The Measurement of Consumer Expectations using Survey Data

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Abstract

Surveys of consumers collect considerable information on consumer expectations. However, the simple categorical structure of the questions -- such as "Do you expect your income to rise, fall, or stay the same?" -- makes their value for research uncertain. This paper analyzes the information content of the survey measures. I draw on Manski's finding that, while categorical questions do not identify the probability of an event occurring, they do provide information on probability bounds. I analyze data from two well-known surveys, showing that, although the bounds are often wide, for some measures they move closely with the series they are intended to track or predict.

Key words: Consumer expectations, probability bounds, survey data.

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I. Introduction

Expectations play a major role in economic theories of consumption and saving. In the standard life cycle/permanent income model, expected income is a key determinant of spending and saving decisions. More elaborate versions of the model also consider expectations related to bequests, Social Security, welfare benefits, lifespan, and other factors. In precautionary saving theories, consumers' decisions depend not just on the expected values of future variables, but also on the degree of uncertainty about them.

While the importance of expectations is well established, there is always some question of how to handle expectations in empirical work. The standard approach is to infer expectations from observed outcomes, for example, using the time series properties of a process to derive its expected future value.[1] However, this appoach requires important assumptions about people's knowledge, and leaves open the possibility that people have information that the econometrician does not.[2]

Alternatively, direct measures of expectations are sometimes available from survey data. Surveys of consumer expectations--the main focus of this paper--have been conducted regularly since the 1950s.[3] An important problem in using the survey data concerns the way in which the questions are typically asked. Most questions are of a simple categorical form, such as "In the next year, do you expect your income to be higher, lower, or about the same?" Because terms like "expect" and "intend" are vague, and respondents are only asked to place themselves in broad ranges, it is unclear how well they capture underlying expectations. For example, it is a common finding that, when households are asked whether they intend to buy an item and subsequently are asked about purchases, most purchases turn out to be made by those not expressing an intention to buy (Juster 1966).

This paper analyzes the information content of the survey measures of expectations. Charles Manski (1990) has shown that, while yes/no expectations questions do not identify the probability of an event occurring, they do provide information on the bounds within which the probability falls. I apply this insight to the consumer surveys, extending the framework to a common feature of questions in these surveys, namely that a large share of responses are neither

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[1]See, for example, Brayton et al. (1997).

[2]Deaton (1992, pp. 122-135) discusses the issue of superior information.

[3]Many household surveys have collected some kind of information on expectations, including the Panel Survey of Income Dynamics (Duncan and Morgan 1975), the National Longitudinal Survey of Youth (Manski 1990), and the Health and Retirement Survey (Hurd and McGarry 1995, 1997).

yes nor no, but rather "uncertain" or "the same." I use data from two well-known consumer surveys, from the University of Michigan and the Conference Board. The surveys ask about a wide range of variables of potential importance in understanding consumer behavior, including expectations of unemployment, income, inflation, purchases of durable goods, and stock prices. I show that the probability bounds of the survey measures of expectations are often fairly wide, although in some cases the bounds move closely with the series they are intended to track or predict. I also discuss the potential for incorrect inference due to imprecise measurement.

II. Background

There are two major surveys of consumer attitudes and expectations. The University of Michigan SRC Survey of Consumers has been conducted regularly since 1958.[4] Currently, the survey interviews 500 people by phone each month. The sample is randomly drawn from a list of household telephone numbers, with about 70 percent of sampled households responding to the survey. The Michigan sample is an overlapping panel, with households recontacted once six months after the original interview.

The second major survey is the Conference Board's Survey of Consumer Attitudes and Buying Plans. The survey has been conducted regularly since 1967.[5] At present, the Conference Board survey canvasses about 5,000 people by mail each month, with about 70 percent returning completed questionnaires. The sample has a balanced-quota design, in which households are selected into the sample based on specified characteristics; this method is intended to produce a sample that looks like the population with regard to those characteristics.[6]

Both the Michigan and Conference Board surveys publish their results in the last week of the survey month--several weeks before official statistics on consumer spending, saving, and income become available. The best-known results are the Michigan Survey's Index of Consumer Sentiment and the Conference Board's Index of Consumer Confidence. These indexes not only provide timely information on shifts in consumer spending; for decades they have also figured in debates on the role of consumer sentiment or expectations in consumer spending.[7]

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[4]The survey was run quarterly until 1978, and has been run monthly since then. The interviews are conducted by the University of Michigan's Survey Research Center.

[5]Originally run bi-monthly, it changed to a monthly frequency in 1977. The survey is carried out by National Family Opinion Research, Inc., a marketing research organization.

[6]While quota methods are widely used for marketing research, they raise a concern about bias, because easily-contacted members of a subgroup may not be representative of the subgroup as a whole. Also, the statistical properties of quota-sample estimates are not well established. See Lansing and Morgan (1971, pp. 59-62).

[7]For a recent contribution, see Carroll, Fuhrer, and Wilcox (1994), who find that the Michigan SRC Index of Consumer Sentiment has some value for predicting future changes in

The two surveys ask a wide range of questions on expectations of income, unemployment, business conditions, inflation, family finances, and other items. Because purchases of motor vehicles and large appliances vary considerably over the business cycle, both surveys attempt to capture early signs of shifts in spending on these items. The Conference Board collects information on households' buying intentions, through questions such as "Do you plan to buy a car in the next six months?" In contrast, the Michigan Survey asks more general questions about buying conditions, like "Do you think now is a good time or a bad time to buy a car?"

Almost all questions in the two surveys ask for a response of yes/no/uncertain or higher/lower/same. While this question format is easily understood by respondents, the response categories are vague and thus may fail to capture shifts in underlying expectations. Some possible evidence of poor measurement comes from reinterview surveys, which often show mediocre correlations between stated expectations and subsequent outcomes (Lansing and Withey 1951, McNeil 1974). For example, in the Quarterly Survey of Buying Intentions, run by the Census Bureau from 1960-66, many respondents who said they intended to buy a car had not bought within the specified time period, while some of those saying they did not intend to buy actually did (McNeil 1974). Because the nonintender group was typically large, even though only a small share of nonintenders ended up buying a car, they accounted for two thirds of all new car purchases, and also much of the variation in purchases from period to period. Indeed, this is why the Michigan survey asks general questions about buying conditions, rather than specific questions about buying intentions (see Katona and Mueller 1956).

Conceivably, some part of the mediocre correlation may result from the use of vague terminology: respondents may know they have some chance of buying a car, but report no intention to buy when the chance is low. Thus, F. Thomas Juster (1964, 1966) argued that respondents should be asked directly about the chances of particular outcomes -- for example, "What are the chances that some one living here will buy a car in the next six months?"[8] Such questions worked well in pilot studies, yielding high purchase rates among those stating high chances of buying, and low rates among those stating low chances. However, like traditional measures of buying intentions, they also failed to predict a major shift in buying patterns in the early 1970s, in part because of the nonnegligible share of purchases due to people reporting a

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spending, even after controlling for other determinants of spending. For more detailed information on the Michigan and Conference Board surveys, see Curtin (1995) and Linden (1979, 1990) respectively.

[8]To clarify the intended scale, respondents would be shown a scale from 0 to 100, with 0 marked as "absolutely no chance," 100 marked as "absolutely certain," and some other points also described.

zero chance of buying.[9]

III. The information content of the survey measures

To understand the information content of survey measures of expectations, it is valuable to consider the decision process underlying response to the survey questions. Manski (1990) has considered the process by which individuals answer yes/no questions about expectations. Suppose the item of interest is the respondent's expectation that a particular outcome, Y=1, will occur in some specified time period. The subjective expectation of Y=1 depends on information known at the time of the survey, s, and information not known at that time, u. Let $P_u|s$ be the actual probability distribution of u conditional on s, and P(Y|s) be the actual distribution of Y conditional on s. The event Y=1 occurs if the realization of u is such that Y(s,u)=1. Thus, the probability that Y=1 is $P(Y=1|s)=P_u[Y(s,u)=1|s]$.

Presumably, a respondent will say she expects the outcome to happen if P(Y=1|s) exceeds some threshold, m.[10] The survey response measuring expectations or intentions, I, would be determined as follows:[11]

$$I = \begin{cases} 1 & \text{if } P(Y=1|s) \geq m \\ 0 & \text{if } P(Y=1|s) \leq m \end{cases} \qquad (1)$$

The probability of Y=1 could be expressed as follows:

$$P(Y=1|s) = P(I=1) * P(Y=1|s,I=1) + P(I=0) * P(Y=1|s,I=0) \qquad (2)$$

Data report the survey response, P(I=i) for i=0 to 1, but the values of P(Y=1|s,I=i) are not known. Consequently, P(Y=1|s) is not identified. In the case of consumer expectations, one might think that, if the values of P(Y=1|s,I=i) did not vary much over time, the intentions measures would

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[9]Precise expectations questions were used in the Survey of Consumer Buying Expectations, conducted quarterly by the Census Bureau from 1967 to 1973. Because this survey involved regular reinterviews, reported intentions could be matched to subsequent purchases. Among respondents reporting zero chance of buying a car in the next six months, roughly 10 percent would end up buying a car. Again, because this group was relatively large, it accounted for 50 to 60 percent of total purchases (see McNeil 1974).

[10]This is a sort of best-case scenario (Manski 1990).

[11]This assumes the respondent selects the category containing the mean of the subjective distribution. See Das, Dominitz, and Van Soest (1997) for detailed discussion of other possibilities, and analysis of loss-functions consistent with different response strategies.

nonetheless be highly informative about movements in P(Y=1|s). However, the findings from reinterview studies mentioned above suggest that, at least for questions on buying intentions, P(Y=1|s,I=1) and P(Y=1|s,I=0) probably vary over time.

Manski (1990) shows that the simple measure nonetheless provides information on the range within which the probability of interest falls. The relationships given in (1) and (2) imply that P(Y=1|s) has the following bounds:

$$m^*P(I=1) \leq P(Y=1|s) \leq m^*P(I=0) + P(I=1) \tag{3}$$

How much information the bounds provide depends on the threshold used by respondents in deciding whether to answer yes or no.

To apply this insight to the measurement of consumer expectations, we first need to consider that most questions on consumer expectations offer three possible responses rather than just two, for example, yes/no/uncertain rather than yes/no, or higher/lower/same rather than higher/lower. This is empirically important because the share of respondents answering in the middle range is usually large, and it varies over the business cycle. Assuming there is a natural ordering from yes to uncertain to no, or more to same to less, the expectations variable could instead be expressed as follows:

$$I = \begin{cases} 2 & \text{if } m_U \leq P(Y=1|s) \leq 1 \\ 1 & \text{if } m_L \leq P(Y=1|s) \leq m_U \\ 0 & \text{if } 0 \leq P(Y=1|s) \leq m_L \end{cases} \tag{4}$$

These relationships can be re-expressed as follows:

$$0 \leq P(Y=1|s,I=0) \leq m_L \leq P(Y=1|s,I=1) \leq m_U \leq P(Y=1|s,I=2) \leq 1 \tag{5}$$

The subjective probability of the event occurring is:

$$P(Y=1|s) = P(Y=1|s,I=0)^*P(I=0) + P(Y=1|s,I=1)^*P(I=1) + P(Y=1|s,I=2)^*P(I=2) \tag{6}$$

Again, the data contain information on the survey responses, P(I=i) for i=0 to 2, but the values of P(Y=1|s,I=i) are not known, so P(Y=1|s) is not identified. However, the relationships given in (4)-(6) imply that the bounds for P(Y=1|s) are as follows:

$$m_L*P(I=1|s) + m_U*P(I=2|s,I=1) \leq P(Y=1|s) \leq$$
$$m_L*P(I=0|s) + m_U*P(I=1|s) + P(I=2|s,I=1) \quad (7)$$

Analysts of consumer surveys are usually interested in describing the expectations of consumers overall. Suppose the item of interest is the subjective expectation of Y=1 for the average consumer, **P**(Y=1) (alternatively, it could be the expectation for different groups within the population). Assuming that the thresholds are constant across individuals and over time, and letting S(I=i) represent the share of respondents reporting response i to the expectations question, then **P**(Y=1) would have the following bounds:

$$m_L*S(I=1|s) + m_U*S(I=2|s,I=1) \leq \mathbf{P}(Y=1|s) \leq$$
$$m_L*S(I=0|s) + m_U*S(I=1|s) + S(I=2|s,I=1) \quad (8)$$

Equation (8) sheds insight into the question of how to handle the "same" and "uncertain" responses when analyzing the data. In calculating the contributions of individual series to index, the Conference Board essentially ignores them, looking at those saying "yes" as a share of all "yes" and "no" responses. In contrast, the Michigan survey uses a "diffusion index" to represent responses:[12]

$$E = 2*S(I=2) + 1*S(I=1) + 0*S(I=0)$$
$$= S(I=2) - S(I=0) + 100 \quad (9)$$

where here the shares are normalized to sum to 100. Interestingly, this is a transformation of the lower bound in (8), under the assumption that m_U is twice as large as m_L. If this assumption reasonably approximates the thresholds used by respondents, the Michigan method will preserve some of the underlying information content of the survey measure, although it basically ignores the fact that some "no's" are "unlikely's" rather than total "no's".

IV. Empirical evidence

Most recent empirical work examines whether the indexes of consumer expectations have independent effects on consumer spending, after controlling for income and other factors (see Carroll, Fuhrer, and Wilcox, 1994). In contrast, there has been hardly any recent examination of

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[12]See Katona and Mueller (1956). This method is used in a variety of surveys having questions in this format (Nerlove 1983).

whether individual measures of expectations track or predict the series about which they ask.[13] Such an examination provides some direct evidence on the quality of survey measures of expectations, and also sheds insight into the subcomponents of the widely used indexes.

The survey measures analyzed in this section fall into three categories: expectations of general economic conditions (unemployment, inflation, business conditions, and the stock market); household income and personal finances; and major purchases (large consumer durables, cars, and homes). For measures where the Michigan and Conference Board surveys ask similar questions, I present the results from the Michigan Survey only.[14] I also include some questions from the Conference Board that either are not asked in the Michigan Survey or are asked in a very different way. Table 1 shows the details of the questions analyzed here, including the wording of each question and the survey from which it is taken.

To analyze the relationships between the survey measures and the series they are intended to track or predict, I plotted the bounds implied by each measure against the series to which it seemed most closely related.[15] The details of the series used for comparison with the expectations measures are shown in Table 1. The plots, shown in Figures 1 to 3, are formatted as follows. In each case, the scale of the bounds for the survey measure is on the left-hand side, while the scale of the observed series is on the right. The probability bounds are represented in dashed lines and the series itself in solid line. To compute the bounds, I used values of .30 and .70 for m_L and m_U respectively; while one might want to tailor the thresholds for each measure, the use of uniform values facilitates comparisons across measures. The values chosen seem generally consistent with some of the numbers coming from early work. Of course, the bounds are sample estimates of population statistics, and so are subject to sampling error. Nonetheless, the magnitudes of sampling error for the bounds are likely to be relatively small.[16]

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[13]Some early work compared expectations measures from surveys with population data on realizations (see, for example, Okun 1960). However, at that time the surveys were conducted quarterly rather than monthly, and the time series were relatively short.

[14]In cases where the surveys ask similar questions, the analysis yielded qualitatively similar results.

[15]In the few cases were there was more than one possibility, I chose the series that moved most closely with the expectations measure (such cases are noted below).

[16]Based on sampling errors computed for the Michigan Survey (Curtin 1995) and my assumptions about the thresholds, the 95 percent confidence interval for a lower bound of 30 percent would be about 4.5 percent; for an upper bound of 70 percent it would be about 6.5 percent. The issue of sampling error is probably more important for the estimation of small shares, such as the share of households intending to buy a house or car. Indeed, concern about sampling error for such items motivated the use, in the 1970s, of supplements to the Current Population Survey to collect data on buying intentions (McNeil 1974).

General economic conditions

Figure 1 shows results for unemployment, business conditions, inflation, and stock prices. The bounds of the series are fairly wide, generally exceeding 30 percentage points. While the width is determined by the assumptions about m_L and m_U and so should not be taken too literally, the results nonetheless suggest a need for caution in interpreting the survey measures: because respondents place their expectations in broad ranges only, estimates of underlying probabilities are not tightly bounded.

Unemployment. Figure 1, part (a), shows the bounds associated with the probability of worsening job prospects in the next 12 months, along with movements in the civilian unemployment rate. The bounds have generally risen prior to recessions and moved down as subsequent expansions got underway. However, after the sharp decline in unemployment in 1983-84, the bounds went back up and remained relatively high, although the unemployment rate continued to decline for several more years. Generally, these results suggest that consumers had some sense that job prospects would improve or deteriorate prior to the time that they did, but that the timing of turns in expectations did not correspond closely to the timing of turns in unemployment.

Business conditions in the next year. Figure 1, part (b), shows the bounds associated with the likelihood of an improvement in business conditions in the coming year, along with the growth rate of real GDP. Again, there is a broad correspondence between the bounds and GDP growth, with some clear downward movements in the bounds at periods near recessions and movements up thereafter. However, it is difficult to tell whether these shifts in the bounds precede changes in economic activity, or merely parallel them; we return to this issue in Section V below.

Inflation. Unlike other questions about expectations, for gauging expected inflation, the consumer surveys ask respondents for a point estimate of their expectation of inflation over the coming year. Figure 1, part (c), shows the median of the reported values, along with the CPI inflation rate.[17] Broadly speaking, the median expected value tracks the actual inflation rate fairly well: it was relatively high in the early part of the period when future inflation was relatively high, and moved down when future inflation declined. Since January 1983, the median expected value has averaged around 3.2 percent, with only small fluctuations around this level. The average for the actual inflation rate in the post-1983 period was just slightly higher at 3.3

[17]Results are qualitatively similar using the deflator for personal consumption expenditures.

percent.[18] Altogether, the figures suggest that the expectations measure caught the downward shift in inflation pretty well, and that in the subsequent period of stable prices, the typical consumer had realistic expectations of near-term inflation.[19]

Stock prices. In mid-1987, the Conference Board survey started asking people about their expectations for stock prices over the next 12 months. Figure 1, part (d), shows the bounds for the likelihood of stock prices going up. Compared to the other series, the bounds for this series are relatively flat: they dipped a bit in 1987 and 1990, when stock prices slumped, but just edged up when stock prices soared in the period after 1994. Of course, it is quite unlikely that this expectations series would systematically lead overall trends in stock prices, although some market movements may be anticipated before they occur.[20]

Personal financial circumstances

In addition to general questions about the economy, the consumer surveys also ask respondents about their expectations for their own incomes and personal finances. Figure 2 shows results for these types of measures.

Income. The Michigan Survey asks, "During the next 12 months, do you expect your (family) income to go up more than prices will go up, about the same as prices, or less than prices?" The bounds for this measure are perhaps surprisingly flat. They slipped a bit in the 1981-82 recession and rose somewhat at the outset of the subsequent recovery, but overall they seem only weakly related to growth in real labor income per household.[21] Several factors may be involved. First, the question wording may be somewhat confusing to respondents, because they have to consider the joint distribution of nominal income and prices. Second, the growth of real labor income may not provide a good measure of income for the typical household. Median household income would be better, but data are available on a calendar-year basis only. Third, while income expectations should in principal be based on assessments of a variety of factors -- including wages, hours, and employment -- people may answer the question more narrowly, for example, reporting expectations for incomes conditional on employment.[22] Such a

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[18]The difference may reflect rounding in the survey responses.

[19]The mean expectation of near-term inflation tends to be higher than the median, but the mean and median tend to move together.

[20]For example, see Shiller (1989) for survey evidence on stock price expectations prior to the 1987 stock market crash.

[21]Following Carroll, Fuhrer, and Wilcox (1994), labor income is defined as wages and salaries plus transfers minus personal contributions for social insurance. Results are qualitatively similar using real disposable personal income as the income measure.

[22]Dominitz and Manski (1996) found this to be an issue in their study of the earnings expectations of high school students.

misinterpretation would cause the expectations measure to understate the possibility of lower income due to job loss.

Personal finances (current). In addition to the direct question on income, the Michigan survey also asks a more general question, "Would you say that you (and your family living here) are better off or worse off financially than you were a year ago?" This question implicitly asks the respondent to consider all aspects of the family's financial situation, and so would seem to get around the problem mentioned for the income question. However, the question is vague, so it is unclear what factors people consider when thinking about improvements or deteriorations in their personal finances. Nonetheless, as shown in Figure 2, part (b), the probability bounds associated with this measure have some correspondence with the growth of real labor income: the bounds have generally declined in recessions, when income growth fell, and shifted up in expansions when income growth resumed.[23] The correspondence with income growth is perhaps not surprising, given the importance of income in financial well-being.[24] However, it is important to note that this question asks about changes over the past year, and so is presumably easier to answer than a question about the future.

Personal finances (future). To gauge expectations for the future, the Michigan survey also asks "... [D]o you think that a year from now you (and your family living here) will be better off financially, or worse off, or just about the same as now?" Figure 2, part (c), shows the bounds for this measure. The bounds move similarly to the bounds for the comparable question asking about the past year. This suggests that people tend to consider the same factors when reporting recent experience and near-term expectations.

Major purchases

Because spending on durable goods is the most cyclical part of consumer spending, it is of great interest to know about shifts in spending in a timely way. Figure 3 shows information on purchases of large durable goods, motor vehicles, and homes. In each case, results are presented both for the Conference Board question about intentions to buy and the Michigan question about whether now is a good time to buy.

Large durable goods. Figure 3, part (a), shows the bounds for the Conference Board measure of intentions to buy large household items (washer/dryer, range, TV, air conditioner,

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[23]I also checked whether the bounds for this measure moved with the ratio of debt payments to income, another potentially important aspect of household finances (Carroll and Dunn, 1997). However, the corrrespondence was quite weak.

[24]When respondents are asked to explain their answers to this question, "higher income" and "lower income" are the main factors mentioned. The response "prices are high" was also common in 1970s.

etc.) in the next 6 months. The bounds are computed for the probability of making a purchase, and are mapped against the growth in real spending on major household appliances over the past year. The bounds are quite wide and flat, despite pronounced cyclical shifts in the rate of growth of spending. The wide spread between the bounds is partly due to the yes/no character of the intentions measure: because we know nothing about variation in purchase probabilities among those saying they do not intend to buy, the upper bound has to be high to reflect the possibility that many of them will. In contrast, the bounds for the Michigan question on buying conditions (part (b)) moved broadly with spending growth for large durables over the period, rising during expansion periods and falling off during recessions. The correspondence likely reflects the fact that the Michigan question asks people for their views of *current* buying conditions; one would expect these views to be correlated with current sales, as long as people have a reasonable idea of buying conditions on average.

Motor vehicles. Figure 3, part (c), shows the bounds for the Conference Board question on intentions to buy a car in the next 6 months, along with real growth in personal consumption expenditures on motor vehicles. Again, the bounds are relatively wide and flat, despite some clear cyclical fluctuations in vehicle sales. Here also the upper bound is relatively high, reflecting the possibility that many of those not intending to buy a car may end up buying. Part (d) shows the implied bounds from the Michigan survey, which asks whether the next year or so is a good time to buy a car. Here the bounds have some correspondence with vehicle sales, declining when vehicle sales have fallen and rising when they move back up.

Purchases of homes. Figure 3, part (e), shows the bounds for the Conference Board measure of intentions to buy a home in the next 6 months, mapped against the level of existing home sales in the past year. Like the other intentions measures, the bounds for this measure are flat and wide, although there is some weak correspondence (not visible from the scale of the graph) between movements in the lower bound and changes in home sales. Conceivably, intentions to buy a home may be more likely to be realized than other types of intentions: because of their importance in household finances, home purchases are usually carefully planned, and once a decision to buy is made, the timing may be constrained by practical considerations (e.g. the start of the school year, relocation for a new job, etc). In contrast, for large durable goods, planned purchases are more readily postponed (or unplanned purchases initiated) if the household's circumstances change. As shown in part (f), the bounds for the Michigan buying-conditions question track existing home sales relatively well.[25]

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[25]See Goodman (1994) for additional analysis of the value of the survey data in forecasting housing activity.

V. Regression analysis of predictive value

The graphical analysis suggested that the bounds for some survey measures move closely with the series they are intended to track or predict, while for others the correspondence is weak. This section investigates whether the survey measures have any significant value for predicting the related series. This question indicates something about the information content of the survey measures. Conceivably, a survey measure may provide timely information on a related series, but have no value for predicting it. In other cases, the survey measure may have some predictive value, but without providing independent information on likely future developments; rather, the measure may simply reflect knowledge of recent economic conditions, which in turn helps to predict future developments. Thus, to determine whether a survey measure contains independent information on likely future developments, one would want to determine whether it has predictive value after controlling for information on recent economic conditions.[26]

A simple way to evaluate the predictive value of a survey measure is through a regression of the following form:

$$X_{it} = A_i + \sum_{s=1}^{4} \beta_{is} S_{it-s} + \varepsilon_{it} \qquad (10)$$

where S_{it} is a representation of survey measure i (e.g. unemployment expectations) and X_{it} is the variable it is intended to track or predict (the change in the unemployment rate). Here the joint significance of the β_{is}'s will indicate whether the survey measure has significant predictive power, while the R-squared of the regression will indicate how much of the variation in the series is captured by the survey measure.

To implement the regressions, I used the same survey measures as above. While various scalar representations of the survey measure are possible, I focus on results using the Michigan transformation shown in (9).[27] For the series related to the survey measures, I used the same series as detailed in table 1; however, a few series have been converted to differenced form to avoid problems caused by nonstationarity.[28] The models are estimated on a quarterly basis, with

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[26]Some studies have examined whether shifts in consumer sentiment have causal effects on aggregate economic activity, with fairly mixed results (see Matsusaka and Sbordone, 1995). While I do not attempt to determine the role of causal effects, it is not clear that a structural approach would be compelling, given the imprecision of the expectations measures.

[27]The use of the diffusion index is suggested by its preservation of the underlying information content of the survey responses (see above). As a sensitivity check, I also estimated the regressions using other possibilities--the upper bound, the lower bound, and the midpoint between the bounds--with few qualitative differences in results.

[28]Augmented Dickey-Fuller tests could not reject the hypothesis of nonstationarity for a few survey measures and series: the unemployment rate, the inflation rate, the expected inflation

estimation periods that vary by survey measure (see table 2). All hypothesis tests were conducted using a heteroskedasticity- and serial-correlation-robust covariance matrix, allowing serial correlation at lags up to 4.

The results of the regressions are presented in table 2. Columns (1) and (2) show the adjusted R-squareds and probability values from the regressions using only the lagged survey measures as explanatory variables. On balance, the results suggest that most of the survey measures contain information relevant for predicting the related series. Looking first at the measures of general economic conditions, all of the survey measures explain a fair amount of the variation in the related series, with R-squareds ranging between one-third and one-half; in addition, all four measures are significant at a 5 percent level. Among the income measures, the personal-finance measures have R-squareds of 0.30 or above, well above that of 0.089 for the direct measure of income expectations; all three measures are statistically significant. Among the major-purchase measures, performance is fairly mixed. The measure of buying-conditions for large durables has an R-squared of 0.18 and is significant at a 5 percent level, whereas the analogous buying-intentions measure has no significant predictive value; this broadly supports the view that the conditions variables do better than intentions measures in predicting major purchases.[29] The measures for motor vehicles and homes have very small R-squareds, although the measures for homes are statistically significant.

The simple regression results suggest the survey measures have a decent amount of predictive value for the related series. However, as mentioned, the survey measures may not represent independent information about likely future developments, but rather may reflect knowledge of recent economic conditions, which in turn helps predict future developments. To examine this possibility, I ran regressions of the form:

$$X_{it} = A_i + Z_{it}'\delta + \sum_{s=1}^{4} \beta_{is} S_{it-s} + \varepsilon_{it} \qquad (11)$$

where Z_{it} is a vector of other factors that may be relevant for predicting X_{it}. Following Carroll, Fuhrer, and Wilcox (1994), I included as other factors four lags of the changes in the following: real labor income, the unemployment rate, the inflation rate, the real interest rate, and an index of stock prices; for cases where the dependent variable is not on this list, I also included its four

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measure, spending on motor vehicles, existing home sales, and the Michigan measure of home buying conditions. After differencing, all series used in the regressions were stationary over the periods under consideration.

[29]The Conference Board acknowledges the relatively poor predictive power of its intentions measures; see, for example, Linden (1979, pp. 77-78).

lagged values.[30] Here the joint significance of the β_{is} 's will indicate the marginal predictive value of the survey terms, while the incremental R-squared will indicate the survey terms' marginal contribution to the explanatory power of the regression.

Columns (3) and (4) of Table 2 show the incremental R-squareds and probability values of the survey measures in the regressions including other explanatory variables. For the measures of general economic conditions, the explanatory power associated with the survey measures is considerably lower after the other explanatory variables are included, suggesting that the survey measures share much of their information in common with the other explanatory variables.[31] Nonetheless, the measures remain statistically significant when the other explanatory variables are included, indicating they have some predictive value beyond that related to knowledge of recent conditions.[32] In terms of the income measures, the predictive power of the personal-finance measures declines considerably when the other explanatory variables are included, although all three measures remain significant at a 10 percent level. Again, results for the major-purchase measures are mixed: most measures have negligible incremental R-squareds, although one of the buying-intentions measures and two of the buying-conditions measures have significant predictive value.

The fact that the economic-conditions variables have marginal predictive values similar to the income measures, and better than the major-purchase variables, is somewhat surprising: one might think that the average respondent would have a good idea of their own income prospects and buying intentions, but have little information on future inflation and unemployment. Conceivably, the limited power of the questions about respondents' own situations may reflect the difficulty of stating expectations or intentions when the event in question depends on conditions that are uncertain at the time of the survey (e.g. plans to buy a car in the next year may depend on income changes over the period). Because such conditionalities can be complicated, and the survey questions provide no mechanism for expressing them, respondents may tend to answer casually, producing series that contain a lot of noise.[33] Without

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[30]The inflation measure is based on the Consumer Price Index. The real interest rate is the rate on a 3-month T-bill, minus CPI inflation. The measure of stock prices is the S&P 500.

[31]Carroll, Fuhrer, and Wilcox (1994) find a similar result for the value of the Index of Consumer Sentiment in predicting consumer spending.

[32]Note that, while the stock price measure has an incremental R-squared of 0.08 and is estimated to be statistically significant, the result may be an artifact of the relatively short estimation period for this series (10 years); for example, the coefficients on the stock-price expectations variables have the wrong sign, and their joint significance is sensitive to changes in specification. (The results for the other three series are not so sensitive to changes in specification, generally remaining significant with modest explanatory power).

[33]See Dominitz (1997) for discussion of conditional information.

direct information on the underlying subjective probabilities, it is difficult to tell whether this is what is going on. Recently several household surveys have introduced questions that elicit subjective expectations in probabilistic forms--for example, what is the percent chance that you will buy a car in the next year--mostly with favorable results.[34] Such an approach seems likely to be beneficial in consumer surveys, especially in cases where the correspondence between stated expectations and subsequent realizations may be weak.

VI. Summary and implications for the analysis of consumer behavior

In sum, while the surveys of consumers provide a potentially rich source of information on the determinants of consumer spending, respondents report their expectations in terms of broad ranges only, making the bounds around the underlying probabilities relatively wide. This highlights a reason for caution (beyond the general issue of sampling error) in interpreting monthly movements in the expectations series. Nonetheless, by examining correlations between the survey measures and the series they are intended to track or predict, we also showed that some of the survey measures have significant value for predicting the related series. This suggests that the survey measures have some information content that should be taken seriously.

An additional implication of our findings concerns the use of the survey measures in research on consumer behavior. Many studies have used individual measures from the consumer surveys to represent expectations empirically.[35] However, as the current paper makes clear, the survey measures only *proxy* for underlying expectations. Of course, if a survey measure is highly correlated with the underlying expectation, its use in analysis may be quite informative.[36] But without independent information on the underlying expectation, the strength of the correlation for a particular survey measure is basically uncertain. The risk for analysis is that, if the correlation is weak, estimation using the proxy may show no significant effect of expectations on outcomes, but as a result of measurement error rather than a genuine lack of effect.

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[34]For example, Guiso, Jappelli, and Terlizzese (1992, 1996); Hurd and McGarry (1995, 1997); and Dominitz and Manski (1996).

[35]For example, Carroll (1992) and Carroll and Dunn (1997) examined whether unemployment expectations affect consumer spending, using the unemployment measure from the Michigan survey.

[36]For example, Krasker and Pratt (1986) show that a proxy will correctly indicate the sign of the effect of a variable of interest, if the correlation between the proxy and the variable is sufficiently high.

Table 1. **Survey measures of expectations**

Measure	Source	Question	Related series:
Unemployment	Michigan	How about people out of work during the coming 12 months--do you think there will be more unemployment than now, about the same, or less?	Civilian unempl. rate (perccent)
General business conditions	Michigan	Now turning to business conditions in the country as as whole, do you think the next 12 months will have good times financially, or bad times, or what?	Year-to-year percent change in real GDP
Inflation (median)	Michigan	By about what percent do you expect prices to go up/down during the next 12 months?	Year-to-year percent change in the CPI
Stock prices	Conf. Board	Do you expect stock prices to increase, decrease, or stay the same in the next year?	Year-to-year percent change in S&P 500
Real income	Michigan	During the next 12 months, do you expect your (family) income to go up more than prices will go up, about the same, or less than prices?	Year-to-year percent change in real labor income per HH ('92 $)
Personal finances (current)	Michigan	Would you say that you (and your family living here) are better off or worse off financially than you were a year ago?	Year-to-year percent change in real labor income per HH ('92 $)
Personal finances (expected)	Michigan	Now looking ahead, do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?	Year-to-year percent change in real labor income per HH ('92 $)
Large durables	Conf. Board	Which, if any, of the [following] items do you plan to buy in the next 6 months? Refrigerator, washing machine, TV set, range, etc.	Year-to-year percent change in real spending on major HH appliances ('92 $)
Large durables	Michigan	About the big things that people buy for their homes, such as furniture, kitchen stove, television, and things like that. Generally, speaking do you think now is a good time or a bad time to buy major household items?	Year-to-year percent change in PCE on major HH appliances ('92 $)

Motor vehicles	Conf. Board	Does any one in your household plan to buy a car in the next 6 months?	PCE on motor vehicles ('92 $, in logs)
Motor vehicles	Michigan	Speaking now of the automobile market, do you think the next 12 months or so will be a good time or a bad time to buy a car?	PCE on motor vehicles ('92 $, in logs)
Housing market	Conf. Board	Does any one in your household plan to buy a house in the next 12 months?	Existing home sales, millions of units (in logs)
Housing markets	Michigan	Generally speaking, do you think now is a good time or a bad time to buy a house?	Existing home sales, millions of units (in logs)

Table 2. **Reduced form regressions of expectations measures on related series**

Series	*Simple models*		*Models with other explanatory variables included*		Beginning of estimation period
	Adjusted R-squared	Joint significance of expectations variables	Incremental R-squared	Joint significance of expectations variables	
	(1)	(2)	(3)	(4)	(5)
General conditions					
Unemployment	0.400	0.000	0.028	0.001	1960:Q4
Business conditions	0.487	0.000	0.018	0.000	1960:Q1
Inflation	0.373	0.000	0.147	0.000	1978:Q1
Stock	0.412	0.000	0.083	0.035	1987:Q2
Income measures					
Income	0.089	0.034	0.018	0.022	1976:Q4
Curr. personal finances	0.343	0.000	0.014	0.070	1958:Q1
Exp. personal finances	0.322	0.000	0.007	0.100	1958:Q1
Major purchases					
Durable goods:					
Intentions	0.028	0.237	0.054	0.007	1978:Q1
Buying conditions	0.183	0.007	-0.004	0.391	1958:Q1
Motor vehicles:					
Intentions	-0.035	0.493	-0.012	0.985	1978:Q1
Buying conditions	-0.004	0.239	0.018	0.084	1958:Q1
Homes:					
Intentions	0.005	0.038	-0.020	0.896	1978:Q1
Buying conditions	0.031	0.011	0.020	0.070	1977:Q1

Notes: For each regression, the dependent variable is the variable the survey measure is intended to track or predict (see table 1). The regressions in the first two columns regress the lagged values of the expectations measure on this variable; the regressions in the third and fourth columns also include other explanatory variables, as described in the text. Hypothesis tests are conducted using a heteroskedasticity- and serial-correlation-robust covariance matrix, allowing serial correlation at lags up to 4. All estimation periods end in 1998:Q4.

Figure 1. Measures of general economic conditions

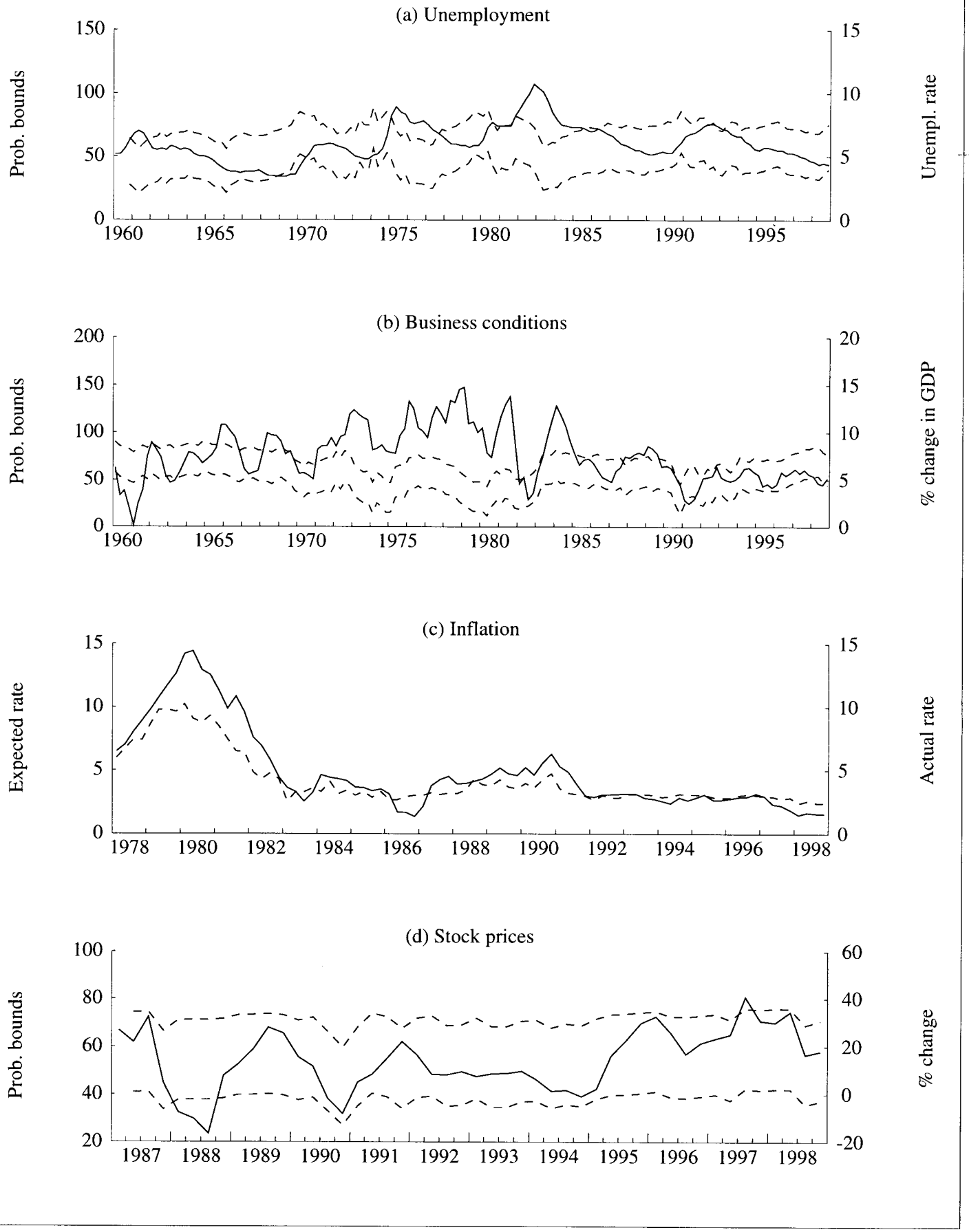


Figure 2. Measures of personal financial circumstances

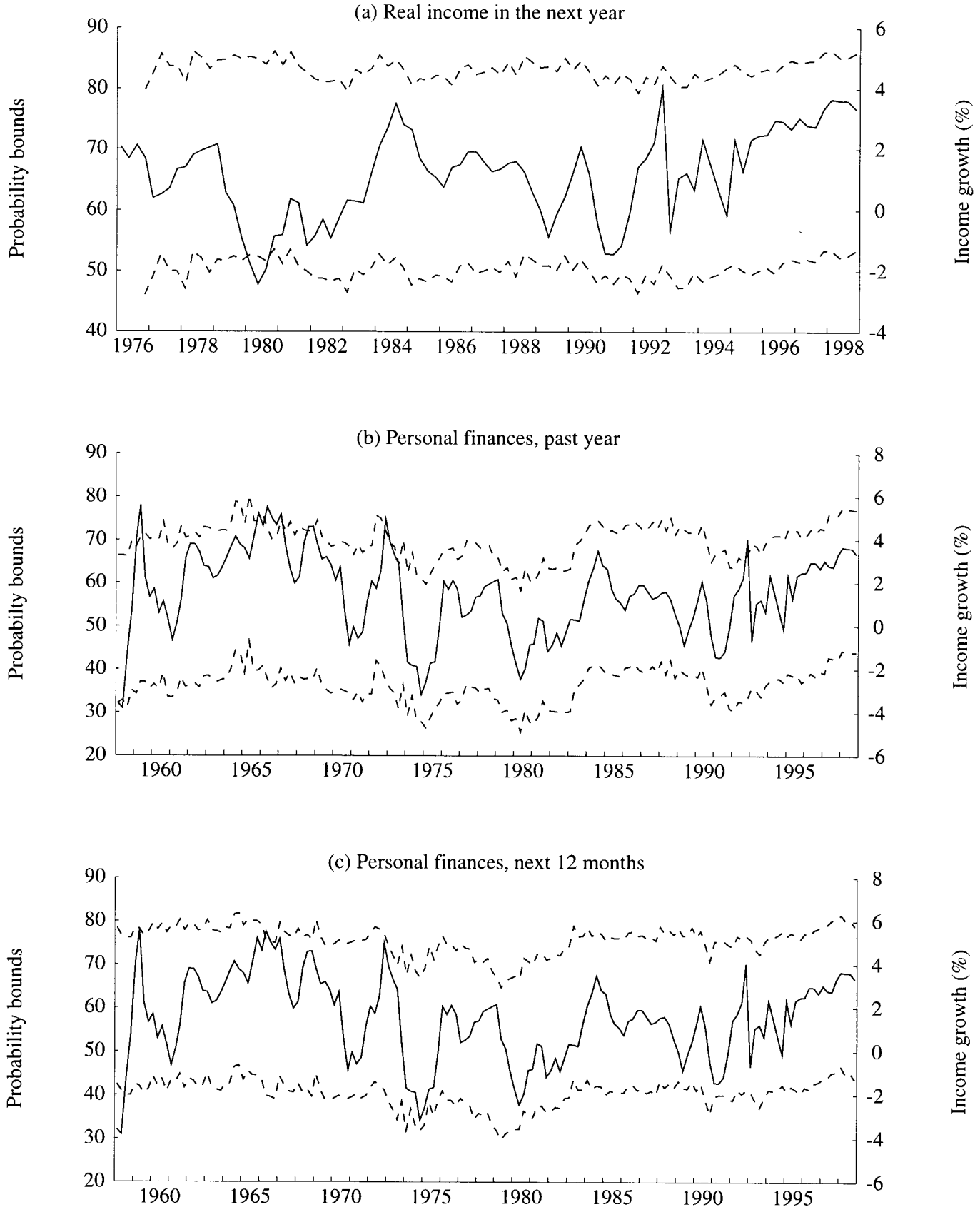
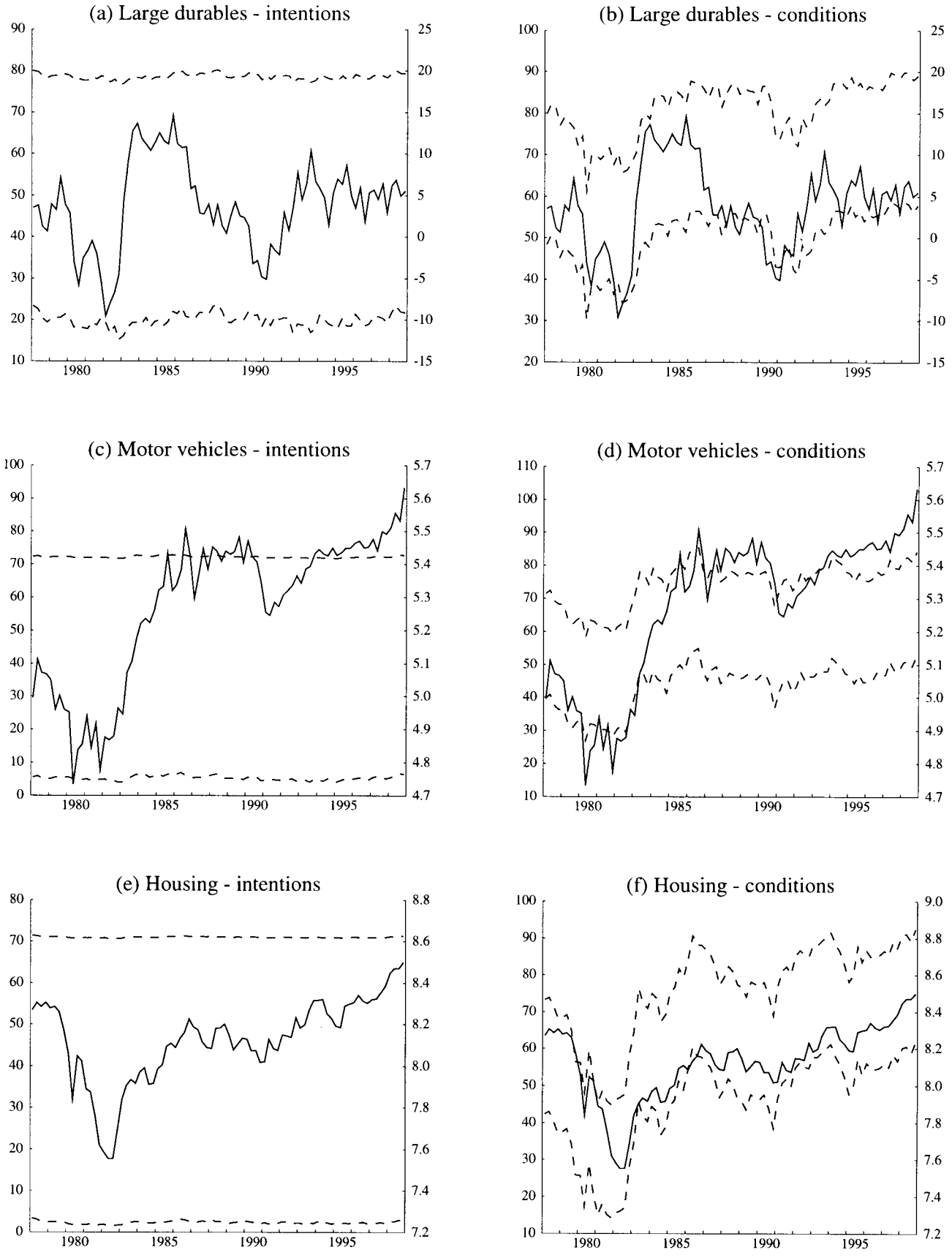


Figure 3. Measures of major purchases



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