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# Rotation Group Bias in Measures of Multiple Job Holding

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OF POLICY STUDIES

# Rotation Group Bias in Measures of Multiple Job Holding

Barry T. Hirsch and John V. Winters

Abstract

Reported multiple job holding rates in the U.S. are found to be substantially higher among workers in their first month in the CPS sample (the first rotation group), with rates declining in subsequent rotation groups. True rates should not differ across rotation groups. Using 22 years of CPS data, multiple job holding rates based solely on the first rotation group were 27.5 percent higher than official rates based on all rotation groups. Rotation group bias worsened over time and could account for as much as one-quarter of the measured decline in multiple job holding.

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## 1. Introduction

The monthly Current Population Survey (CPS) is a key source for U.S. labor statistics, most notably the monthly unemployment and labor force participation rates. Residences and their occupant households are surveyed over eight 'month-in-sample' periods (i.e., MIS or rotation group). A residence is surveyed over four consecutive months, followed by eight months out of the survey, followed by four additional months (e.g., MIS 1-4 in April-July 2014; MIS 5-8 in April-July 2015).[1] There is no reason to expect true labor force outcomes to differ with respect to MIS, yet Krueger, Mas, and Niu (KMN forthcoming) show that U.S. unemployment rates are highest in MIS 1, declining in MIS 2-4, rising in MIS 5, and declining again in MIS 6-8. 'Rotation group bias' (RGB) in the unemployment rate was noted previously (Hall 1973, Bailar 1975, Solon 1986), but was not widely known to researchers or analyzed in depth prior to KMN. The authors do not argue that RGB is universal; they find no evidence for RGB in unemployment in the Canadian labor force survey.

In this note, we show that another official employment measure compiled from the CPS, the multiple job holding (MJH) rate, exhibits substantial rotation group bias. Multiple job holding provides opportunities for individuals and households to increase incomes and lower risk, to acquire a broader portfolio of human capital, and, in some cases, increase job satisfaction. Secondary jobs tend to be short-term; hence, MJH rates at a point in time greatly understate the proportion of workers who have held multiple jobs within the past year or at some point in the past.[2] The Bureau of Labor Statistics (BLS) and the Census Bureau began measuring multiple job holding on a regular monthly basis following a major overhaul of the CPS in January 1994. Using an index suggested by KMN, we show that MJH rates in the first rotation group (MIS 1) are 21 percent larger than the rate using all rotation groups in 1994-95; the difference in 2014-2015 is 33 percent. This rotation group bias for multiple job holding is substantially higher than the 9 percent level found for unemployment by KMN over the 1994-2014 period (KMN, forthcoming, Table 2).[3] Because rotation group bias is substantial and worsened over time, it is likely that the true MJH rate is higher than the official rate and that measured decline in MJH is overstated. We document these patterns below.

## 2. Data and Analysis

Multiple job holding was measured on a regular basis beginning in January 1994 following the major redesign of the CPS. All employed individuals ages 16+ are asked the question: "Last week, did you have more than one job (or business), including part-time, evening, or weekend work?" The Bureau of Labor Statistics (BLS) defines a multiple job holder as an individual who: (a) holds wage and salary jobs with two or more employers; (b) combines a wage and salary job with self-employment; or (c) combines a wage and

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[1] The first and fifth rotation groups require (with some exceptions) that a Census field representative conducts the household survey in person. For MIS 2-4 and 6-8, most surveys are conducted over the phone rather than in person.
[2] For references to the larger literature on multiple job holding, see Lalé (2015) and Hirsch, Husain, and Winters (2016).
[3] The unemployment rate is of course a more important measure of economic performance than is the MJH rate.

salary job with one as an unpaid family worker. In this paper, we use the same data and methodology as BLS, including all rotation groups of the CPS from January 1994 through December 2015 (22 years). The combined sample size for years 1994-2015 is 16,736,173, an average 760,735 workers per year.

Following BLS procedures, Figures 1a and 1b show annual MJH rates (diamonds) for men and women based on all CPS rotation groups, respectively, from 1994-2015. Men's rates fell from an average 6.2% in 1994-95 to 4.5% in 2014-15; women's rates fell from 6.2% to 5.3% over the same period (the combined rates fell from 6.2% to 4.9%). Also included in the figures are MJH rates compiled separately for

Figure 1a: Male Multiple Job Holding Rates by Year for All,
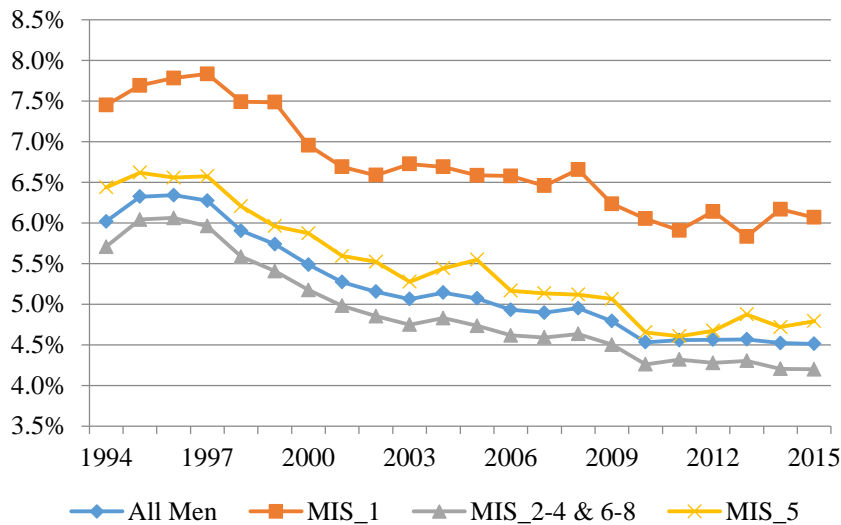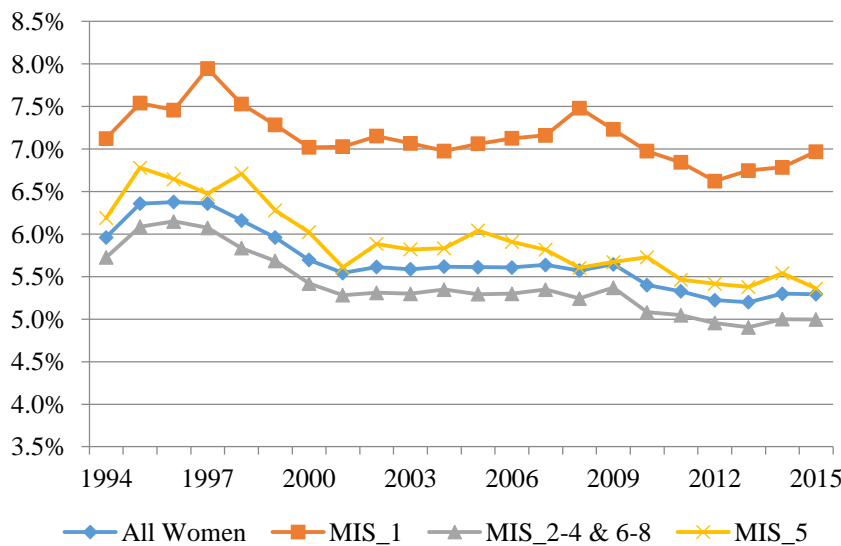MIS 1, MIS 5, MIS 2-4 & 6-8



Figure 1b: Female Multiple Job Holding Rates by Year
for All, MIS 1, MIS 5, MIS 2-4 & 6-8

MIS 1 (squares), MIS-5 (crosses) and from the remaining six (MIS 2-4 & 6-8, triangles). Clearly evident is that individuals report substantially higher rates of MJH in their first month in the survey than in subsequent months. The official rate is substantially lower than the MJH rate reported by workers in MIS 1, modestly lower than for those in MIS 5, and higher than the average for the remaining six rotation groups.

Figure 2 provides summary evidence of differences in reported MJH rates by rotation group based on the average across 22 years, showing overall MJH rates and those for men and women. Focusing on combined male and female rates, MJH for those in MIS 1 averages 6.9%, as compared to only 4.9% for MIS 8 (and 5.2% for MIS 2 through MIS 8). The 'tilted-W' pattern seen in Figure 2 mimics that seen for the unemployment rate (KMN forthcoming), although rotation group bias is more extreme for MJH than for unemployment.

Figure 2: Mean Multiple Job Holding Rates by Rotation Group and Gender, 1994-2015
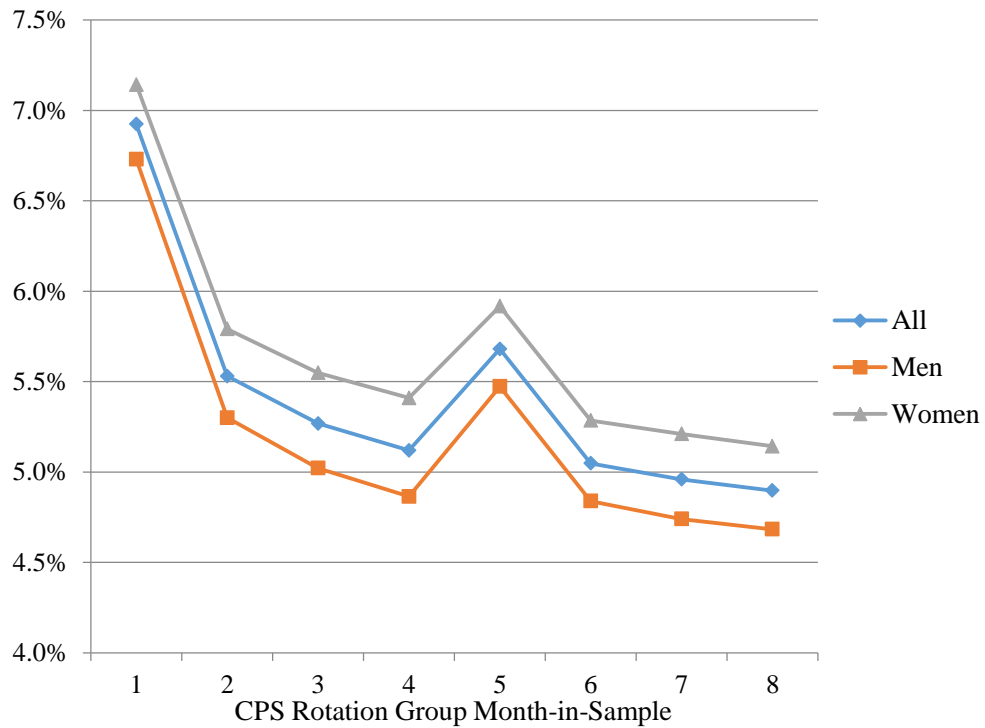


We draw three general takeaways from the evidence. First, households appear to provide more comprehensive labor market information when surveys are conducted in person, hence the peaks at MIS 1 and MIS 5. Second, lower MJH is reported the longer a household is in the survey, seen by the downward slope as one moves from earlier to later rotation groups.[4] And third, rotation group differences are somewhat higher among men, the ratio of MIS 1 to MIS 8 rates being 1.44 for men and 1.39 for women. Although we find evidence of severe rotation group bias in multiple job holding, we cannot know whether reports in MIS

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[4] An important implication of rotation group bias and declines in MJH or unemployment reporting by month-in-sample is that transitions out of (into) MJH or unemployment are overstated (understated). Lalé (2015) documents reported MJH transitions seen in monthly pairs of the CPS. Numerous papers have examined unemployment transitions.

1 (or any other month in sample) provide an unbiased (or least biased) measure of MJH. Our expectation is that households are the most engaged in the survey during the first MIS and provide the most accurate information in that month. We cannot rule out, however, the possibility that in the first month respondents "telescope" and recall earlier MJH that they incorrectly report as occurring the prior week. Moreover, some respondents may overreport activities due to a (misplaced) desire to please a Census field representative, although this motive would apply to some degree for all months in sample.

There is widespread belief by economic pundits and many economists that the U.S. labor market is producing an increasing number of short-term, flexible "gig" jobs, but that such changes are difficult to discern in official government statistics (see Abraham et al. 2016; Katz and Krueger 2016). Multiple jobs are often short-term jobs, but official MJH rates have declined rather than increased over time. Might some of the decline seen in MJH, in particular among men, be the result of rotation group bias? The short answer is yes, but not by much. Table 1 provides average MJH rates, overall and by gender, for 1994-5 and 2014-15. Over this 20 year period, the nationwide MJH rate declined by 1.28 percentage points, from 6.17 to 4.88 percent. Percentage point declines for MIS 2 through MIS 8 ranged from 1.25 to 1.44, whereas the decline in MIS 1 was only 0.99. Comparing the 0.99 MIS 1 percentage point decline to the 1.28 decline seen overall, the suggestion is that decline in MJH may be overstated by as much as 29 percent (1.28/0.99) or, equivalently, 23 percent of the apparent decline reflects rotation group bias (1 – 0.99/1.28). This conclusion relies on the assumption that rates reported in MIS 1 are accurate and those in MIS 2-8 are not, or alternatively, that changes in MIS 1 rates over time are accurate but those in MIS 2-8 are not. In short, rotation group bias causes MJH decline to be overstated; it does not reverse the finding that MJH has declined.

### 3.    Conclusion and Implications

This note demonstrates that there exists strong rotation group bias in reporting of multiple job holding. Space does not permit us to explore in depth why MJH reporting declines with months spent in the survey. KMN thoroughly examine explanations for rotation group bias in measuring unemployment, and rule out most of these. Two conclusions appear justified. First, households are more engaged and provide fuller information during MIS 1 and 5, interviews (mostly) conducted in person rather than by phone. In drawing this conclusion we downplay the likelihood of telescoping. Second, continuing declines in MJH (and unemployment) rates in the survey months following MIS 1 and 5 suggest that households become less engaged and less likely to report some labor market activities. Consistent with this interpretation, KMN emphasize that increases in rotation group bias occurred over periods in which we have seen increases in survey and item (e.g., earnings) nonresponse.

We examined two possible explanations for rotation group bias in MJH. First, we speculated that as time in the survey increases, decreased willingness to report dual jobs might be concentrated among those

with second jobs requiring relatively few hours. If that were the case, we should see higher mean hours worked on secondary jobs in later rotation groups displaying low rates of MJH. No such pattern is found. Mean hours on both secondary jobs and the primary job are highly similar across all rotation groups. Second, we examined MJH differences between self-respondents and those whose labor market responses are provided by a proxy (another household member, frequently a spouse). Reported MJH rates are substantively higher in the self-respondent than in the proxy respondent sample; however, the pattern of rotation group bias was nearly identical for both (KMN provide similar evidence for unemployment).

Evidence that rotation group bias affects the quality of labor market measures suggests the need for further study and experimentation. The Census Bureau (and outside researchers) might study and document the degree of rotation group bias seen in widely-used labor market measures. Census can experiment with alternative survey methods and determine whether there exist cost-justified changes. If rotation group bias is omnipresent, one can consider whether a switch to in-person surveys in all months-in-sample reduces rotation group bias sufficiently so to warrant the higher costs. Census also could alter survey methods for specific measures deemed problematic. Multiple job holding, for example, falls off sharply following the first and fifth months in survey. In MIS 2-4 and MIS 6-8 individuals could be reminded if they reported 2 or more jobs in the prior month, and then asked if they continue to work at multiple jobs.[5]

## References

Abraham, Katherine G., John Haltiwanger, Kristin Sandusky, and James R. Spletzer. 2016. Measuring the 'gig' economy. Paper presented at the Society of Labor Economists Annual Meetings, May.

Bailar, Barbara A. 1975. The effects of rotation group bias on estimates from panel surveys. *Journal of the American Statistical Association* 70, no. 349: 23-30.

Hall, Robert E. 1970. Why is the unemployment rate so high at full employment? *Brookings Papers on Economic Activity?* 70, no. 3:369–410.

Hirsch, Barry T., Muhammad M. Husain, and John V. Winters. 2016. Multiple job holding, local labor markets, and the business cycle. *IZA Journal of Labor Economics* 5, no. 4: 1–29.

Katz, Lawrence F., and Alan B. Krueger. 2016. The rise and nature of alternative work arrangements in the United States, 1995-2015, unpublished manuscript, March.

Krueger, Alan B., Alexandre Mas, and Xiaotong Niu. forthcoming. The evolution of rotation group bias: Will the real unemployment rate please stand up? *Review of Economics and Statistics*.

Lalé, Etienne. 2015. Multiple jobholding over the past two decades. *Monthly Labor Review*, April.

Solon, Gary, 1986. Effects of rotation group bias on estimation of unemployment. *Journal of Business & Economic Statistics* 4, no. 1: 105-109.

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[5] Beginning in 1994, Census adopted this "dependent interviewing" approach for the primary job (and other activities), stating to the respondent what specific job was reported the previous month and then asking if the worker is currently in that same job.

Table 1: Weighted MJH Means by Month-in-Sample, 1994-95 and 2014-15

| | 1994-95 | | | 2014-15 | | | |
| | N | MJH rate | KMN Index | N | MJH rate | KMN Index | ΔMJH rate |
|---|---|---|---|---|---|---|---|
| All | 1,561,602 | 6.17% | 100.0 | 1,480,008 | 4.88% | 100.0 | -1.28 |
| MIS 1 | 193,761 | 7.46% | 121.0 | 184,403 | 6.47% | 132.6 | -0.99 |
| MIS 2 | 197,971 | 6.31% | 102.3 | 187,328 | 5.05% | 103.5 | -1.25 |
| MIS 3 | 197,394 | 6.02% | 97.6 | 187,285 | 4.70% | 96.2 | -1.32 |
| MIS 4 | 196,119 | 5.96% | 96.6 | 186,300 | 4.52% | 92.5 | -1.44 |
| MIS 5 | 191,952 | 6.51% | 105.6 | 181,069 | 5.08% | 104.1 | -1.43 |
| MIS 6 | 194,576 | 5.81% | 94.3 | 183,543 | 4.53% | 92.8 | -1.28 |
| MIS 7 | 194,926 | 5.69% | 92.2 | 184,251 | 4.40% | 93.8 | -1.28 |
| MIS 8 | 194,903 | 5.55% | 90.1 | 185,829 | 4.25% | 87.1 | -1.30 |
| Men | 823,038 | 6.17% | 100.0 | 771,982 | 4.52% | 100.0 | -1.65 |
| MIS 1 | 101,968 | 7.57% | 122.7 | 96,051 | 6.12% | 135.4 | -1.45 |
| MIS 2 | 104,353 | 6.29% | 102.0 | 97,580 | 4.66% | 103.2 | -1.63 |
| MIS 3 | 104,096 | 5.97% | 96.8 | 97,564 | 4.34% | 96.0 | -1.64 |
| MIS 4 | 103,372 | 5.95% | 96.4 | 97,254 | 4.14% | 91.7 | -1.81 |
| MIS 5 | 101,151 | 6.53% | 105.8 | 94,458 | 4.75% | 105.3 | -1.77 |
| MIS 6 | 102,592 | 5.82% | 94.3 | 95,781 | 4.16% | 92.1 | -1.66 |
| MIS 7 | 102,769 | 5.68% | 92.0 | 96,221 | 4.02% | 92.6 | -1.66 |
| MIS 8 | 102,737 | 5.54% | 89.8 | 97,073 | 3.90% | 86.3 | -1.65 |
| Women | 738,564 | 6.16% | 100.0 | 708,026 | 5.30% | 100.0 | -0.86 |
| MIS 1 | 91,793 | 7.33% | 119.0 | 88,352 | 6.88% | 129.9 | -0.46 |
| MIS 2 | 93,618 | 6.32% | 102.6 | 89,748 | 5.49% | 103.7 | -0.83 |
| MIS 3 | 93,298 | 6.07% | 98.5 | 89,721 | 5.10% | 96.4 | -0.96 |
| MIS 4 | 92,747 | 5.97% | 97.0 | 89,046 | 4.94% | 93.3 | -1.03 |
| MIS 5 | 90,801 | 6.49% | 105.3 | 86,611 | 5.45% | 102.9 | -1.04 |
| MIS 6 | 91,984 | 5.81% | 94.4 | 87,762 | 4.96% | 93.6 | -0.86 |
| MIS 7 | 92,157 | 5.70% | 92.5 | 88,030 | 4.84% | 94.9 | -0.86 |
| MIS 8 | 92,166 | 5.57% | 90.4 | 88,756 | 4.65% | 87.9 | -0.91 |

KMN Index is the ratio of the MJH rate for each MIS, divided by the all-MIS rate.
Source: Monthly Current Population Surveys, January 1994 - December 2015.