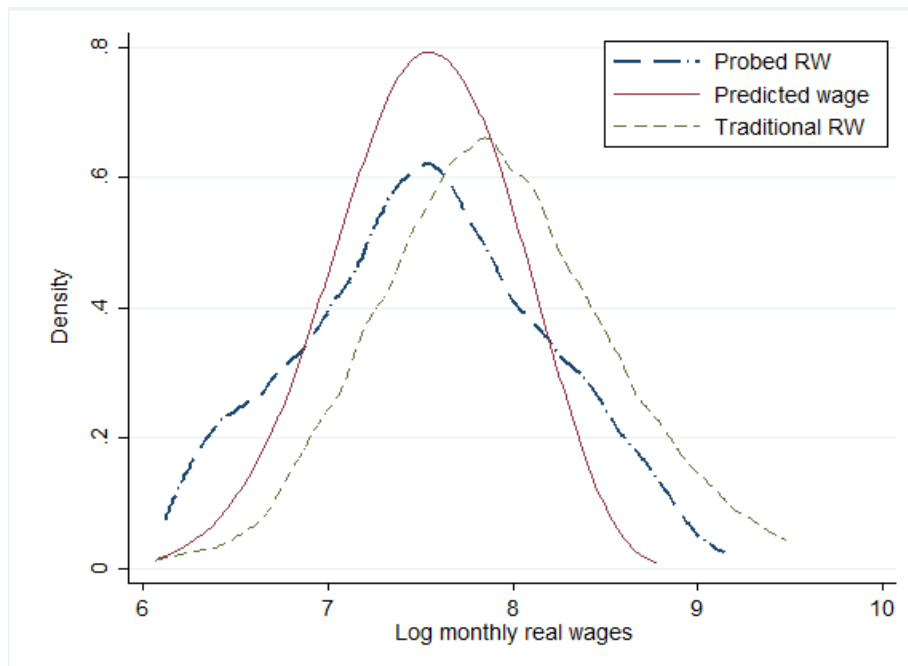
$$rw_2 = rw^* + v_2 \quad (2)$$

where v_2 represents the probed measurement error term. If the traditional reservation wage is upwardly biased, and more so than the probed measure, then we would expect $E(v_2) < E(v_1)$. Furthermore, if the factors causing inaccuracies in the probed measure are less severe than those that affect the traditional measure, then this implies that $Var(v_2) < Var(v_1)$.

Figure 1 compares the kernel density estimates for the traditional and probed reservation wage responses, as well as for predicted wages.¹² The curves reveal that all three measures appear to be roughly log-normally distributed, and that the traditional reservation wage measure is substantially higher on average than both the probed reservation wage and the predicted wage.

¹² We obtain the predicted wage by regressing log wages on education, experience, race, wave and neighbourhood dummies.

Figure 1: Kernel density estimates of (log)reservation wages and predicted (log)wages (deflated to 2008 value)



Source: Cape Area Panel Study, waves 2 to 5; full sample.

5. Internal consistency

We start our empirical analysis of the relative reliability of the two reservation wage measures by investigating the internal consistency of these responses. In particular, we document how these reservation wages relate to each other, and to three other wage measures: (i) *predicted*, (ii) *typical*, and (iii) subsequently *earned* wages. We also take advantage of variation in the ordering of questions across survey waves to investigate the relative sensitivity of the reservation wage measures to priming effects.

We first note that in this sample of young South Africans, respondents tend to provide much higher values to a question about what they perceive as a “typical wage” for someone like them than the predicted wage for someone who shares their observable productivity characteristics.¹³ This difference is about 0.46 log points on average for the whole sample and about 0.71 log points for those individuals without any work experience. Moreover, although those without any work experience have 0.53 log points lower predicted wages than those with job experience, their reported typical wages are only 0.10 lower than those that have worked before. It thus appears that with prevalent weak attachment to the labor market, many

¹³ The survey question asks: “What is the typical take-home monthly wage for other people like you (same age, education, and skills) who have full-time jobs?”.

young job-seekers are over-optimistic about the wage offer distribution. Possibly this is a result of limited market feedback on which they can downwardly adjust their expectations.¹⁴

If responses to the traditional reservation wage question are partly anchored to perceptions about fair or desired wages, then we would expect the traditional measure to be an upwardly biased estimate of true reservation wages. If this hypothesis is correct, then responses to the hypothetical wage offers should frequently contradict the responses to the traditional reservation wage question. Indeed, in our sample, these kinds of contradictions occurred in about 60% of cases. In other words, roughly 60% of the sample reported lowest acceptable wage offers that were higher than one of the hypothetical wage offers that they subsequently stated they would accept. This share is even higher for those with weak labor market attachment: 67% for those who have not worked before and 66% for those who reside in high unemployment districts. These apparent contradictions are consistent with our hypothesis.

Using U.S. data, Holzer (1986) finds that reservation wages for ‘sought jobs’ are generally higher than the reservation wages for specific low-wage jobs, particularly for black respondents. Holzer hypothesizes that this may be due to the negative compensating differentials on specific jobs as well as to the perception that low-wage jobs may be more temporary than the jobs sought by individuals. Young blacks may accept those jobs more frequently, particularly if they need temporary income while continuing their search for permanent positions for which they will request a higher wage. To test for the plausibility of this hypothesis in our context, we use data from waves 1 and 2 of CAPS, which included a third reservation wage question (immediately following the traditional question) that asks individuals to report the lowest acceptable wage for “casual or daily work” (wave 1) and for “part-time work” (wave 2). Comparing responses to these questions with responses to the traditional open-ended question in the same survey wave, we find that respondents demand significantly higher pay (measured daily or hourly) for casual or part-time work than they do for full-time permanent jobs. This suggests, albeit indirectly, that even if respondents perceive the hypothetical job offers as temporary employment, this would not explain why the probed measure is on average lower than the traditional one.

How would we then expect our two reservation wage measures to compare to predicted wages, typical wages and accepted wages? If the traditional measure is partly anchored to over-optimistic wage expectations that are also reflected in responses to typical wages, then we would expect rw_1 to be close to responses about the perceived typical wage, whereas rw_2 should be lower than that on average. Columns 1 and 2 in Table 1 confirm that this is indeed

¹⁴ Using similar variables in U.S. survey data, Holzer (1986) documents that unemployed youth have higher wage expectations relative to the labor demand they face.

the case: the traditional measure is almost identical to individual responses about typical wages on average, while the probed measure is about 0.62 log points below this value.

Table 1: Mean/median differences between predicted, accepted, typical wages and reservation wages.

	RW – Typical wage		RW – Predicted wage		RWt-1 – Accepted wage	
	(1)	(2)	(3)	(4)	(5)	(6)
	rw_1	rw_2	rw_1	rw_2	rw_1	rw_2
Mean	.002	-.618	.266	-.283	.227	-.208
(Std. Dev)	(.775)	(.682)	(.622)	(.523)	(.981)	(.836)
T-test (t-value)	(0.16)	(-23.52)	(14.61)	(-19.20)	(6.35)	(-7.48)
Median	-.052	-.618	.204	-.286	.090	-.311
Obs.	1268	1268	1179	1179	555	555

Notes: Columns (1) to (4) are based on the unemployed sample. Columns (5) and (6) focus on individuals who hold a job in the next period. Differences given for log values.

Predicted wages are reflective of what firms are actually paying workers, and since these wages have been accepted by workers, we would expect true reservation wages to be lower than predicted wages on average. Columns 3 and 4 in Table 1 demonstrates that the traditional measure is 0.27 log points higher than predicted wages, whereas the probed measure is 0.28 lower.

Columns 5 and 6 of Table 1 compare the two reservation wage measures with accepted wages in the subsequent survey period. Since job-seekers accept work when receiving a wage offer larger or equal to their reservation wage, we would expect most accepted wages to be above previously reported reservation wages. This is consistent with what happens for the probed measure, which is on average 0.21 log points below the accepted wage, whereas the traditional measure is 0.23 log points higher on average than subsequently accepted wages.

Finally, we also find that 55% of accepted wage offers were lower than the traditional reservation wage in the previous survey, whereas this share is 20% for the probed reservation wage (not reported in Table 1 for brevity). As a comparison, Krueger and Mueller (2016) find that 44 percent of their U.S. respondents accepted a lower wage than their (traditional) reservation wage in the previous survey period. This suggests that our findings are relevant beyond the South African context.

Priming Effects

If responses to the traditional reservation wage question are partly anchored to other memorable wages, then we would expect this measure to be particularly sensitive to seemingly irrelevant priming effects like the questions that precede the reservation wage

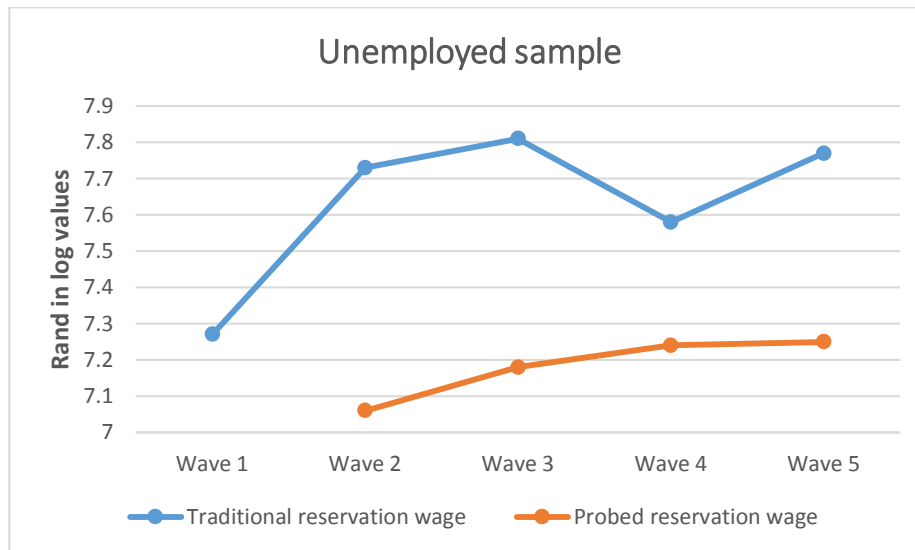
question in the survey. On the other hand, the probed measure should be more stable across surveys.

Variations in the survey structure across the panel waves offer us a pseudo-experiment to test this hypothesis. In waves 1, 4 and 5 the traditional reservation wage question followed after questions about the current job search strategy or probability of finding work, whereas in waves 2 and 3 it was preceded by a question that asked about the individual's labor market prospects at the age of thirty. Being asked to imagine oneself in the future is likely to trigger thoughts of wage aspirations and wishful thinking, which – if our hypothesis is correct – should make these wage aspirations more prominent as an anchor for responses to the traditional reservation wage question. The hypothetical wage offer questions were also moved around in the survey. In wave 1 these questions were not asked, whereas in wave 2 they followed a series of questions on government assistance. In waves 3 to 5 these questions followed directly after the traditional reservation wage question. Our hypothesis is that being asked to accept or reject specific wage offers requires individuals to probe their preferences, which would imply that such responses ought to be less vulnerable to irrelevant priming effects, and relatively stable across survey waves.

The observed responses to both measures across waves are reported in Figure 2. The trend in responses to the traditional reservation wage question over time shows visible upward jumps in waves 2 and 3, when the traditional question was preceded by a question on future wage expectations.¹⁵ On the other hand, the probed reservation wage measure is more stable over time, showing only a moderate concave trajectory that is consistent with a Mincerian life-cycle wage path.

¹⁵ Again, this effect is larger for those with weak labor market attachment, as measured by having never worked before or residing in a high unemployment district, than for the sample as a whole (results not shown in the figure).

Figure 2: Mean traditional and probed reservation wage values over the 5-wave period



The patterns in Figure 2 provide further suggestive evidence that for many job-seekers responses to the traditional reservation wage question might not correspond to the lowest acceptable wage offer. We now turn to examine how this form of measurement error affects coefficient estimates from a series of regression models often used in empirical labor economics.

6. Reservation wages in common empirical models

Combining the discussion about the two reservation wage measures in Section 4 with theoretical models of the determinants and effects of reservation wages produces more approaches for evaluating the relative reliability of these two measures. First, if the probed measure is truly more reliable than the traditional measure, then we may expect it to be more responsive to changes in the economic environment that determine reservation wages. For example, standard job search models predict that individuals who have accumulated considerable wealth should be less inclined to accept low wage offers than they would be if they had very little assets. This evidence is reviewed in Section 6.1. Secondly, if the probed measure is more reliable than the traditional measure, then it should be more successful in predicting behavior that is caused by reservation wages. For instance, if high reservation wages cause job-seekers to be less likely to transition into employment, then we would expect a stronger negative correlation between employment and the probed measure than between employment and the traditional measure. We test whether this is indeed the case in Section 6.2. Finally, we show in Section 6.3 that a combined variable that uses information from both measures is more informative than either measure on its own. Furthermore, a simple model that uses a weighted average of the two variables allows us to estimate their relative informational content (i.e. relative reliability) under minimal assumptions. We find

that the probed measure is significantly more reliable for job-seekers with weak labor market attachment.

6.1 Determinants of reservation wages

Standard job-search theory suggests that reservation wages should be higher for those with valuable assets, high non-wage income, who reside in high transportation cost regions, who possess productive attributes that are associated with higher predicted wages, who have been unemployed for a relatively short duration, and who reside in low unemployment regions. International studies show that these predictions generally hold in countries where most individuals have a stronger attachment to the labor market (e.g. Bloemen and Stancanelli, 2001, DellaVigna and Paserman, 2005, Brown and Taylor, 2011, Krueger and Mueller, 2016). However, for countries (or sub-groups within a country) where the available reservation wage measure is very noisy, these relationships may be difficult to identify from survey data.

The effect of measurement error in the dependent variable depends crucially on the nature of the error. If the error is classical then the coefficients will be consistently but imprecisely estimated. However, a commonly observed type of non-classical measurement error occurs when the error term is mean-reverting: individuals with particularly high reservation wages are more likely to under-report and those with very low reservation wages are more inclined to over-report.¹⁶ This could arise if, for example, individuals with a weaker labor market attachment tend to have lower reservation wages, but are also more likely to report upwardly biased lowest acceptable wages. In this case, we should observe a negative correlation between the measurement error and the true reservation wage, $Cov(v_1, rw^*) < 0$. This will cause the measurement error to displace some of the informative variation in the reservation wage measure, which will attenuate the regression coefficients towards zero. This attenuation bias will be larger, the higher the variance of the measurement error term.

Our hypothesis implies two predictions about the relationship between the determinants of reservation wages and the two observed measures. First, measurement error should attenuate the coefficients on the explanatory variables and this attenuation should be stronger for the traditional than for the probed measure. Secondly, we would expect proxies of weak labor market attachment (e.g. whether the individual resides in a high unemployment region) to be positively associated with the traditional measure, but not with the probed measure. We test these implications in Table 2 below, which reports the coefficients from regressions of both reservation wage measures on a number of theoretical determinants for unemployed males. Given the categorical nature of the information obtained from the hypothetical reservation

¹⁶ Mean-reverting measurement error is a common feature of self-reported income (Gottschalk and Huynh 2010).

wage, we report interval regression estimates for the probed reservation wage measure. When the reservation wage is the dependent variable, the coefficient estimates from an interval regression are directly comparable to those obtained from an OLS regression on reservation wage point data.¹⁷

The estimated coefficients in Table 2 confirm that the predictors of true reservation wages affect both measures in the expected direction, but have a weaker partial correlation with the traditional than with the probed measure. This is most notably true for the effect of household assets. In addition, household income and transportation costs have greater magnitude and significance in the specification using the probed measure as the dependent variable, although differences are not statistically significant between columns.¹⁸

When an individual resides in a high unemployment district, this ought to decrease the true reservation wage via the decreased wage offer arrival rate, but it also pushes up the wage anchor because the individual will have had fewer opportunities to downwardly adjust their unrealistic wage expectation. The coefficient on the district unemployment rate in the traditional measure regression shows that these two effects cancel out to leave the reservation wage unaffected by the local unemployment rate.¹⁹ This is not the case for the probed measure, and very significantly so: higher unemployment is associated to considerably lower reservation wages.

Furthermore, we have suggested that individuals who have worked before may have more realistic and hence lower wage expectations. The coefficient on the dummy variable specifying whether individuals have never worked indicates a strong positive association with the traditional reservation wage measure, but not with the probed measure. This is consistent with our main hypothesis.

¹⁷ Interval regressions are ordered probit estimators in which the cut-offs are specified rather than estimated. If the thresholds at which the latent variable produces different discrete values are economically meaningful, then the coefficient vector inherits this property. Furthermore, its magnitudes are directly comparable to those obtained from an estimator that uses continuous point data as the dependent variable (Wooldridge, 2002: 501).

¹⁸ The sample sizes in Table 2 are slightly smaller than those in columns 3 and 4 of Table 1. This is due to missing values in some of the regressors, mainly household income and local transportation cost.

¹⁹ Local unemployment here refers to an enumerator area, consisting of a median of 150 households.

Table 2: Determinants of reservation wages

VARIABLES	(1) OLS $\log(rw_1)$	(2) Interval regression $\log(rw_2)$
Asset index	0.000 (0.026)	0.106*** (0.028)
Log(labour income)	0.037 (0.027)	0.045* (0.025)
Log(grant income)	0.026 (0.029)	0.027 (0.027)
Log(transportation costs)	0.028 (0.062)	0.072* (0.041)
Log(predicted wage)	0.301*** (0.084)	0.274*** (0.081)
Log(unemployment duration)	-0.037*** (0.014)	-0.041*** (0.012)
Local unemployment rate	0.000 (0.253)	-0.492** (0.240)
Never worked	0.140*** (0.053)	0.054 (0.048)
Constant	5.336*** (0.668)	4.817*** (0.684)
Observations	991	992
R-squared	0.154	
Pseudo R-squared		.061

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The analytical sample consists of unemployed male respondents. Not listed but included in the regression are wave, district and schooling dummies.

6.2 The effects of reservation wages on labor market outcomes

It is well understood that measurement error in the independent variable can attenuate the coefficients in a linear regression framework (Bound et al., 1994). Non-classical properties in the measurement error, like mean reversion, will typically diminish but not eliminate this attenuation bias. Our hypothesis would therefore imply that both reservation wage measures should have a weaker association with individual behavior than is the case for the true reservation wage, but that this attenuation bias ought to be more severe for the traditional than for the probed measure. In Table 3, we test this implication by estimating the regression coefficients for both measures on labor market behaviors that standard theory predicts should be affected by the true reservation wage.²⁰

²⁰ For the probed measure, the explanatory variable in the model is the imputed point value from the reservation wage categories (as described in section 4 above). Obtaining bootstrap standard errors to correct for the inclusion of a generated regressor is not straightforward when using fixed effects (or first-differenced) estimators on our unbalanced panel. However, we can estimate bootstrapped standard errors for the simple OLS estimators in column 6 of Table 3. We find that they are very similar to the uncorrected standard errors reported in Table 3, with the p-values on both reservation wage measures being affected by about 1 percentage point.

Columns 1 and 2 report the coefficient estimates for fixed effects (FE) and first-differenced (FD) estimators on whether or not individuals are employed. Allowing for individual fixed effects removes the potential bias due to unobserved time-invariant heterogeneity, such as worker ability or attitude, which may simultaneously determine the probability of finding work and the reservation wage. We also use lagged values of the reservation wage to address reverse causality concerns: finding work may cause workers to upwardly adjust their reservation wages, which could induce an upward bias in the coefficient estimate. The estimates reveal that the probed reservation wage measure is negatively correlated with the probability of being employed, as predicted by economic theory. This effect is very significant and marginally significant (p-value 0.11) in the FD and FE estimators, respectively. The traditional reservation wage measure, on the other hand, has no significant association with the probability of employment.

Table 3: Effects of reservation wages

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	FE Employed	FD Δ Employed	FE Transitioned into employment	FE Transitioned out of employment	FE Quit	OLS Accepted wage	FE Discouraged
Lagged $\log(rw_1)$	-0.009 (0.020)		-0.060 (0.056)	-0.005 (0.029)	-0.032 (0.021)	0.028 (0.048)	
Lagged $\log(rw_2)$	-0.041 (0.026)		-0.138 (0.085)	0.003 (0.031)	0.056** (0.026)	0.138** (0.069)	
Lagged $\Delta\log(rw_1)$		0.002 (0.020)					
Lagged $\Delta\log(rw_2)$		-0.061** (0.027)					
$\log(rw_1)$							-0.044* (0.026)
$\log(rw_2)$							-0.147*** (0.038)
Sample	All	All	Unemployed in period $t - 1$	Employed in period $t - 1$	Employed in period $t - 1$	Unemployed in period $t - 1$	Discouraged or NEA in period t
Observations	2,817	1,245	614	1,584	1,674	387	1,765
R-squared	0.208	0.157	0.192	0.435	0.078	0.102	0.075

Notes: Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1. All regressions include controls for years of schooling, experience, race and panel wave.

Next, we consider the association between reservation wages and transitions into employment. Column 3 contains the regression coefficients for a fixed-effect employment regression where the sample is restricted to those who were unemployed in the previous period. The coefficients reveal that the probed measure has a large and marginally significant negative effect (p-value 0.106) on transitioning into employment, whereas the traditional measure has a smaller and insignificant effect on the probability of finding work. However, given the small size of this sub-sample, we cannot exclude equality of the coefficient estimates.²¹

In Column 4, the sample is restricted to individuals who were employed in the previous period to consider the role of reservation wages on transitioning out of employment. The estimates reveal that neither reservation wage measure can explain transitions out of employment. Of course, reservation wages may not affect whether or not a worker is fired, so a more instructive question may be whether reservation wages determine *voluntary* movements out of employment. Column 5 reports the regression coefficients from a fixed-effects regression on whether someone who was employed in the previous period decided to quit their job. The results show that the probed reservation wage measure is indeed positively correlated to this probability, whereas the traditional reservation wage measure is not.

Search theory also predicts that higher reservation wages should result in higher expected wages from the offer distribution. That is, job-seekers with higher reservation wages should transition into employment less frequently, but do so for higher accepted wages. Column 6 in Table 1, which regresses the accepted wage for those who transitioned into employment, reveals that this is indeed the case for the probed measure but not for the traditional measure.²²

Finally, in Column 7 we restrict the sample to non-employed individuals who are not actively looking for work. This group consists of discouraged job-seekers, who did want to work, and the economically inactive, who did not. The greater willingness to work amongst discouraged job-seekers should be reflected by lower reservation wages and since both reservation wage questions were asked to everyone in our sample, we can gauge which measure more accurately captures this preference. We use current period reservation wages in this regression, since we are interested in whether reservation wage responses are consistent with the individual's reported willingness to work in the same period. The estimates in Column 7

²¹ As a robustness test, we run the employment regression in Columns 1 to 3 of Table 3 separately for each reservation wage measure (i.e. not including both measures in the same regression). The results show the same pattern, with the coefficient on the probed reservation wage now also significant in the FE models.

²² The effect of reservation wages on accepted wages is only informed by individuals who transition into employment. Since there are not sufficiently many individuals who do this more than once in the panel, using a FE estimator to estimate this effect is not feasible. Conditioning on being unemployed should control for some of the unobserved individual heterogeneity.

suggest that the probed reservation wage is a more reliable indicator of an individual's self-reported labour market status than the traditional measure.

6.3 Combining information from both measures

Our hypothesized model for how individuals respond to reservation wage questions posits that both the traditional and the probed measure are imperfect reflections of true reservation wages, but that the probed measure will be more reliable for job-seekers with weak labor market attachment. In this case, a variable that combines information from both measures may be more informative than either measure on its own. We can thus express the reservation wage as a weighted average of the two variables:

$$rw^* = \alpha.rw_1 + (1 - \alpha).rw_2 \quad (3)$$

in which the weight parameter, α , represents the informational content (i.e. reliability) of the traditional reservation wage measure relative to that of the probed measure. This parameter can be identified by re-estimating the equations in Table 3 under the assumption that the outcomes are determined by a single reservation wage measure, which is the weighted average of the traditional and probed measures. Formally, the regression equation for column j in Table 3 can be expressed as

$$y_{jt} = \mathbf{x}_{jt}\boldsymbol{\beta}_j + \lambda_j\{\alpha.rw_{1j,t-1} + (1 - \alpha).rw_{2j,t-1}\} + u_{jt} \quad (4)$$

where the effects of the control variables and the composite reservation wage measure are allowed to vary across equations, but the weight parameter is assumed to be the same across columns. This model can be estimated with a maximum likelihood system estimator.²³

Column 1 of Table 4 reports the coefficient estimates from Eq. (4). The weight attached to the traditional measure is 0.115, which is significantly larger than zero, but much less important than the weight attached to the probed measure. This suggests that for the average South African in our sample, the probed measure is much closer than the traditional measure to the true reservation wage that determines their decisions and survey responses. Furthermore, most of the estimated reservation wage effects are now larger in absolute magnitude and more accurately estimated than those obtained for either measure in Table 3. This is consistent with the combined measure being more informative and less vulnerable to attenuation bias than either measure on its own.

²³ The labour market outcome and reservation wage measures are first transformed according to the estimator and control variables used in Table 3 (e.g. regressed on individual fixed effects, years of schooling, experience, race and panel wave for the fixed effects regressions) and the resulting variables are then combined in a system estimator in which the transformed outcome is affected by the weighted average of the transformed reservation wage variables.

Our hypothesis suggests that the traditional reservation wage measure will be relatively unreliable for individuals with weak labor market attachment. In terms of our composite reservation wage measure, this implies that the weight parameter α may be higher for individuals with stronger labor market attachment. We thus allow α to depend on two measures of labor market attachment: whether the individual resides in a high unemployment district and whether he has ever worked before. Since we are particularly interested in investigating the relative reliability of these measures for South Africans who receive as much feedback as job-seekers in developed country labor markets, we define high-unemployment districts as areas where the unemployment rate is similar to developed country norms.²⁴

We therefore re-estimate equation (4) while allowing the weight attached to the traditional measure to depend on an observable measure of labor market attachment \mathbf{z} :

$$y_{jt} = \mathbf{x}_{jt}\boldsymbol{\beta}_j + \lambda_j\{\mathbf{z}_{t-1}\boldsymbol{\pi}.rw_{1j,t-1} + (1 - \mathbf{z}_{t-1}\boldsymbol{\pi}).rw_{2j,t-1}\} + u_{jt} \quad (5)$$

In the estimation of Eq. 5, we omit the first-differenced employment equation as it uses the same variation as the fixed effects employment regression. We also exclude the equations for transitioning out of employment and quitting a job, since these samples include no individuals who have never worked before. The coefficient estimates in Column 2 show that limiting the system to fewer equations does not substantially alter the results in Column 1. The maximum likelihood system estimates of the modified model in Eq. 5 are reported in Column 3 of Table 4. The estimated coefficients reveal that for job-seekers who reside in low unemployment areas and have worked before – the norm in most developed countries – the weight attached to the traditional measure is 0.793, which indicates high reliability compared to the probed measure. However, for those who reside in high unemployment districts and with no work experience this weight reduces to 0.038, indicating that in these contexts the traditional reservation wage measure is virtually uninformative.

²⁴ We split the sample into districts with an unemployment rate below 7% (covering about 23% of individuals in our sample) and the rest. Our results are robust to this threshold as long as the rate at which we split the sample is not larger than 12%. Splitting at higher unemployment rates no longer has an effect on the reliability of the different measures. This may not be surprising, to the extent that the traditional reservation wage is only reliable when job-seekers experience a level of attachment common in developed countries.

Table 4: Effects of reservation wage

	(1)	(2)	(3)
Weight attached to traditional measure			
Intercept	0.115*	0.184***	0.606***
	(0.069)	(0.068)	(0.214)
High unemployment district			-0.568***
			(0.215)
Ever worked			0.187
			(0.134)
Effect of reservation wages			
Employed	-0.057***	-0.058***	-0.062***
	(0.018)	(0.018)	(0.018)
Δ Employed	-0.068***		
	(0.026)		
Transitioned into employment	-0.183***	-0.192***	-0.183***
	(0.044)	(0.044)	(0.044)
Transitioned out of employment	0.006		
	(0.020)		
Quit	0.04**		
	(0.017)		
Accepted wage	0.170***	0.176**	0.156**
	(0.059)	(0.059)	(0.059)
Discouraged job seeker	-0.148***	-0.150***	-0.183**
	(0.022)	(0.022)	(0.044)

Notes: Standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1. All regressions include controls for years of schooling, experience, race and panel wave.

7. Conclusions

We contribute to the empirical literature on the role and determinants of reservation wages by using a series of survey questions on explicit job offers as well as standard questions on the lowest acceptable wage. Using data from the Cape Area Panel Study (CAPS, 2002-2009) in South Africa, we suggest that the way surveys elicit information on reservation wages is of relevance. In particular, individuals with weak attachment to the labor market may systematically misreport their reservation wages and the resulting measurement error can bias the coefficients of common models used in empirical labor economics.

People asked to report their lowest acceptable wage appear to start their thought process by thinking of a desired wage – especially when primed by a question about aspirations or expectations – and then only partially adjust towards the true lowest acceptable wage offer. As a consequence, the ‘traditional’ measure is an upwardly biased estimate of true reservation wages. On the other hand, responses based on hypothetical job offers are both internally consistent and more in line with expected patterns from economic theory. By forcing individuals to consider whether or not they would accept specific wage offers, this ‘probed’ measure is shown to be less biased and hence lower than the traditional measure. The

difference in the relative reliability of the two measures is remarkable for individuals with weak labor market attachment.

Our results have implications for a variety of empirical models in labor economics. In particular, we suggest that empirical analyses of wages and employment in high-unemployment contexts may not ignore the lower reliability of self-reported reservation wages. Our study has also implications for analyses of reservation wages with respect to specific groups or time periods (e.g. youth, minorities, regions, pre- vs. post-financial crisis) within countries with overall low average rates of unemployment.

Finally, our analysis highlights the potential for eliciting subjective information through the use of context-relevant hypothetical questions. This may be informative beyond the labor economics literature with respect to various other measures obtained from subjective questions, such as self-reported health or support for different types of redistributive policies.

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Appendix

Table A1: Characteristics of male respondents in the Cape Area Panel Study (2002-2009)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave5
Number of observations	2,140	1,787	1,620	1,558	1,317
Broad unemployment rate	21%	25%	20%	20%	32%
Employed	25%	38%	52%	59%	63%
In school	58%	43%	30%	21%	9%
Mean age	17.7	19.5	20.8	21.7	24.6
Black	28%	26%	27%	26%	26%
Coloured	53%	56%	55%	55%	54%
White	18%	17%	17%	19%	19%

Source: CAPS, waves 1-5.

Notes: Descriptive statistics use sample weights. The weighted distributions are within two percentage points of the population group distribution in Cape Town in the 1996 Census (see Lam et al. 2013). Due to the small number of observations from the Indian population (11), this group is omitted from the analysis.

Table A2: Attrition pattern for the Cape Area Panel Study: Waves 2 to 5.

Number of observations	Percent	Wave observed			
		2	3	4	5
1,028	51.95	yes	yes	yes	yes
255	12.89	yes	yes	yes	
156	7.88	yes			
107	5.41	yes	yes		
91	4.60	yes	yes		yes
67	3.39	yes		yes	yes
59	2.98		yes	yes	yes
59	2.98	yes		yes	
37	1.87		yes	yes	
120	6.06		other pattern		

Source: CAPS, waves 2-5.

Table A3: List of hypothetical job offers in the Cape Area Panel Study

Job description	Rand amount (in wave 2)	Survey wave
Domestic worker	864	2 to 5
Security guard	1300	2 to 5
General worker	1438	2 to 5
Machine operator	1619	2 to 5
Cashier at retail store	2000	2 to 5
Bookkeeper	3000	2 to 4
Accept 'a job' for R3000	3000	5
Production manager	5000	4

Source: CAPS, waves 2-5.

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