AUTOMATIC FISCAL POLICY: A NEW DESIGN

Laurence S. Seidman and Kenneth A. Lewis

Department of Economics

University of Delaware

Newark, DE 19716

June , 2002

SeidmanL@be.udel.edu **LewisK@udel.edu**

302-831-1917 **302-831-1912**

ABSTRACT

We offer a new design for automatic fiscal policy that can strengthen its role as a complement to counter-cyclical monetary policy, and analyze it in the Fair macroeconometric model that has been estimated using quarterly data for the U.S. economy. Our automatic fiscal policy consists of the triggering of a transfer (or "income tax rebate") of particular magnitude in response to a decline in the output of the economy of a particular magnitude. The magnitude of the transfer is set with the sole purpose of effectively combating a recession. By contrast, the magnitudes of current automatic stabilizers are unintended by-products of setting the ratio of tax revenue to GDP, the degree of progressivity of the tax system, and the level of unemployment benefits. We generate a severe recession using historical data and simulate the impact of our automatic fiscal policy. We assume that the Federal Reserve adheres to a counter-cyclical monetary policy governed by the interest rate (Taylor) rule estimated from historical data. We find that the interest rate rule alone mitigates the severe recession only modestly, whereas our automatic fiscal policy (together with the interest rate rule) substantially reduces the severity of the recession while generating only a relatively small rise in the government debt/GDP ratio.

Might monetary policy need help combating a recession? In the 2001 U.S. recession, the Federal Reserve cut the federal funds rate almost to its floor (from 6.50% to 1.75%). The Bank of Japan went to the floor in its attempt to combat the stagnation of the Japanese economy in the 1990's. We accept the dominant view that monetary policy should play an important counter-cyclical role, but believe it is essential to strengthen automatic counter-cyclical fiscal policy in order to reduce the risk that monetary policy will run out of ammunition fighting a recession. Most economists are justifiably skeptical that Congress can implement *discretionary* counter-cyclical fiscal policy in a timely and effective manner. At the same time, most economists nevertheless believe that *automatic* fiscal stabilizers are useful. In this paper, we offer a new design for automatic fiscal policy that can strengthen its role as a complement to counter-cyclical monetary policy. Our automatic fiscal policy consists of the triggering of a transfer to households of particular magnitude in response to a decline in the output of the economy of particular magnitude.[1] The magnitude of the transfer is set with the sole purpose of effectively combating a recession. By contrast, the magnitudes of current automatic stabilizers are unintended by-products of setting the ratio of tax revenue to GDP, the degree of progressivity of the tax system, and the level of unemployment benefits.

Why an automatic policy? Discretionary fiscal policy often takes too long to move through the legislative process. This is not always the case. In the 1975 recession, from the time Republicans shifted their top priority from inflation to recession (January 1975), thereby joining the Democrats, it took just three months for a tax cut stimulus package to be enacted, and checks to households were sent out in the next three months. In the 2001 recession, Congress and the President enacted tax legislation in June, and tax rebate checks were mailed to households in the next three months. But even these two cases illustrate the importance of making the policy automatic. In 1975, an automatic policy would have sent checks out beginning in January, rather

[1] Fair (1999) considers automatic variation of the indirect business tax. Taylor (2000) considers a more complex rule involving variation of the actual budget surplus.

than April. In 2001, action occurred in June because tax legislation that was aimed at long-run objectives, not recession, had been introduced at the beginning of 2001 by President Bush as a fulfillment of his campaign promise to reduce the tax burden on the American people. As the economic slowdown became evident in mid 2001, it was easy for Congress to tack on a tax rebate at the last minute to a comprehensive tax bill that had been debated for a half year. In the fall of 2001, with the recession deepening, Republicans and Democrats deadlocked over the best way to further stimulate the economy. Experience therefore suggests that it is important to make counter-cyclical fiscal policy automatic. The automatic policy can always be over-ridden by discretionary action by Congress and the president. The automatic policy is simply a default position: If Congress fails to take discretionary action, stimulus is promptly triggered by the decline in the economy.

It was pointed out years ago by Branson (1973), Feldstein (1976), and Modigliani and Steindel (1977), and recently by Feldstein (2001) and Blinder (2001), that a temporary consumption tax cut might be an effective instrument of counter-cyclical fiscal policy because it provides an incentive for consumers to spend before the temporary cut is terminated. We find their argument plausible, and regard it is an important topic for future research. In the section that precedes the conclusion, we briefly consider how an automatic temporary consumption tax cut might be implemented through the enactment of a value-added-tax (VAT) that is made progressive by VAT rebates implemented through the April 15th household tax. We suspect that such an automatic temporary consumption tax cut would be a useful complement to the automatic transfer ("tax rebate") analyzed in this paper. In this paper, however, we propose and analyze an automatic transfer (or income tax cut) because, despite the permanent income and life cycle hypotheses, in our judgment, recent empirical studies show that there is sufficient short-run response of consumption to temporary changes in disposable income due to transfers or income tax cuts to make such a policy sufficiently effective.

In the past decade empirical studies have challenged the validity of the extreme versions of the permanent-income and life-cycle hypotheses. Although permanent or life-cycle income

remains important for predicting consumption, it appears that current disposable income does, after all, also have an important impact on consumer spending. N. Gregory Mankiw (2000) reviews empirical studies on consumption behavior and comments (p120):

> "...A large empirical literature...has addressed the question of how well households intertemporally smooth their consumption. Although this literature does not speak with a single voice, the consensus view is that consumption smoothing is far from perfect. In particular, consumer spending tracks current income far more than it should."

Mankiw looks at empirical studies that examine whether households keep their consumption steady ("smooth") despite fluctuations in their current disposable (after-tax) income, or instead adjust their consumption to changes in their disposable income. He says that although some economists think consumers "should" keep their consumption smooth, most of these studies conclude that consumer spending tracks current disposable income far more than "it should." For example, John Campbell and Mankiw (1989) estimate that roughly half of income goes to households that consume according to current income, and half to households that consume according to permanent (normal) income. Jonathan Parker (1999) examines income changes resulting from Social Security taxes and reports that the elasticity of expenditure on nondurable goods with respect to a decline in income is roughly one-half. Nicholas Souleles (1999) studies the impact of predictable income tax refunds and concludes that consumption increases by at least 35 percent of a refund within three months.[2] Mankiw says imperfect smoothing occurs because some consumers may not have "rational expectations" and may simply extrapolate their current income into the future because it is the only definite information available (Tversky and Kahneman, 1973); and some may face borrowing constraints, as indicated by the finding that some engage in "buffer-stock saving" to prepare for emergencies (Carroll, 1997), and by the fact that many households have virtually zero wealth (Wolff, 1998). He says that a simple conclusion is inescapable: many households do not have the financial means to smooth consumption, and the prevalence of these low-wealth households explains why

[2] Souleles (2001) finds a similar result for the Reagan tax cut.

consumption tracks current disposable income. The empirical evidence implies that "temporary tax changes have large effects on the demand for goods and services" because an important share of the population are "spenders who live paycheck-to-paycheck." Mankiw concludes (p121):

"Reflecting on these facts, one cannot help but be drawn to a simple conclusion: many households do not have the financial wherewithal to do the intertemporal consumption-smoothing assumed by much modern macroeconomic theory...Acknowledging the prevalence of these low-wealth households helps explain why consumption tracks current income as strongly as it does."

Poterba (1988) studies the impact of the 1975 tax rebate. He writes (p414):

"My analysis differs from previous studies in using monthly consumption data to exploit the pronounced intraquarter pattern of the 1975 rebate. (More than three-quarters of the rebate were received in May.) This higher frequency data is also attractive because finding that spending rises in the month when tax payments change is strong evidence of a link between current income and consumption."

He describes the rebate (p413-14):

"The Tax Reduction Act of 1975 consisted of a 10 percent rebate of 1975 taxes up to a maximum of $200. The House passed the bill in late February, the Senate approved it in March, and President Ford signed it in late March. The legislation transferred $8.1 billion from the Treasury to households, mostly during the two months from late April to mid-June. Measured at an annual rate in 1987 prices, this corresponds to a disposable income increase of more than $100 billion...The 1975 tax bill included the tax rebate as well as a smaller, transitory income tax reduction that was subsequently made permanent...My analysis focuses on the rebate's consumption effects, since it is difficult to describe consumer expectations with respect to the other tax changes."

He runs a regression to estimate the impact of the rebate on consumption spending in the month the rebate is received (p414-15):

"The results differ somewhat across specifications, but suggest that consumption spending rises by between 12 and 24 cents per dollar of temporary tax rebate."

It must be emphasized that Poterba ignores any impact in future months; this omission implies that he underestimates the full impact of the rebate over several months. In contrast to Poterba's equation, most macroeconometric models include a distributed lag of disposable income, so that a change in disposable income this quarter is assumed to raise consumption

spending over several quarters.[3]

Souleles (1999) study is especially relevant to our automatic tax rebate because he uses uses micro data from the U.S. Bureau of Labor Statistics' Consumer Expenditure (CEX) Surveys from 1980 to 1991 to estimate the response of household consumption to income tax refunds. His study *underestimates* the one-year, or even half-year, impact of refunds on consumption because it focuses exclusively on the one-quarter impact. Souleles draws these conclusions from his study (1999, p956):

"This paper has found significant evidence of excess sensitivity in the response of households' consumption to their income tax refunds. Further, some of the sources of this sensitivity were identified. In particular, liquidity constraints appear to play an important role, because the nondurable consumption of constrained households increased at the time of refund receipt, far more than for unconstrained households. However, more than liquidity constraints are at play, because durable expenditures by the unconstrained also responded substantially; and the response of nondurables extended later into the year, after refund receipts. Furthermore, the response in durables by the unconstrained is not easily explained by standard models of durables or self-control, because liquid households could have bought their durables before receiving their refunds. There was also some evidence of a disproportionate response to larger refunds, counter to some views of mental accounts...

Having rejected the null hypothesis of the life-cycle theory, the paper estimated under a simple alternative hypothesis the marginal propensity to consume out of refunds. The response of total consumption was found to be at least 35 percent of refunds within a quarter, up to over 60 percent. Given the large aggregate value of tax refunds, these results imply rather substantial macroeconomic effects of refunds, and more generally of fiscal policy."

[3] In a recent preliminary report, Shapiro and Slemrod (2001) ask survey questions to households in August and September about their plans for the tax rebate mailed by the U.S. Treasury in July, August, and September of 2001 ($600 per family). About 20% of the households say they expect to spend most of the rebate this year, while the rest say they expect to save most it or use most of it to pay off debt this year. Slemrod and Shapiro note that in their earlier study (1995) a higher proportion of households said they expected to spend a temporary cut in their income tax withholding in 1992. The 2001 survey did not ask households who say they expect to save most of it this year whether they expect to spend most of it next year. The survey also did not ask households who say they expect to pay down debt with this rebate whether they would expect to spend a subsequent rebate. It is interesting to note the following. At year's end, suppose the authors resurvey each household and ask what it actually did with the rebate that year. It would be difficult for any household to figure out the answer given the fungibility of the rebate. The household must compare its actual spending to a hypothetical-- what it would have spent had there been no rebate. The household may think it used the rebate for activity X, but the real issue is how much greater is X with the rebate than it would have been without it.

At first glance, the Shapiro and Slemrod (2001) study of the 2001 rebate seems to run counter to the rest of the recent empirical literature, including their earlier study (1995). They ask survey questions to households in August and September about their plans for the tax rebate mailed by the U.S. Treasury in July, August, and September ($600 per family). They write (2001, p1) :

"We find that only 22 percent of those receiving the rebate reported that it would lead them to mostly increase spending. This propensity to spend is remarkably low, both from a theoretical perspective and when compared to previous estimates."

They are puzzled by their finding. They write (2001, p2):

"The lower propensity to consume we find cannot be attributed to our survey methodology. In 1992, we fielded a similar survey question to measure the propensity to consume from the 1992 changes in income tax withholding. Both the 1992 and 2001 survey questions were included as modules on the University of Michigan Survey Research Center's monthly Survey of Consumers, so the procedures for drawing the sample were the same in both surveys. For the 1992 withholding change, we found that over forty percent of households would spend the extra current income from a reduction in withholding, despite the fact that the increase in take-home pay would be offset by either a lower tax refund or higher final payment. While that behavior is inconsistent with unconstrained optimization, it is quite consistent with the broad range of evidence that a high fraction of income goes to households who act myopically or liquidity constrained with respect to changes in income. Because the methodology used to study the 2001 rebate so closely mirrors that of the 1992 study, the surprising results of the 2001 study appear to represent a genuine departure from past behavior and are not an artifact of our methodology or the specific details of the survey."

However, there are two crucial differences in the wording of the key question that may well have biased the 2001 study. Here is the wording of the 2001 key question (2001, Appendix):

"Earlier this year a Federal law was passed cutting income tax rates and expanding certain credits and deductions. The tax cuts will be phased in over the next ten years. This year many households will receive a tax rebate check in the mail. In most cases, the tax rebate will be $300 for single individuals and $600 for married couples.

Thinking about your (family's) financial situation this year, will the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?"

Now compare that wording to the wording of the 1992 key question (1995, p282):

"The federal government *has* recently changed the amount of income tax that is being withheld from paychecks. On average, the change in withholding should *increase* your take-home pay by about $25 per month, or by a total of about $250 for all of 1992. It also means that

next year your tax refund will be about $250 less than otherwise, or you will have to pay about $250 more in taxes next year than otherwise. How do you think you will use the extra $25 per month— do you think you will *spend most* of it, *save most* of it, use *most* of it to *repay debts*, or what? (What do you think you will do with *most* of the extra money?)"

First, the 2001 key question begins with the phrase, "Thinking about your (family's) financial situation." This phrase does not appear in the 1992 key question. We contend that this phrase is likely to influence the respondent away from answering "spend" and towards answering either "save" or "pay off debt." Suppose instead that the phrase had been "Thinking about the needs of your family." Such a phrase might do the reverse: influence the respondent towards answering "spend." On reflection, it seems clear that there should have been no introductory phrase at all, and the question should simply have begun: "Will the tax rebate lead you..." This is exactly what was done in the 1992 question: there was no introductory phrase.

Second, the 2001 question asks whether the respondent will mostly "increase spending," whereas the 1992 question asks whether the respondent will "spend most of it." The word "increase" appears in the 2001 question but not the 1992 question. We wonder whether some 2001 respondents might have thought, "I don't plan to use the rebate to increase spending, just to maintain spending despite the recession," and consequently did not select "increase spending." It is true that in the 2001 question the word "increase" also appears with saving. But it does not appear with "pay off debt." Hence, one of the three choices does not ask the respondent for an "increase." It seems to us that this may have influenced the respondent towards answering "pay off debt."

To summarize: In contrast to the 1992 question, the 2001 question asks the respondent to "think about your (family's) financial situation," and omits the word "increase" only for the choice "pay off debt." Given these two differences, it is not surprising that more 2001 respondents answered "pay off debt" than either "increase spending" or "increase saving." These two changes have unfortunately biased the 2001 survey. Therefore, we cannot know what the results would have been if the 2001 key question had been worded neutrally.

There are other cautions about the 2001 study. The 2001 survey uses the phrase "this

year." Suppose a respondent intends to spend it in the first half of 2002. The respondent may well answer "save" rather than "spend." The survey also did not ask households who say they intend to pay down debt whether they would intend to spend a subsequent rebate or paycheck. It is interesting to note the following. At year's end, suppose the authors resurvey each household and ask what it actually did with the rebate that year. It would be difficult for any household to figure out the answer because of the fungibility of the rebate. The household must compare its actual spending to a hypothetical-- what it would have spent had there been no rebate. The household may think it used the rebate for activity X, but the real issue is how much greater is X with the rebate than it would have been without it. We pose this question to the reader: "What did you do with your 2001 rebate?" To give the correct answer, you have to know what you would have done had there been no rebate. Are you sure you know this?

We believe, then, that the jury is still out on the impact of the 2001 tax rebate. A decision must await the kind of empirical studies of behavior cited above in this section. Until these studies are done, it is sensible to assume that the results of recent research on rebates and refunds are likely to hold for the 2001 tax rebate. The flaws in the wording of the key question in the Shapiro/Slemrod study disqualify that study from generating a new conventional wisdom about tax rebates.

In this paper, we present a new design for an automatic counter-cyclical fiscal policy and analyze it in the Fair macroeconometric model that has been estimated using quarterly data for the U.S. economy through 2001.1. Our automatic fiscal policy consists of the triggering of a transfer (or "income tax rebate") in response to a decline in the output of the economy of particular magnitude. We generate a severe recession using historical data and simulate the impact of our automatic fiscal policy using historical data for several years. We assume that the Federal Reserve adheres to a counter-cyclical monetary policy governed by the interest rate (Taylor) rule estimated on historical data in the Fair model. We find that this interest rate rule alone mitigates the severe recession only modestly, whereas our automatic fiscal policy (together with the interest rate rule) substantially reduces the severity of the recession while generating

only a relatively small rise in the government debt/GDP ratio. We also simulate a false alarm of a severe recession, a supply shock due a sharp increase in import prices, three past recessions (1975, 1982, and 1991), and a severe recession beginning in 2001. The automatic fiscal policy performs well over all simulations.

A Proposed Automatic Fiscal Policy

Current automatic stabilizers (for example, see Cohen and Follette (2000), and Auerbach and Feenberg (2000)) are unintended byproducts of setting the ratio of tax revenue to GDP, the degree of progressivity of the tax system, and the level of unemployment benefits. Hence the magnitude of the stabilizing impact is held hostage to these objectives. We introduce an automatic fiscal policy with the sole objective of combating recession, and can therefore set the magnitude solely for the purpose of stabilization (Seidman, 2001). This automatic fiscal policy was once called "formula flexibility" to distinguish it from automatic stabilizers. In his monograph on public finance, Musgrave (1959) devotes a section to "formula flexibility" (p512):

> "*Formula Flexibility*
> Formula flexibility refers to an arrangement whereby changes in tax rates and/or expenditure levels are legislated in advance, to go into effect if and when specified changes in income occur. For instance, it might be legislated that income tax rates be reduced or public expenditures raised by x percent if income falls by y percent."

Our automatic fiscal policy aims solely at countering recession— stimulating demand when the economy is in recession, as a complement to monetary stimulus. The policy is asymmetric: It does not attempt to restrain demand when demand is excessive. That task is left to monetary policy. We offer an asymmetric policy because we suspect that Congress may be more willing to pre-enact fiscal stimulus than to pre-enact fiscal restraint. Although our policy is automatically triggered by the state of the economy, Congress must "pre-enact" the automatic policy-- it must be willing to vote for a bill that would trigger a fiscal change according to the state of the economy. It may be more willing to vote to trigger a tax cut to counter recession

than to vote to trigger a tax increase to counter inflation.[4]

Our policy provides an automatic transfer whenever real GDP is at least X percent below "normal" real GDP (the threshold X percent is either zero or positive), and the amount of the transfer varies with the magnitude of this excess GDP gap. "Normal" real GDP is the real GDP that would have occurred if the unemployment rate had been normal.[5] We describe our policy more specifically as follows. Let

$[Ygap]_t$ = Percent Gap of real GDP below "normal" real GDP, so

$[Ygap]_t / (Y_{nt} - Y_t)/Y_{nt}$,

where Y_{nt} is normal real output in quarter t and Y_t is actual real output in quarter t.

$X/ (Y_{ht}/Y_{nt})$,

where Y_{ht} is the threshold level of Y in quarter t and ($Y_{ht} \# Y_{nt}$).

R_t = the *new counter-cyclical* real transfer from the federal government to households

We consider policies of the form:

(1) $R_t /Y_{nt} = \forall [Ygap - X]_{t-1}$

where X percent is the threshold that must be exceeded before the transfer is triggered, [Ygap - X] percent is the excess GDP gap, and $\forall$ is the "power" coefficient. Below we consider a threshold of 0%, and of 2%. If the Ygap percent is less than X percent, then the transfer would be zero.[6]

---

[4] For example, the 1968 tax surcharge to counter inflation took much longer to enact than the 1975 tax rebate to counter recession.

[5] The real GDP gap in each quarter is obtained as follows. Fair provides data on actual real GDP, chain-weighted 1996$. To get normal ("natural") real GDP, chain-weighted 1996$, we use Gordon's "natural" real GDP series in fixed weighted 1992 dollars from Gordon (2000). In each quarter, Gordon provides a ratio of natural to real GDP. We use this ratio to compute natural real GDP, chain-weighted $1996; specifically, Y_n = (realGDP1996$)(Gord$Y_n$ / realGDP1992$Gord).

[6] Phillips (1954), Pack (1968), and Duggal (1975) investigate a more complex automatic fiscal policy with three components: "proportional," "derivative," and "integral." We did some preliminary testing with derivative and integral components, but found that the proportional

Note that equation (1) assumes that it is administratively feasible to trigger a transfer this quarter based on GDP data for the preceding quarter. In fact, the U.S. Department of Commerce releases its preliminary estimate for the preceding quarter's GDP approximately one month after the end of the quarter. The dollar amount of each transfer to each household would have to be stamped on each check before it could be mailed. Alternatively, instructions would have to be given to and implemented by employers concerning the magnitude of the adjustments in withholding rates. It may turn out that only a two-quarter, rather than a one-quarter lag, is administratively feasible.

We also consider modifying the policy for inflation. Under this modification, R_t is given by the above equation, (1), except that R_t is reduced according to the excess of inflation above its target (p_t - p*). Under the modified policy, R_t might equal Z percent of the cut prescribed by equation (1) where

(2) $Z = [1 - \exists(p_t - p^*)]$, where $\exists > 0$.

Suppose p_t - p* equals 5% and $\exists$ is 8. Then the modified transfer equals 60% of the unmodified transfer.

Testing the Policy in a Macroeconometric Model

Ideally, the policy should be tested in a variety of macroeconometric models. This paper tests it in one particular model: the Fair U.S. quarterly model, estimated from 1952.1 through 2001.1. The Fair model is a mainstream traditional macroeconometric model. Its properties are roughly similar to other mainstream traditional models.[7]of reducing the short-term interest rate 1

---

component alone is satisfactory, simpler, and more transparent. Hence, we use only the proportional component in our automatic fiscal policy.

[7] A useful source for comparing the Fair model with other mainstream traditional macroeconometric models is provided in Klein (1991) which reports the results of a conference focused on a comparison of these models. Each of the models performed the experiment

percentage point (100 basis points) below the baseline path. Specifically, each model had to adjust its monetary variables each quarter to achieve the target path for the short-term interest rate: a path of numerical values 1 percentage point below the historical value in each quarter. For the fourth quarter, the models predicted the following percentage increase in GDP: BEA, 0.89%; DRI, 0.31%; MICH, 0.67%; WEFA, 0.44%; FRB, 0.57%; FAIR, 0.43% (source: Table A2.5, [2B], in Klein, 1991). Fair (1994, p1-16) provides a careful discussion of the relationship of his model to the Lucas critique and rational expectations. Fair makes his model accessible to other researchers. We estimate and simulate the Fair model using the Fair-Parke program downloaded from Fair's website. The data and model files are also provided by Fair on his website. We could not simply use the interactive version of the model because of the need to introduce interest rate floors and fiscal rules such as our policy.

We give a brief overview of the Fair U.S. quarterly model. More comprehensive expositions are given by Fair (1994, 2000b). The model consists of 30 stochastic equations, econometrically estimated by two-stage least squares, 101 identities, 131 endogenous variables, slightly over 100 exogenous variables, and many lagged endogenous variables. The model has six sectors: household, firm, financial, federal government, state and local government, and foreign. For monetary policy, the Fair model estimates an interest rate reaction function based on the historical behavior of the Federal Reserve. The estimated equation implies that the Fed generally engages in counter-cyclical monetary policy, lowering the interest rate (specifically, the three-month Treasury bill rate, RS) in response to a rise in the unemployment rate (UR), and raising the interest rate in response to a rise in the inflation rate.

For our study of a counter-cyclical fiscal policy implemented through automatic transfers to households[8], the key equations are the four household expenditure equations explaining

[8] We perform simulations to determine the quantitative impact of transfers on GDP in the Fair model (estimated through 2001.2). Under the tax act of 2001, a transfer of about $40 billion was paid by government to households in one quarter (July-September), 2001.3. Hence, at an annual rate, the transfer in that quarter was $160 billion. We therefore use a transfer of $160 billion and an initial quarter of 2001.3 in our multiplier simulations. We raise nominal exogenous transfers (government to household) by $160 billion for 1 quarter only, for 2 quarters, for 3 quarters, or for

consumption of services (CS), nondurables (CN), durables (CD), and investment in residential housing (IHH). In all four, disposable income is a right-hand variable. Transfers enter the consumption equations through disposable income. The Fair model implicitly assumes that the response of consumption to a change in disposable income is the same regardless of the source of that change (e.g. a change in wage income, a "temporary" transfer or tax cut, or a "permanent" transfer or tax cut).

The consumption equations econometrically estimate the coefficient of disposable income, and no attempt is made to estimate one coefficient for gross labor earnings, another for taxes, and another for transfers. How realistic is this assumption? Distinguish two situations. Under the first, gross labor earnings are growing normally, but a transfer jumps disposable income abruptly above its normal growth path. Under the second, gross labor earnings decline due to recession, but the transfer reduces the decline in disposable income, thereby keeping the growth path of disposable income closer to normal. In the first case, the transfer bumps disposable income above its normal growth path; here it seems plausible that consumers might raise consumption less than if gross labor earnings had risen. But in the second case, the transfer helps keep disposable income nearer to its normal growth path; here it seems plausible that consumers might continue normal spending in response to the transfer. The objective of our counter-cyclical transfer is to keep disposable income growing at its normal trend rate despite the recession. It therefore seems plausible that the Fair model might provide an accurate estimate of the impact on consumption of our counter-cyclical transfer that attempts to keep disposable

---

8 quarters, and then return it in the following quarter to its base value. We assume the Fed adheres to the interest rate reaction function estimated by the Fair model. The transfer of $160 billion is 1.55% of the base value of nominal GDP ($10,335) and 19.2% of the base value of transfers ($832 billion) in the first quarter of the simulation (2001.3). That transfer raises nominal GDP 0.35% above its base value in the first quarter. If that transfer is sustained for two quarters, then nominal GDP is 0.78% above its base value in the second quarter. If that transfer is sustained for three quarters, then nominal GDP is 1.17% above its base value in the third quarter. If that transfer is sustained through eight quarters, then nominal GDP is 1.86% above its base value in the eighth quarter.

income on its normal growth path.

Our policy introduces a new endogenous transfer from the federal government to households. In the Fair model, $TRGH_t$ is the exogenous nominal transfer from the federal government to households in quarter t. We re-label Fair's transfer by adding a *b* subscript as $TRGH_{bt}$. We introduce the real counter-cyclical transfer R_t (from our equation (1) above), so that $(PH_t)R_t$ is the nominal counter-cyclical transfer (where PH_t is the price deflator for consumer expenditures for services, nondurables, durables, and residential investment, inclusive of indirect business taxes). Thus, the total nominal transfer from federal government to households is $TRGH_t = TRGH_{bt} + (PH_t)R_t$.[9]

Automatic Fiscal Policy in Response to a Severe Recession

In order to run policy simulations, we adopted the standard procedure of first adding historical residuals to the constant term of each equation so that the model tracks history perfectly over the simulation period. A severe recession is generated beginning in 1986.1, a convenient period of relative macroeconomic tranquility with available historical data, as follows. The constant term is reduced by a fixed amount for eight quarters (1986.1-1987.4) in each of the following five behavioral equations: consumer expenditure for services (CS), consumer expenditure for nondurables (CN), consumer expenditure for durables (CD), residential investment (IHH), and business capital stock (KK) which thereby reduces non-residential fixed investment (IKF). Following Fair's (2000a) analysis of a fall in the stock market, we reduce the constant term in the behavioral equation for the capital gain (loss) on corporate stock in the first quarter (1986.1); the magnitude of our adjustment is scaled down from Fair's because of the difference in the level of the stock market (measured by the S&P 500

[9] An endogenous transfer from state and local government to households is nominal unemployment insurance benefits (UB), which also enters disposable income.

index) in 1986.1 vs the period he uses in his article (1999.3).

These changes generate a severe recession. We focus on three variables shown in the three panels of Figure 1 (a,b, and c). Figure 1a shows the path over twelve quarters (1986.1 through 1988.4) of the unemployment rate; 1b, the interest rate (the three-month treasury bill rate); and 1c, the deficit ratio (the ratio of the NIPA nominal deficit (- SGP), deflated by the GDP deflator, to natural real GDP) beginning in 1986.1 under several alternative policy responses.

How severe would the recession be if there were no response from either monetary or fiscal policy? By this we mean that the Fed keeps the interest rate at its historical value in each quarter (instead of cutting the interest rate below its historical path as it usually would in response to a recession), and there is no fiscal policy other than the current automatic stabilizers due to the current tax and transfer system. We call this the shock simulation, and label it "shock" in Figure 1. In Figure 1a, the shock unemployment rate path is well above its historical path. In Figure 1b, the shock interest rate path coincides with the historical path because of our assumption of no monetary policy response. In Figure 1c, the shock deficit ratio path is above the historical path because the recession automatically reduces tax revenue.

Now suppose instead that the Fed responds as it usually does historically to changes in the unemployment rate and inflation rate. Recall that the Fair model contains an econometrically estimated interest rate rule equation for the historical period indicating how monetary policy usually responds to these changes. It should be noted that the Fed's response to a severe recession might differ from an equation estimated on data with smaller changes in the unemployment rate. The simulation generated by adherence to this interest rate rule equation we call the monetary policy simulation, and label it "M" in Figure 1. In Figure 1a, the M unemployment rate path is below the shock path (note that the gap between the two paths opens up gradually) but still well above the historical path. In Figure 1b, the M interest rate path is well below the shock path (which is the same as the historical path)-- indeed, the interest rate hits the floor of zero for several quarters; in these quarters, the estimated interest rate rule equation generates a negative value for the three-month Treasury bill rate, RS, which we over-ride by

substituting 0%. In Figure 1c, the M deficit ratio path is below the shock path because the recession is not as deep and the fall in tax revenue is not as great; but the M deficit ratio path is still well above the historical path.

What would happen if an automatic fiscal policy were in effect when the recession occurs? We consider three automatic fiscal policies that respond to the level of the real GDP gap in the previous quarter; the first (F1) is the most cautious and the least powerful policy, and the third (F3) is the least cautious and the most powerful. Under automatic fiscal policy 1 (F1), a transfer is triggered only when the percent GDP gap exceeds 2.0%-- hence, the policy is "cautious"-- and the power coefficient $\forall$ is only 0.5 so that the transfer equals only half the of the excess GDP gap of the previous quarter. Under fiscal policy 3 (F3), a transfer is triggered as soon as the GDP gap exceeds 0%-- hence, the policy is not "cautious"-- and the power coefficient $\forall$ is 1.5 so that the transfer equals one and a half times the GDP gap of the previous quarter. Although the shock hits the economy in 1986.1, with F1 the transfer does not occur until 1986.3 because of the 2.0% threshold, and because we assume there is a one-quarter implementation lag (i.e. if the threshold is exceeded in 1986.2, the transfer goes into effect in 1986.3). But with F3 the transfer occurs in 1986.2 because the threshold is 0% but there is still the one-quarter implementation lag. We assume that the Fed adheres to its interest rate rule. Thus, the simulation generated by the Fed's monetary policy and an automatic fiscal policy we call the monetary/fiscal policy simulation and label it "M&F."

To implement these automatic fiscal policies in the Fair U.S. Quarterly Model, we solve the model successively using the Fair-Parke program (Fair, 1996). On the first pass, we treat TRGH (the total nominal transfer from federal government to households) as an endogenous variable (using the Fair-Parke GENR command) to solve for the TRGH and the real GDP gap (Ygap). On successive passes, we treat the TRGH path from the previous round as exogenous, solve the Fair model for the endogenous Ygap path, and use formula (1) perhaps modified by (2) to solve for the implied TRGH path. We iterate until the TRGH path is approximately the same (to a very small tolerance) in two consecutive rounds.

In Figure 1, we show two alternative fiscal policies, 1 (the weakest policy) and 3 (the strongest policy), and label the monetary/fiscal policies M&F1 and M&F3. In Figure 1a, the M&F1 unemployment rate path is below the M unemployment rate path (once the fiscal policy is implemented), and the M&F3 path is lower still. In Figure 1b, the M&F1 interest rate path is above the M interest rate path, and the M&F3 interest rate path is higher still: although the Fed adheres to the same interest rate *rule* (an equation that varies the interest rate according to the unemployment rate and the inflation rate), the M&F interest rate paths are higher than the M interest rate path because the automatic fiscal policy mitigates the recession and keeps the unemployment rate lower. In Figure 1c, the M&F1 deficit ratio path is above the M deficit ratio path, and the M&F3 deficit ratio path is higher still (through the tenth quarter).

Whereas Figure 1 shows the path of the unemployment rate (UR), the three-month Treasury bill rate (RS), and the deficit ratio D/Y_n over twelve quarters, Table 1 focuses on the numerical values in the eighth quarter (1987.4) of each simulation, roughly the trough of the recession. The historical column gives the historical values for the unemployment rate (UR), the three-month Treasury bill rate (RS), the deficit ratio D/Y_n-- the ratio of the deficit deflated by the real GDP deflator (D), to natural real GDP (Y_n), and the debt ratio B/Y_n — the ratio of nominal debt (-AG) deflated by the real GDP deflator, to natural real GDP (Y_n). We begin with the shock column. Under the shock, the "shortfall" in real GDP would be 12.7%-- that is, real GDP would be 12.7% below its historical value (the shortfalls in CS, CN, CD, IHH, and IKF are also shown), UR would be 12.9% (compared with a historical value of 5.9%), and RS would be at its historical value of 6.0%. Note that the deficit ratio (D/Y_n) is 7.9% (compared to its historical value of 3.0%), and the debt ratio (B/Y_n) is 41.4% (compared to its historical value of 33.4%). It is important to emphasize that without our counter-cyclical fiscal policy, the recession itself causes deficits each quarter and therefore a significant increase in the debt ratio.

If monetary policy follows its historical estimated rule equation, it would react by cutting RS to 0.0%, as shown in the M column, and as a consequence the shortfall in real GDP would be reduced to 9.3%, and UR, to 11.1%. With the M policy, the deficit ratio is reduced to 6.5%

(from 7.9% under the shock) for two reasons: the economy is stronger generating more tax revenue, and the interest rate is lower thereby reducing government spending for debt service. But even with monetary policy providing some help, the recession remains deep enough so that the debt ratio still rises to 39.7% (compared to its historical value of 33.4% and to the 41.4% it would have reached if there had been no help from monetary policy)

With combined monetary and fiscal policy, the shortfall in GDP, and UR, would be reduced still further. The table shows three alternative fiscal policies (F1, F2, and F3), where F2 is intermediate in strength between F1 and F3; F2 has the same threshold as F1 (2%) so it is as "cautious," but it has the same power coefficient $\forall$ as F3 ($\forall$=1.5) so it is as powerful as F3 once the threshold is surpassed. Together with monetary policy, the weakest fiscal policy (M&F1) reduces the GDP shortfall to 6.4% (instead of to 9.3% with monetary policy alone), and UR, to 9.5% (instead of to 11.1%), requiring a cut in RS to 1.2% (instead of to 0.0%), whereas the strongest fiscal policy (M&F3) reduces the GDP shortfall to 3.2%, and UR, to 7.6%, requiring a cut in RS only to 3.9%.

However, the stronger the fiscal policy, the greater is the counter-cyclical transfer ratio R/Y_n — the ratio of the counter-cyclical real transfer (R) to natural real GDP (Y_n); the greater is the deficit ratio D/Y_n; and the greater is the debt ratio B/Y_n. As shown in Table 1, in the eighth quarter the historical value of D/Y_n is 3.0% whereas under the shock D/Y_n would be 7.9%, and with monetary policy D/Y_n would be 6.5%; and the historical value of B/Y_n is 33.4% whereas under the shock B/Y_n would be 41.4%, and with monetary policy B/Y_n would be 39.7%. Under the weakest combined policy M&F1, R/Y_n would be 2.4%, D/Y_n would be 8.5%, and B/Y_n would be 42.5%, whereas under the strongest combined policy M&F3, R/Y_n would be 4.5%, D/Y_n would be 10.0%, and B/Y_n would be 46.8%. As is evident in Figure 1c, under both M&F1 and M&F3, the deficit ratio actually peaks in the fifth quarter (9.8% under M&F1, and 13.4% under M&F3).

Thus, strengthening the fiscal policy reduces the severity of the recession and reduces the required cut in the interest rate, but raises the deficit ratio and the debt ratio. For example, in the

eighth quarter, relative to the shock path, M&F3 reduces the unemployment rate 5.3 percentage points (from 12.9% to 7.6%), while raising the deficit ratio 2.1 percentage points (from 7.9% to 10.0%) and raising the debt ratio 5.4 percentage points (from 41.4% to 46.8%). This relatively small rise in the debt ratio is reassuring. By contrast, over the decade-long Japanese recession, the debt ratio rose from below 50% to well over 100%; much of the rise was due to the recession itself, and only part was due to discretionary fiscal stimulus.

Automatic Fiscal Policy in Response to a False Alarm

Our automatic fiscal policy works well in response to a prolonged severe recession. But suppose there is a false alarm of a severe recession— a sudden plunge that appears ominous, but that suddenly reverses, launching a recovery that mushrooms into a boom. Does our automatic fiscal policy overreact to this false alarm, thereby overheating the booming economy and generating significant inflation?

To answer this question, we generate a false alarm in the model. We introduce the identical downward shift in the constant term of each consumption and investment equation as in our severe recession scenario (above), but sustain it only for two quarters, 1986.1 and 1986.2. Instead of continuing to hold down each constant term for six more quarters (as occurred in the severe recession), we shift each constant term back up above its initial value for the next two quarters (1986.3 and 1986.4); the upward shift in the third quarter (1986.3) is double the magnitude of the downward shift in the first two quarters; this upward shift is cut in half in the fourth quarter (1986.4); and beginning in the fifth quarter, each constant term is restored to its initial value.

In Figure 2a, the “shock” path shows the unemployment rate in the absence of policy (meaning the Fed keeps the interest rate at its historical value in each quarter and there is no fiscal policy other than the current automatic stabilizers due to the current tax and transfer system) for eight quarters (1986.1 through 1987.4). The unemployment rate initially rises, but

then declines until it is below the historical path.

Now suppose instead that the Fed responds as it usually does historically. The simulation generated by adherence to the Fed's estimated interest rate rule we call the monetary policy simulation, and as before label it "M" in Figure 2a. The M unemployment rate path lies slightly below the shock path.

What would happen if an automatic fiscal policy were in effect when the recession occurs (and the Fed continues to adhere to its interest rate rule)? Once again, we consider three automatic fiscal policies, from the weakest (F1) to the strongest (F3). In Figure 2, we show two of the policies, 1 (the weakest) and 3 (the strongest), and label these monetary/fiscal policies M&F1 and M&F3. In Figure 2a, the M&F1 unemployment rate path is slightly below the M unemployment rate path, and the M&F3 unemployment path is substantially lower. Thus, all three policies— M, M&F1, and M&F3— mitigate the initial rise in unemployment, but amplify the subsequent fall. The false alarm does induce all three policies to be activated, resulting in an amplification of the boom. The amplification is greatest with F3.

Figure 2b shows the consequences for the inflation rate. The shock, by initially generating a downturn, reduces the inflation rate below the historical path; but the subsequent boom raises the inflation rate above the historical path beginning in the fifth quarter. The shock raises the inflation rate about two-thirds of one percent (0.67%) in the sixth and seventh quarters (for example, in the sixth quarter, the inflation rate under the shock is about 3.56%, whereas its historical value is about 2.89%). How much do the policies add to this shock inflation? For M, and M&F1, the increment to inflation is small. For M&F3, the peak increment, which occurs in the fifth quarter, is roughly one percentage point (the inflation rate is 3.86% with M&F3, whereas its shock value is 2.96%); thereafter, the increment subsides. Thus, even with our strongest fiscal policy, a false alarm would raise the inflation rate in the boom by only one percentage point at its peak impact, and this increment disappears in a few quarters.

Automatic Fiscal Policy in Response to a Supply Shock

As we learned in the 1970's, a supply shock presents a dilemma for policy-makers: it simultaneously generates a recession and inflation. The automatic fiscal policy we have examined so far focuses solely on recession. The policy provides the same stimulus in response to a given GDP gap, whether that gap is generated by a demand shock or a supply shock. But it can be argued that if the gap is generated by a supply shock, so that inflation is simultaneously worsened, then the fiscal stimulus should be moderated. In this section, we consider such a modification of our automatic fiscal policy.

Under this modification, R_t is given by the equation (1) above, except that R_t is reduced according to the excess of inflation above its target (p_t - p*) according to equation (2). We assume ∃ is 8. We use an inflation target p* of 2%.

We generate a supply shock in the model. We introduce the shock into the equation of the domestic price level which is a function of an exogenous import price and several other variables. Our shock consists of a sudden increase in the exogenous import price. We use the import price shock of the 1970's as a rough guide for magnitudes (that shock was generated by an increase in oil prices, but a sudden depreciation of the dollar could also be the source of an import price shock). In the first quarter, 1986.1, we raise the import price by roughly 80%. In subsequent quarters, we gradually roll back the increase in the import price until it settles (beginning about the ninth quarter) at a level roughly 20% above its historical path.

In Figure 3a, the “shock” path shows for eight quarters (1986.1-1987.4) the unemployment rate in the absence of policy (meaning the Fed keeps the interest rate at its historical value in each quarter and there is no fiscal policy other than the current automatic stabilizers due to the current tax and transfer system). The unemployment rate rises gradually and the economy falls into recession. In Figure 3b, the shock path shows the sharp jump in the inflation rate, and then its gradual decline so that it is back to the historical path in about seven quarters.

Now suppose instead that the Fed responds as it usually does historically. The simulation

generated by adherence to the Fed's interest rate rule we call the monetary policy simulation, and once again label it "M" in Figure 3a. Since the rule causes the Fed to stimulate (cut the interest rate) in response to recession, but restrain (raise the interest rate) in response to inflation, it is not obvious whether the Fed's policy will raise or lower the unemployment rate; it depends on the weights the Fed gives to fighting recession vs fighting inflation and the magnitude of inflation and unemployment that it faces. Given the weights and magnitudes of the estimated interest rate rule in the Fair model, apparently the Fed initially gives higher priority to fighting inflation and therefore restrains the economy in response to the supply shock, because in Figure 3a the M policy raises the unemployment rate above the shock path for eight quarters. This is perhaps not surprising given the huge initial jump in inflation (from a historical value of 1% to over 13%). Eventually, once inflation comes down significantly but the recession lingers, the Fed's M policy shifts its priority to reducing unemployment so after the eighth quarter, the M unemployment rate path is below its value along the shock path.

What would happen if an automatic fiscal policy were in effect when the recession occurs (and the Fed continues to adhere to its interest rate rule)? We consider only the intermediate fiscal policy, F2, and the modification described above in equation (2) with $\exists$=8 that scales down the anti-recession fiscal stimulus in proportion to the simultaneous inflation, F2I. In Figure 3a, the M&F2 unemployment rate is below the M&F2I unemployment rate (once the fiscal policies take effect); in the fifth quarter, the M&F2 unemployment rate is 8.2% whereas the M&F2I unemployment rate is 8.8%. On the other hand, in Figure 3b, the M&F2I inflation rate is below the M&F2 inflation rate; in the fifth quarter, the M&F2 inflation rate is 5.8% whereas the M&F2I inflation rate is 5.3%.

Automatic Fiscal Policy in Four Historical U.S. Recessions

When would our policy have come into play during the past several decades? There were four recessions. What would have happened in the four recessions that occurred in the U.S. over

the past quarter century (1975, 1982, 1991, and 2001 recessions) if our automatic fiscal policy had been put in place just prior to the onset of each recession? Figure 4 shows the impact of policies M&F2 and M&F3 on the path of the unemployment rate in the first three recessions. Policy M&F3 would have caused a significant reduction in the unemployment rate in all three recessions. Policy M&F2 would have caused a somewhat smaller reduction in the unemployment rate in the 1975 and 1982 recessions, but due to its 2% threshold, would not have been activated in the milder 1991 recession.

In the 2001 recession, whether even F3, our least cautious policy with a 0% threshold, would have been activated depends on the values projected for normal real GDP (Y_{nt}) in each quarter following our estimation period which ends in 2001.1 Because the economy was very strong just prior to the recession (in 2001.1 actual real GDP was 2.2% *greater* than normal real GDP and the unemployment rate was only 4.2%), real GDP would have had to decline to normal real GDP to trigger our least cautious policy F3, and to 2% below normal real GDP to trigger our more cautious policies F1 or F2 which have a threshold of 2%. If Y_{nt} is projected to grow at its average quarterly growth over the last six quarters of our estimation period, then even M&F3 would by a narrow margin not be triggered (actual real GDP would still be 0.1% greater than projected normal real GDP). However, if Y_{nt} is projected to grow at its average quarterly growth over the last twelve quarters of our estimation period, then M&F3 would by a narrow margin be triggered for one quarter-- actual real GDP would be 0.2% below projected normal real GDP in 2001.4 so a small transfer would occur in 2002.1-- but the transfer would be terminated in the next quarter (2002.1) because of the quick recovery of real GDP.

Automatic Fiscal Policy in Response to a Severe Recession That Begins in 2001

A severe recession is generated beginning in 2001.2. The constant term is reduced by a fixed amount for eight quarters (2001.2-2003.1) in each of the following five behavioral equations: consumer expenditure for services, consumer expenditure for nondurables, consumer

expenditure for durables, residential investment, and business capital stock which thereby reduces non-residential fixed investment. Following Fair's (2000a) analysis of a fall in the stock market, we reduce the constant term in the behavioral equation for the capital gain (loss) on corporate stock in the first quarter (2001.2); the magnitude of our adjustment is scaled up from the adjustment we used in our earlier analysis of a severe recession beginning in 1986.1 These changes generate a severe recession. Table 2 focuses on the eighth quarter (2003.1), roughly the trough of the recession, and presents results for that quarter under three alternative policy responses (the numbers that are highlighted in Table 2 also appear in Table 3 which will be explained below). As a benchmark, the first column in the table gives values of a baseline for the unemployment rate (UR), the three-month Treasury bill rate (RS), the deficit ratio (D/Y_n), and the debt ratio (B/Y_n); the baseline assumes an absence of the shocks that generate the severe recession.

How severe would the recession be if there were no response from either monetary or fiscal policy? By this we mean that the Fed keeps the interest rate at its baseline value in each quarter (instead of cutting the interest rate below its baseline path as it usually would in response to a recession), and there is no fiscal policy other than the current automatic stabilizers due to the current tax and transfer system. As before, we call this the shock simulation, and label it "shock" in Table 2. Under the shock column, the "shortfall" in real GDP in the eighth quarter (2003.1) would be 10.1%-- that is, real GDP would be 10.1% below its baseline value, UR would be 9.4% (compared with the baseline value of 4.8%), and RS would be at its baseline value of 5.2%. Note that the deficit ratio (D/Y_n) is 1.0% (compared to a surplus of 2.6% along the baseline), and the debt ratio (B/Y_n) is 23.8% (compared to 18.5% along the baseline).

Now suppose instead that the Fed responds as it usually does historically to changes in the unemployment rate and inflation rate. It should be noted that the Fed's response to a severe recession might differ from an equation estimated on data with smaller changes in the unemployment rate. The simulation generated by adherence to the Fed's estimated interest rate rule we call the monetary policy simulation, and label it "M" in Table 2 as above. If monetary

policy follows its historical estimated rule, it would react by cutting RS to 0.5%, as shown in the M column, and as a consequence the shortfall in GDP would be reduced to 8.0%, and UR, to 8.4%. With the M policy, the deficit ratio is reduced to 0.3% (compared to 1.0% under the shock) for two reasons: the economy is stronger generating more tax revenue, and the interest rate is lower thereby reducing government spending for debt service. But even with monetary policy providing some help, the recession remains deep enough so that the debt ratio still rises to 23.0% (compared to its historical value of 18.5% and to the 23.8% it would have reached if there had been no help from monetary policy).

What would happen if an automatic fiscal policy were in effect when the recession occurs? We consider the two automatic fiscal policies, F2 and F3. As before, we assume that the Fed adheres to its interest rate rule. Thus, the simulation generated by the Fed's monetary policy and an automatic fiscal policy we call the monetary/fiscal policy simulation and label it "M&F." With combined monetary and fiscal policy, the shortfall in GDP, and UR, would be reduced more than under monetary policy alone. As shown in Table 2 for the eighth quarter (2003.1), policy M&F2 reduces the GDP shortfall to 4.7% (instead of to 8.0% under monetary policy alone), and UR, to 6.9% (instead of to 8.4%), requiring a cut in RS to 2.3% (instead of to 0.5%), whereas policy M&F3 reduces the GDP shortfall to 3.4%, and UR, to 6.3%, requiring a cut in RS only to 3.1%.

However, the stronger the fiscal policy, the greater is the counter-cyclical transfer ratio R/Y_n; the greater is the deficit ratio D/Y_n; and the greater is the debt ratio B/Y_n. Under combined policy M&F2, R/Y_n would be 3.0%, D/Y_n would be 2.9% (compared to 0.3% under the M policy), and B/Y_n would be 26.4% (compared to 23.0% under the M policy) ; whereas under combined policy M&F3, R/Y_n would be 3.9%, D/Y_n would be 3.6% (compared to 2.9% under M&F2), and B/Y_n would be 28.1% (compared to 26.4% under M&F2).[10]

[10] With monetary policy alone, M, the deficit ratio is 0.3%. With M&F2, the counter-cyclical transfer ratio is 3.0% and the deficit ratio increases by 2.6% to 2.9%. With M&F3, the counter-cyclical transfer ratio is 3.9% and the deficit ratio increases by 3.3% to 3.6%. It might be thought that the increase in the deficit ratio would be much smaller than the transfer ratio

It is evident that policies M&F2 and M&F3 make a substantial improvement in mitigating the recession, and reduce the required cut in the interest rate, but raise the deficit ratio and the debt ratio. For example, in the eighth quarter, relative to the shock path, M&F3 reduces the unemployment rate 3.1 percentage points (from 9.4% to 6.3%), while raising the deficit ratio 2.6 percentage points (from 1.0% to 3.6%) and raising the debt ratio 4.3 percentage points (from 23.8% to 28.1%).

Table 3 shows the path over time of the GDP gap and the unemployment rate under three policies, M, M&F2, and M&F3, and also the path of the counter-cyclical transfer ratio under the two policies, M&F2 and M&F3. The highlighted numbers are the same as the highlighted numbers in Table 2.

Although the shock hits the economy in 2001.2, it takes several quarters for the transfers to go into effect. With M&F2, which has a 2% threshold, the transfer goes into effect in the fourth quarter, 2002.1, while with M&F3, the transfer barely goes into effect in the third quarter (2001.4). There are three reasons for the lag of several quarters. First, in 2001.2, the baseline of the economy was strong: output was high and the unemployment rate was low; had there been no shock, on the baseline path actual output would have been well above natural output-- the percentage gap would have been -3.4% (not shown in the table), and the unemployment rate would have been only 4.2% (also not shown). With the shock countered only by monetary policy (M), the gap would still have been negative, -2.2%, as indicated in the first row of Table 3 under policy M, and the unemployment rate would have been only 4.6%. The table shows that our shock, countered only by monetary policy (M), leaves a GDP gap of 2.4 percent in the third quarter (2001.4). Second, there is a one-quarter implementation lag (e.g. if the threshold is

---

because the fiscal stimulus mitigates the recession and hence reduces the fall in tax revenue. However, with monetary policy alone, the interest rate is cut to 0%, whereas with the help from fiscal policy, monetary policy cuts the interest rate less. With a positive interest rate, government spending on interest payments on its debt is greater, and this raises the deficit ratio. The greater interest payments are almost as large as the improvement in tax revenue, so the deficit ratio increases almost as much as the size of the counter-cyclical transfer ratio.

exceeded in 2001.4, the transfer goes into effect in 2002.1). Third, policy F2 has a 2.0% threshold.

In fact, the U.S. Congress implemented a rebate in 2001.3, sooner than either of our policies, F2 or F3. The actual rebate in 2001.3 generated a counter-cyclical transfer ratio R/Y_n of 1.4%. One reason for the speed of implementation is that the rebate was one component of a long-debated large tax bill originally proposed a year earlier by candidate Bush during the presidential campaign. Congress was working on the tax bill in the first half of 2001, and enacted the bill, including the rebate, in June, 2001. If a tax bill, aimed primarily at long-term issues, had not been in progress, it is doubtful that Congress would have enacted a rebate as promptly in response to the economic downturn. Nevertheless, it should be emphasized that if our automatic fiscal policy had been in place, Congress would have been free to move more quickly at its discretion because our automatic policy is a default position which can always be over-ridden by Congress.

It should be noted that if the 2001 downturn had turned into as deep a recession as the one we consider in tables 3 and 4, then our policies, F2 and F3, eventually generate much larger counter-cyclical transfer ratios than the 1.4% enacted by Congress and implemented in 2001.3. With F2, the peak transfer ratio is 4.1% which occurs in 2002.3, and with F3, the peak transfer ratio is 5.2%, which occurs in 2002.2.

An Automatic Temporary Consumption Tax Cut

As we noted in the introduction, a promising policy to consider in future research would be an automatic temporary consumption tax cut. To combat recession, Martin Feldstein (2001) proposes a temporary cut in the value-added tax (VAT) for Japan, and Alan Blinder (2001) proposes that the Federal government offer to reimburse states that implement a temporary cut in their sales tax. We will propose a progressive value-added tax (PVAT), and show how it could be used to implement a temporary consumption tax.

An automatic temporary consumption tax cut is symmetrical to the automatic tax rebate. The policy provides an automatic cut in a consumption tax rate whenever real GDP is at least X percent below "normal" real GDP (the threshold X percent is either zero or positive), and the amount of the rate cut varies with the magnitude of this excess GDP gap. Specifically, let

$[Ygap]_t$ = Percent Gap of real GDP below "normal" real GDP, so

$[Ygap]_t / (Y_{nt} - Y_t)/Y_{nt}$,

where Y_{nt} is normal real output in quarter t and Y_t is actual real output in quarter t.

$X/ (Y_{ht}/Y_{nt})$,

where Y_{ht} is the threshold level of Y in quarter t and (Y_{ht} # Y_{nt}).

$)t_t$ = the reduction in the consumption tax rate in quarter t.

Then:

(3) $)t_t = ([Ygap - X]_{t-1}$

where X percent is the threshold that must be exceeded before the tax rate cut is triggered, [Ygap - X] percent is the excess GDP gap, and (is the "power" coefficient. If the Ygap percent is less than X percent, then the tax rate cut would be zero.

As with the automatic tax rebate, we also consider modifying the policy for inflation. Under this modification, $)_t$ is given by equation (3) above, except that $)_t$ is reduced according to the excess of inflation above its target (p_t - p*). Under the modified policy, $)_t$ might equal Z percent of the cut prescribed by equation (1) where

(4) $Z = [1 - \exists(p_t - p^*)]$, where $\exists > 0$.

Suppose p_t - p* equals 5% and $\exists$ is 8. Then the modified rate cut equals 60% of the unmodified rate cut.

To our knowledge, there are as yet no simulation studies of an automatic temporary consumption tax cut that captures the incentive effect on consumers to shift consumption to the recession period when the tax rate is temporarily low. This is a promising topic for future research.

Implementation of a temporary consumption tax cut would be straightforward if the U.S.

had a value-added tax (VAT). Under a VAT each business firm would be taxed on its sales revenue minus its purchases (including investment goods) from other firms. The subtraction of purchases of investment goods makes the VAT similar to a consumption tax. It is generally assumed that the VAT is reflected in the price of consumption goods. A central obstacle to a enacting a VAT, therefore, has been concern about its regressivity.

But a VAT can be made progressive by coupling it with a VAT rebate implemented through the April 15th household income tax return. The VAT rebate must be an integral part of the VAT, enacted simultaneously. The following example shows how a progressive value-added tax (a PVAT) would work. The example utilizes a 10% VAT. To avoid a sudden increase in prices of 10%, the 10% VAT should be phased in gradually (for example, 2% per year for five years). Assume the five- year phase in is over and the VAT is now 10%.

Suppose the 10% VAT is coupled with the VAT rebate schedule shown in Table 4. For example, consider the first row of the table. A household with $20,000 of income plus transfers (including cash welfare and the earned income tax credit) would file its April 15th income tax return and then receive a $2,000 check from the U.S. Treasury (10.00% of its income plus transfers). Thus, a household's VAT rebate would be based on its income plus transfers as reported on its tax return. Note that a household's VAT rebate would not vary with its actual consumption expenditure. Hence, the rebate would not affect the household's incentive to spend vs save.

Assume the typical $20,000 household is estimated to have consumption expenditure of $20,000. Then its estimated VAT gross burden is $2,000 (10% of $20,000). Its VAT rebate of $2,000 would leave it with an estimated VAT net burden of $0. Note that a household's VAT rebate is not based on its actual expenditure, which is unknown, but on its income plus transfers. Thus, the table shows actual VAT rebates at each level of income plus transfers, but only *estimated* expenditure and gross and net burdens— the expenditure and burdens borne by a typical household with that particular income plus transfers. Empirical study would be needed to provide the numbers in the expenditure column, and therefore in the gross and net burden

columns. Here, without empirical study, expenditure numbers are provided for illustration.

Now consider the second row of the table. A household with $40,000 of income plus transfers would receive a $3,500 check from the U.S. Treasury (8.75% of its income plus transfers). Assume the typical $40,000 household is estimated to have consumption expenditure of $39,000. Then its estimated VAT gross burden is $3,900 (10% of $39,000). Its VAT rebate of $3,500 would leave it with an estimated VAT net burden of $400, 1% of its income plus transfers of $40,000.

The rest of the table shows how the VAT rebate would gradually phase down to $0 as household income plus transfers rises to $180,000. The estimated VAT net burden would rise gradually from 0% of income plus transfers (I+R) when I+R is $20,000 to 8% when I+R is $180,000; hence, over this range, which includes most households, the VAT plus rebate would be progressive. Above $180,000, the estimated VAT net burden (which would now equal the estimated VAT gross burden because there would be no VAT rebate) would continue to increase in dollars but would decline very gradually as a percentage of I+R.

A household must file an April 15th tax return to be protected from the VAT. Most low-income working households already file tax returns in order to receive the refundable earned income tax credit (EITC), so there would be little additional compliance or administrative burden for these households (the extra burden would come from reporting transfers received). The VAT rebate would provide an additional incentive for low-income households to file a tax return, thereby enabling the EITC to reach an even greater share of eligible working households. Households with no income receiving government transfers could be alerted to the new VAT rebate, and assisted with filing a tax return, through the administrative apparatus of these transfer programs. Persons who do not file in order to evade income taxes would, of course, receive no protection from the VAT.

An automatic temporary cut in this 10% PVAT would have the same counter-cyclical power to combat a recession as a temporary cut in an ordinary 10% VAT, even though the 10% PVAT raises less *net* revenue than an ordinary 10% VAT because of the VAT rebate. When

GDP falls at least X percent below normal, automatically the VAT rate would be cut below 10% *while the VAT rebate would remain unchanged*. Thus, with the PVAT, every household would receive exactly the same incentive to spend during the temporary tax cut as it would with an ordinary VAT because the price cut would be exactly the same. The temporary increase in the federal deficit would be exactly the same with the temporary PVAT cut as it would be with a temporary ordinary VAT cut.

Conclusions

We have presented a new design for an automatic fiscal policy and analyzed it in a macroeconometric model that has been estimated using quarterly data for the U.S. economy. Our automatic fiscal policy consists of the triggering of a transfer (or "income tax rebate") of particular magnitude in response to a decline in the output of the economy of particular magnitude. We propose and analyze an automatic transfer (or income tax cut) because, despite the permanent-income and life-cycle hypotheses, in our judgment recent empirical studies demonstrate that there is sufficient short-run response of consumption to temporary changes in disposable income due to transfers or income tax cuts to make such a policy sufficiently effective.

We offer our automatic fiscal policy as a complement to counter-cyclical monetary policy. In the current U.S. recession, the Federal Reserve has cut the federal funds rate from 6.50% to 1.75%. We accept the dominant view that monetary policy should play an important counter-cyclical role, but believe that it would be useful to strengthen automatic counter-cyclical fiscal policy.

We propose an automatic policy because discretionary fiscal policy often takes too long to move through the legislative process. In the fall of 2001, with the recession deepening, Republicans and Democrats deadlocked over the best way to further stimulate the economy. Experience therefore suggests that it is important to make counter-cyclical fiscal policy automatic. The automatic policy can always be over-ridden by discretionary action by Congress

and the president. The automatic policy is simply a default position: If Congress fails to take discretionary action, stimulus is promptly triggered by the decline in the economy.

Current automatic stabilizers are unintended byproducts of setting the ratio of tax revenue to GDP, the degree of progressivity of the tax system, and the level of unemployment benefits.. Hence the magnitude of the stabilizing impact is held hostage to these objectives. We introduce an automatic fiscal policy with the sole objective of effectively combating recession, and can therefore set the magnitude solely for the purpose of stabilization.

We generate a severe recession (beginning in 1986) and simulate the impact of our automatic fiscal policy using historical data for several years. We assume that the Federal Reserve adheres to a counter-cyclical monetary policy governed by the interest rate (Taylor) rule estimated on historical data in the Fair model. We find that this interest rate rule alone mitigates the severe recession only modestly, whereas our automatic fiscal policy (together with the interest rate rule) substantially reduces the severity of the recession while generating only a relatively small rise in the government debt/GDP ratio. We simulate a false alarm of a severe recession, and find that our automatic fiscal policy generates very little rise in inflation. In response to a supply shock due a sharp increase in import prices, our automatic fiscal policy moves less aggressively against the recession because of the concern for inflation, but our simulation shows that our policy still mitigates the recession with only a small rise in inflation. Simulating the policy in the 1975, 1982, and 1991 recessions, we find that the strongest version of our policy causes a significant reduction in the unemployment rate in all three recessions (while a weaker policy that is not activated unless the GDP gap exceeds 2% causes a somewhat smaller reduction in the unemployment rate in the 1975 and 1982 recessions, and is not activated in the milder 1991 recession). We simulate a severe recession beginning in 2001. Our automatic policy makes a substantial improvement in mitigating the recession while causing only a small increase in the government debt/GDP ratio. It should be noted that if the actual 2001 recession had turned into as deep a recession as the one we simulated, our policy will generate much larger counter-cyclical transfer ratios than the income tax rebate recently enacted by Congress and

implemented in 2001.3.

A promising avenue for future research would be to analyze an automatic fiscal policy that involves a temporary consumption tax cut, rather than a transfer (or income tax rebate). This policy could be implemented by enacting a value-added tax (VAT) that is made progressive by being coupled with VAT rebates implemented through the April 15th household tax. Such a policy might be a useful complement to the automatic tax rebate that we investigate in this paper.

Table 1: Eighth Quarter (1987.4)

	Historical	Shock	M	M&F1	M&F2	M&F3
Alpha				0.5	1.5	1.5
Threshold				2%	2%	0%
			Shortfalls from Historical			
GDP		12.7%	9.3%	6.4%	4.3%	3.2%
CS		12.0%	9.7%	7.7%	6.2%	5.2%
CN		10.3%	7.7%	5.9%	4.7%	4.0%
CD		28.8%	22.6%	11.0%	2.5%	-2.8%
IHH		47.4%	29.9%	24.4%	24.5%	24.1%
IKF		40.0%	28.4%	18.9%	10.1%	5.8%
			Simulation Values			
UR	5.9%	12.9%	11.1%	9.5%	8.2%	7.6%
RS	6.0%	6.0%	0.0%	1.2%	3.0%	3.9%
R/Y_n				2.4%	3.2%	4.5%
D/Y_n	3.0%	7.9%	6.5%	8.5%	8.8%	10.0%
B/Y_n	33.4%	41.4%	39.7%	42.5%	45.0%	46.8%

Table 2: Eighth Quarter (2003.1)

	Baseline	Shock	M	M&F2	M&F3
Alpha				1.5	1.5
Threshold				2%	0%
			Shortfalls from Baseline		
GDP		10.1%	8.0%	4.7%	3.4%
			Simulation Values		
UR	4.8%	9.4%	8.4%	6.9%	6.3%
RS	5.2%	5.2%	0.5%	2.3%	3.1%
R/Y_n				3.0%	3.9%
D/Y_n	-2.6%	1.0%	0.3%	2.9%	3.6%
B/Y_n	18.5%	23.8%	23.0%	26.4%	28.1%

Table 3: Output Gaps, Unemployment Rates, and Counter-Cyclical Transfer Ratios

	M		M&F2			M&F3		
	Ygap	UR	Ygap	UR	R/Y_n	Ygap	UR	R/Y_n
2001.2	-2.2%	4.6%	-2.2%	4.6%	---	-2.2%	4.6%	---
2001.3	0.0%	5.3%	0.0%	5.3%	---	0.0%	5.3%	---
2001.4	2.4%	6.2%	2.4%	6.2%	---	2.4%	6.2%	0.0%
2002.1	4.3%	7.0%	4.2%	7.0%	0.6%	3.5%	6.8%	3.6%
2002.2	5.7%	7.7%	4.8%	7.4%	3.2%	3.5%	6.9%	5.2%
2002.3	6.5%	8.1%	4.5%	7.4%	4.1%	3.0%	6.8%	5.2%
2002.4	6.9%	8.3%	4.0%	7.2%	3.8%	2.6%	6.5%	4.5%
2003.1	7.1%	8.4%	3.7%	6.9%	3.0%	2.5%	6.3%	3.9%
2003.2	5.9%	8.0%	2.5%	6.4%	2.6%	1.3%	5.9%	3.7%
2003.3	4.2%	7.3%	1.4%	5.9%	0.7%	0.3%	5.4%	2.0%
2003.4	2.5%	6.5%	0.7%	5.4%	---	-0.2%	5.0%	0.4%
2004.1	1.3%	5.7%	0.4%	5.1%	---	-0.2%	4.9%	---

Table 4: Rebates and Burdens under a Progressive VAT

Income Plus Transfers	VAT Rebate	(%)	Estimated Expenditure	Estimated Gross Burden	Estimated Net Burden (%)
$ 20,000	$ 2,000	(10.00%)	$ 20,000	$ 2,000	$ 0 (0%)
$ 40,000	$ 3,500	(8.75%)	$ 39,000	$ 3,900	$ 400 (1%)
$ 60,000	$ 4,500	(7.50%)	$ 57,000	$ 5,700	$ 1,200 (2%)
$ 80,000	$ 5,000	(6.25%)	$ 74,000	$ 7,400	$ 2,400 (3%)
$100,000	$ 5,000	(5.00%)	$ 90,000	$ 9,000	$ 4,000 (4%)
$120,000	$ 4,500	(3.75%)	$105,000	$10,500	$ 6,000 (5%)
$140,000	$ 3,500	(2.50%)	$119,000	$11,900	$ 8,400 (6%)
$160,000	$ 2,000	(1.25%)	$132,000	$13,200	$11,200 (7%)
$180,000	$ 0	(0.00%)	$144,000	$14,400	$14,400 (8%)

REFERENCES

Auerbach, Alan J., and Daniel Feenberg. 2000. "The Significance of Federal Taxes as Automatic Stabilizers." *Journal of Economic Perspectives* 14(3), Summer: 37-56.

Blinder, Alan S. 1981. "Temporary Income Taxes and Consumer Spending." *Journal of Political Economy* 89(1), February: 26-53.

Blinder, Alan S. 2001 "The Economic Stimulus We Need." Op Ed Page Article in the *New York Times*, Sept 28.

Branson, William H. 1973. "The Use of Variable Tax Rates for Stabilization Purposes." In *Broad-Based Taxes: New Options and Sources*, edited by Richard A. Musgrave, Baltimore: Johns Hopkins University Press.

Campbell, John Y. and N. Gregory Mankiw. 1989. "Consumption, Income, and Interest Rates: Reinterpreting the Times Series Evidence." In *NBER Macroeconomics Annual:1989*. Cambridge, MA: MIT Press

Carroll, Christopher D. 1997. "Buffer-Stock Saving and the Life Cycle/Permanent Income Hypothesis." *Quarterly Journal of Economics* 112(1), February: 1-55.

Cohen, Darrel, and Glenn Follette. 2000. "The Automatic Fiscal Stabilizers: Quietly Doing Their Thing." *Economic Policy Review* (Federal Reserve Bank of New York) 6(1), April: 35-67.

Duggal , Vijaya G. 1975. "Fiscal Policy and Economic Stabilization." In *The Brookings Model: Perspective and Recent Developments*, edited by Gary Fromm and Lawrence R. Klein. Amsterdam: North-Holland.

Fair, Ray C. 1994. *Testing Macroeconometric Models*. Cambridge, MA: Harvard University Press.

Fair, Ray C. 1996. "The Fair-Parke Program for the Estimation and Analysis of Nonlinear

Econometric Models: User's Guide." Fairmodel.econ.yale.edu

Fair, Ray C. 1999. "A Fiscal Policy Rule for Stabilization." Unpublished Working Paper, Cowles Foundation, February.

Fair, Ray C. 2000a. "Fed Policy and the Effects of a Stock Market Crash on the Economy." *Business Economics* 35(2): 7-14.

Fair, Ray C. 2000b. "The US Model Workbook." Fairmodel.econ.yale.edu (9/25/2000).

Feldstein, Martin. 1976. "Taxing Consumption." *The New Republic* (February 28): 14-17.

Feldstein, Martin. 2001. "Japan Needs to Stimulate Spending." Editorial Page Article in the *Wall Street Journal*, July 16.

Klein, Lawrence R. (ed.). 1991. *Comparative Performance of U.S. Econometric Models.* New York: Oxford University Press.

Mankiw, N. Gregory. 2000. "The Savers-Spenders Theory of Fiscal Policy." *American Economic Review Papers and Proceedings* 90(2), May: 120-25.

Modigliani, Franco, and Charles Steindel. 1977. "Is a Tax Rebate an Effective Tool for Stabilization Policy." *Brookings Papers on Economic Activity* 1: 175-203.

Musgrave, Richard A. 1959. *The Theory of Public Finance.* New York: McGraw-Hill.

Pack, Howard. 1968. "Formula Flexibility: A Quantitative Appraisal." In *Studies in Economic Stabilization*, edited by Albert Ando, E. Cary Brown, and Ann F. Friedlaender. Washington, D.C.: Brookings Institution.

Parker, Jonathan. 1999. "The Response of Household Consumption to Predictable Changes in Social Security Taxes." *American Economic Review* 89(4), September: 959-73.

Phillips, A.W. 1954. "Stabilization Policy in a Closed Economy." *Economic Journal* 64 (June): 290-323.

Poterba, James M. 1988. "Are Consumers Forward Looking? Evidence from Fiscal Experiments." *American Economic Review Papers and Proceedings* 78(2) May: 413-18.

Seidman, Laurence S. 2001. "Reviving Fiscal Policy." *Challenge* 44(3): 17-42.

Shapiro, Matthew D., and Joel Slemrod. 1995. "Consumer Response to the Timing of Income: Evidence from the Change in Tax Withholding." *American Economic Review* 85(1) March: 274-83.

Shapiro, Matthew D., and Joel Slemrod. 2001. "Consumer Response to Tax Rebates." NBER Working Paper 8672 (December).

Souleles, Nicholas S. 1999. "The Response of Household Consumption to Income Tax Refunds." *American Economic Review* 89(4), September: 947-58.

Souleles, Nicholas S. 2001. "Consumer Response to the Reagan Tax Cuts." *Journal of Public Economics* (forthcoming).

Tversky, Amos, and Daniel Kahneman. 1973. "Availability: a Heuristic for Judging Frequency and Probability." *Cognitive Psychology* 5(2), September: 207-32.

Wolff, Edward N. 1998. "Recent Trends in the Size Distribution of Household Wealth." *Journal of Economic Perspectives* 12(3), Summer: 131-50.

ENDNOTES