The effects of government transfers on monthly cycles in drug abuse, hospitalization and mortality ☆

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Abstract

This paper analyzes the monthly patterns of adverse outcomes due to the consumption of illegal drugs by recipients of government transfer payments. We find evidence that certain subpopulations on government cash aid significantly increase their consumption of drugs when their checks arrive at the beginning of the month, and as a result, experience adverse events including hospitalization and death. Using data from California, we find that the overall rate of drug-related hospital admissions increases abruptly at the beginning of the month, with admissions increasing 23% during the first five days of the month. We find that this cycle is driven largely by recipients of Supplemental Security Income (SSI). SSI recipients also experience an abrupt 22% increase in within hospital mortality after receiving their checks. These findings suggest that "full wallets" adversely affect some aid recipients, and that policymakers should explore alternate disbursement regimes such as a staggered disbursement schedule or in-kind support that have the potential to reduce the rate of adverse events.
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1. Introduction

Government transfer payments such as welfare (TANF), disability insurance (DI), and Supplemental Security Income for the Disabled (SSI) checks are typically disbursed to recipients at the beginning of each month. There is anecdotal evidence that these payments create "full wallets" that increase the consumption of illicit drugs among recipients with substance abuse problems. In addition, the public health literature has documented that drug-related hospital admissions and deaths are higher at the beginning of the month (for example, see Phillips et al., 1999; Halpern and Mechem, 2001). However, the papers in this literature are unable to determine if government transfer programs cause the adverse events because their data sets lack information on program coverage. In this paper, we use a variety of data sources to measure the effect of monthly cash transfer payments on the monthly patterns of drug-related hospitalizations and mortality. We also determine which government transfer programs lead to monthly cycles in drug-related adverse events and estimate the size of the cycles.

An extensive literature has investigated whether consumption follows a smooth pattern despite income being received at discrete points in time. A variety of micro-level studies find that consumers do not always smooth consumption, and that the receipt of disposable income can lead to immediate increases in consumption, even when the income is anticipated.[1] In particular, some studies analyze recipients of government transfers and find that their consumption is higher in the period of the month immediately following receipt of the transfer payment. Stephens (2003) finds that people whose primary income is from Social Security exhibit a 16% increase in "instantaneous consumption", such as dining out, in the week following the receipt of their checks. Shapiro (2005) finds that Food Stamp recipients' caloric intake decreases 10–15% over the course of the month. Most authors study these cycles in consumption in the context of testing the life-cycle/permanent income hypothesis, with the implication being that violation of consumption smoothing leads to utility losses. However, even studies that find violations of consumption smoothing often find utility losses to be small in practice. In the case we examine, the utility loss is likely quite large, though we do not examine it directly. Because we do not directly observe drug consumption, we focus on two of the, arguably more interesting, adverse effects of drug consumption: hospitalization and mortality. The increase in hospitalizations that occurs at the beginning of the month may put stress on health providers because they are constrained by fixed resources. So unlike some of the cycles in consumption documented in the economics literature, the cycles we examine are likely to impose a cost on both individuals and society.

In this paper we make four contributions. First, we document the existence and magnitude of the monthly cycle in drug-related hospital admissions in California and determine how the cycle varies by drug. Second, we show that SSI and DI recipients drive the cycle in drug-related hospitalizations. Also, contrary to what some analysts have suggested, welfare contributes very little to the cycle. Third, we show that Phillips' estimate of the mortality increase at the beginning of the month substantially understates the true amplitude of the cycle in mortality caused by government transfers; the Phillips' estimate combines a large population with no cycle in mortality with a much smaller population with a very pronounced cycle in mortality. We find that SSI recipients experience a 22% increase in mortality after receiving their checks. Finally, we

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[1] For example, the existing literature includes analyses of the immediate consumption response to semi-annual bonuses (Browning and Collado, 2001), income tax refunds (Souleles, 1999), Social Security taxes (Parker, 1999), annual payments to Alaskans from the Alaska Permanent Fund (Hsieh, 2003), tax rebates (Johnson et al., 2004), union contracts (Shea, 2005), the final payment of a car loan (Stephens, 2005), paycheck receipt (Stephens, 2006), and anticipated and unanticipated household energy costs (Cullen et al., 2004). The results regarding excess sensitivity are somewhat mixed. For an older survey, see Browning and Lusardi (1996).
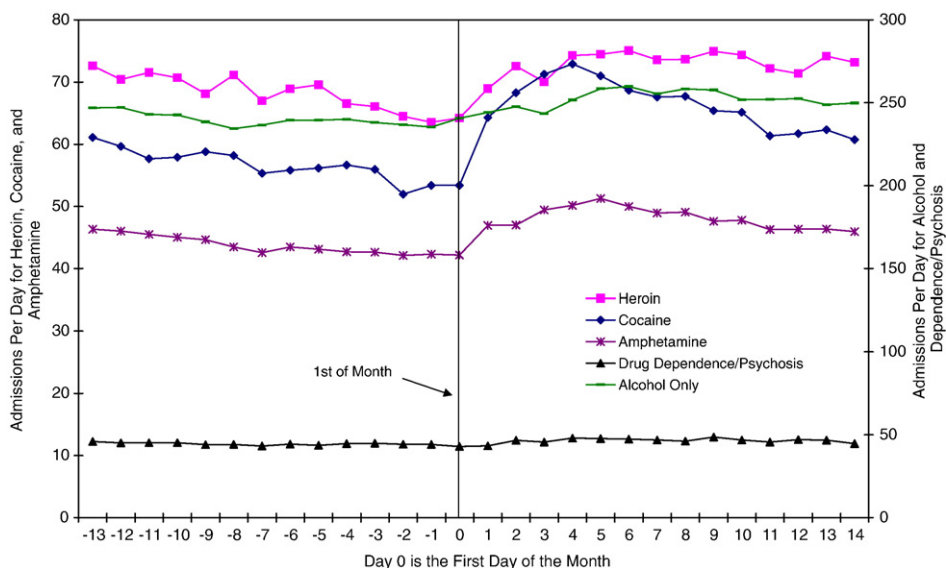
Fig. 1. Average daily drug and alcohol-related hospital admissions (California 1994–2000). Notes: Adjusting for day of week, month, year and major holidays produces a very similar figure. The figure includes patients admitted between 1/1/1994 and 11/30/2000. −1 is the last day of the preceding month. "Drug Dependence/Psychosis" and "Alcohol Only" exclude admissions with a mention of heroin, cocaine, or amphetamine.

provide evidence that smoothing the disbursement of cash aid can reduce the monthly cycle in hospitalizations due to substance abuse. These findings suggest that there are particular subpopulations that might benefit significantly from alternate aid disbursement regimes.

This paper uses patient-level data on admissions to California hospitals that occurred between 1994 and 2000. To identify recipients of welfare and Supplemental Security Income for the Disabled (SSI), each patient's hospital record is linked to their Medi-Cal eligibility history. As shown in Fig. 1, the number of drug-related hospital admissions begins to rise at the beginning of the month and peaks on the sixth day of the month. The cycles for cocaine and amphetamine peak a couple of days earlier and are considerably more pronounced than the cycles for heroin and alcohol. The cycle for cocaine is particularly striking, with 37% more admissions occurring on the fifth of the month than on the first.

Next we determine how much of this cycle in drug-related admissions is caused by recipients of government cash aid. We are able to directly identify welfare and SSI recipients and indirectly identify Social Security Disability Income (DI) recipients. We find that the cycle in admissions is driven primarily by SSI and DI recipients. For both types of recipients, a surge in hospital admissions begins the day after the arrival of aid checks and peaks several days later. SSI aid arrives on the first of the month and hospital admissions begin rising on the second; DI aid arrives on the third of the month and the admissions surge begins on the fourth. We find that welfare recipients have low levels of drug-related admissions and only a weak monthly cycle in admissions. It is worth noting that only a very small proportion of the people enrolled in either welfare or SSI are experiencing drug-related hospitalizations. There is less than one cocaine-related hospitalization per month for every 10,000 welfare enrollees and 7.4 hospitalizations per month for every 10,000 SSI recipients. Although self-reported drug use is more common in the welfare population than in the SSI population, the higher

rate of drug-related hospitalizations among SSI recipients may be due to the prevalence of psychiatric problems among SSI recipients.[2]

This evidence strongly suggests a causal relationship between cash aid and the cycle in drug-related hospitalizations—admissions start rising shortly after the checks arrive and the populations that we examine receive the vast majority of their income from government transfers. However, one might be concerned that the cycle in drug-related hospitalizations could reflect other factors such as the timing of drug distribution, monthly cycles in stress, or cycles in other income (though we do not find cycles in drug-related admissions among people not covered by these programs). To deal with these concerns, we implement a more direct test of the hypothesis that there is a causal relationship between check arrival and the increase in drug hospitalizations. We exploit a change in the timing of welfare check disbursement in Los Angeles County. In 1997, Los Angeles County switched the timing of welfare distribution from the first of the month to a staggered schedule over the first 10 days of the month. We find that this change shifted the peak in hospital admissions in Los Angeles to later in the month and flattened the cycle. Over the same period, we do not observe a significant change in the cycle among welfare recipients in other large counties, suggesting that the changes we observe in Los Angeles were due to the change in disbursement rather than other factors.

Next we investigate the monthly cycle in mortality. We use the hospital admission data to determine if the arrival of government transfer checks causes an increase in mortality. We find that at the beginning of the month, there is an immediate 22% increase in the within hospital mortality rate of SSI recipients. This increase occurs on the first of the month immediately after the receipt of the checks. We do not find corresponding large increases in mortality for other subpopulations.

Our results suggest that it is worth exploring the possible benefits of alternate means of disbursing cash aid. One policy option is to stagger the disbursement of monthly checks to individuals over the days of the month. This can smooth the aggregate monthly cycle in adverse outcomes and reduce stress on health resources at critical times of the month. Another possible policy would target the small subset of aid recipients who account for a disproportionately large share of substance abuse. Switching this population from cash aid to in-kind aid might reduce both the cycle and the level of drug-related hospitalizations and deaths.

The paper is organized into six sections. Section 2 provides a description of the major government transfer programs. Section 3 surveys the literature on the relationship between government programs and drug consumption. Section 4 describes the hospital data and Medi-Cal records used in the analysis. In Section 5, we present our results. Section 6 discusses alternative policies for aid disbursement and Section 7 concludes.

2. Description of federal, state and local cash aid programs

The major federal cash aid programs include Social Security Disability Income (DI) and Supplemental Security Income (SSI). State programs include "welfare" (AFDC or TANF), a state supplement to SSI referred to as SSI/SSP, Unemployment Insurance and Workers' Compensation. Most California counties also disburse cash aid under General Relief and county indigent programs. In this section, we summarize the eligibility criteria, the amount of cash aid, and the timing of disbursement for recipients in California.

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[2] 7% of SSI recipients and 13.4% of welfare recipients surveyed in the National Household Survey on Drug Abuse 1997 report having used cocaine at some point in their lives. The two groups have fairly similar self-reported heroin use with 3.2% of SSI recipients and 3.1% of welfare recipients reporting having used heroin at some point in their lives. However, psychiatric problems are much more prevalent among SSI recipients than among welfare recipients because they are a qualification for SSI coverage while welfare recipients qualify based on their dependent children.

Social Security Disability Income provides partial income replacement for individuals who are unable to engage in "substantial gainful activity" for at least 12 months. The replacement rate varies by income and the number of dependents. For example, a 50 year old disabled worker in 1996 would have a 50% replacement rate if (s)he previously had annual earnings of $17,844, but a 40% replacement rate on $35,604 annual earnings (Bound and Burkhauser, 1999). If the recipient has a spouse and one child, the rates would be 75% and 60%, respectively. The size of the income replacement may be reduced if the person also receives certain other types of disability or workers' compensation. DI recipients are allowed to earn limited employment income and maintain their benefits.[3] All DI recipients become eligible for Medicare after a 2 year waiting period, and we use this feature to identify long-term DI recipients in our data.

Supplemental Security Income/State Supplementary Payment (SSI/SSP) is a cash payment program to support the low income aged, blind and disabled. About two-thirds of California's approximately one million recipients are disabled. SSI/SSP is a means-tested program that provides benefits averaging slightly over $600/month for individuals and $1100 for couples during our sample period (California Department of Social Services, 2003). In a study using 2002 program data, the California Department of Social Services finds that the average length of time spent on SSI/SSP is 9 years, with two-thirds of recipients staying on the program more than 5 years. Less than 1% of SSI/SSP recipients receive earned income and this is at least partially due to the program imposing a high effective marginal tax on earnings. Therefore, it is unlikely that these recipients have other significant sources of income with an arrival date that may affect cash holdings.

Prior to 1997, substance abuse was classified as an impairment that qualified individuals as disabled and potentially eligible for both DI and SSI/SSP. In 1993, over 20,000 recipients of SSI/SSP in California were considered disabled due to substance abuse (California Legislative Analyst's Office, 1995). Recipients were required to be in treatment and cash aid was sent to a "representative payee" who, in principle, was responsible for ensuring that aid was not spent on drugs and alcohol. However, the representative payee was often a friend or family member, and the conventional wisdom was that many recipients were able to control the funds (see Gresenz et al., 1998). In 1995, 25% of California substance abusers were estimated to be on SSI (Barber, 1996). The Welfare Reform Act of 1996 removed drug and alcohol addiction as a stand-alone qualification to receive disability benefits, although the act included provisions for recipients to be reevaluated for other mental illness that would qualify the recipient for benefits. This rule change likely had a larger affect on the SSI than on the DI program (Bound and Burkhauser, 1999).[4]

The program commonly referred to as "welfare" was formerly known as Aid to Families with Dependent Children (AFDC), and is now known generally as Temporary Aid for Needy Families (TANF) or, in California, as California Work Opportunity and Responsibility for Kids (CalWORKs). The exact amount of cash assistance to a particular type of family varies by county and over time. In 1997, a family in California with no earned income received between $538 and $565/month depending upon whether the family lived in a high cost or low cost county (Geen et al., 1998).

Counties were required by the state of California to provide General Relief to all indigent residents who do not qualify for welfare. The average monthly grant to families averaged over $400 until 1996 when it was reduced to just over $200. The average grant to an individual was over $200 for most of our sample period (California Statistical Abstract, 1999). Other cash benefit

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[3] Beginning in 1998, recipients can earn up to $500/month without being classified as "gainfully employed", and a trial work period of up to 9 months is permitted without losing eligibility status.

[4] We should note that evidence of strong monthly drug cycles that we document in Section 5 is present in our data both before and after the time of welfare reform.

programs such as Unemployment Insurance and Workers' Compensation distribute benefits based upon several possible schedules including a bi-weekly schedule.

For each of these programs, the timing of the disbursement is critical for our analysis. SSI/SSP program participants receive their cash support on the 1st of the month, or the last business day of the previous month if the 1st occurs on a weekend. In most counties, welfare checks are mailed so as to be received by the 1st. However, there are several exceptions, most notably Los Angeles County which accounts for approximately one-third of welfare recipients statewide. In June 1997, Los Angeles County switched from a 1st of the month disbursement to a staggered disbursement over the first 10 days of the month.[5] We exploit this policy change in our empirical strategy below to test for the causal impact of aid disbursement. Finally, DI recipients who qualified before May 1997 receive their payment on the 3rd of the month; recipients qualifying after May 1997 receive their payment on the second, third, or fourth Wednesday of each month depending upon their date of birth. Because we can only indirectly identify DI recipients as those non-elderly covered by Medicare and the fact that Medicare coverage begins 2 years after the disability, most of the DI recipients we can indirectly identify in our sample receive their payments on the 3rd of the month.

3. Literature on cycles in drug consumption

A variety of papers have presented either direct or indirect evidence of the existence of a monthly cycle in drug use and hospitalizations, particularly for cocaine. Cycles for other drugs are less well documented, possibly because they are less pronounced and therefore harder to identify with small data sets. There is very little evidence as to how much particular government transfer programs contribute to the cycle because the studies with large representative samples of hospital admissions lack information on which government transfers the study's population is receiving. The few studies with information on their subjects' receipt of government transfers are typically examining a small, homogenous, and severely drug dependent population.

Several large-scale studies find evidence of an increase in drug-related adverse events at the beginning of the month. Phillips et al. (1999) examine all death certificates between 1983 and 1988 and find that there are 1% more total deaths in the first week of the month than in the last week, but 14% more deaths from substance abuse in the first week. The paper speculates that the cause could be the additional availability of funds at the beginning of the month, but the authors cannot test for causes of the cycle because the mortality records have no information on government transfers. Halpern and Mechem (2001) examine all psychiatric illness admissions to the emergency department of the Hospital of the University of Pennsylvania for 7 years. They compare the monthly pattern of admissions for psychiatric illness patients with substance abuse to all other psychiatric illness patients. They find that 34% more patients with substance abuse disorders were admitted in the first versus the last week of the month, while only 6% more patients without substance abuse disorders were admitted the first week. Riddell and Riddell (2006) study drug overdose patterns of about 2500 injection drug users at a large hospital in Vancouver in 1995–1996. The patients are likely to be recipients of some form of cash assistance; however, the patient records cannot be linked to data on social assistance. The paper finds that injection drug users are more likely to leave the hospital against medical advice on the day that checks arrive, and more likely to overdose in the days following check arrival.

Most other studies focus on small samples of subjects with severe mental illness or histories of drug abuse. These studies provide insight into the behavioral response of populations with severe

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[5] Also during our sample period, Fresno County disbursed welfare checks on the 1st, 5th, 10th, 15th, 20th and 25th day of each month depending on the date of birth.

drug problems to the receipt of government transfers. These studies suggest possible causal mechanisms for the general population. Shaner et al. (1995) studied 105 schizophrenic cocaine dependant male veterans with long histories of psychiatric hospitalizations. These veterans received disability payments on the first of the month. After an initial hospitalization, the patients returned once a week for 15 weeks for psychiatric tests and to have their urine tested for indicators of cocaine use. The subjects had the highest level of the cocaine metabolite benzoylecgonine during the first 3 days of the month followed by a peak in hospital admissions 3 to 5 days later. Other studies also analyze the "full wallet" effect on small subpopulations including Rosenheck and Frisman (1996), Watkins and Podus (2000), Swartz et al. (2003), Rosenheck et al. (2000), Samet (2001), Maynard and Cox (2000), Catalano et al. (2000), and Catalano and McConnell (1999). These studies suggest that among recipients with severe drug addictions, "full wallets" may trigger drug consumption. However, these studies do not reveal which programs are driving the overall cycle in drug-related hospital admissions.

As we discuss in the Introduction, studies have found that recipients of public aid do not smooth consumption. Shapiro (2005) investigates cycles in the use of public aid by food stamp recipients. He finds that daily food consumption measured in both dollar value and calories declines in the number of days since the receipt of food stamps. Shapiro claims that much of the cyclicality results from substantial discounting of future consumption. Stephens (2003) finds similar evidence against consumption smoothing among Social Security recipients. In the days immediately after checks arrive, households increase expenditures on instantaneous consumption items such as food away from home, entertainment and recreation, and fresh foods. This effect is strongest for recipients who depend upon Social Security for the majority of their income.

Our paper is also related to the more general investigation of the Life-Cycle/Permanent Income Hypothesis. As noted in the Introduction, an extensive literature has exploited various events that lead to anticipated income shocks in order to test if individuals smooth consumption in response to these shocks. The results regarding so-called "excess sensitivity" are somewhat mixed. However, Cochrane (1989) illustrates that utility losses from violations of consumption smoothing can be quite small in practice. See Browning and Lusardi (1996) and Browning and Crossley (2001) for an interpretation of recent empirical findings.

4. Data

To implement this project we combine individual level records on hospital admissions with the corresponding Medi-Cal (Medicaid) eligibility records. Our hospital admission data cover patients admitted to California hospitals from 1994 to 2000.[6] Patients who are admitted to the hospital are assigned a code for their primary cause of admission (ICD-9 code) as well as up to 24 codes for other conditions.[7] We classify an admission as drug- or alcohol-related if any of the 25 diagnosis codes indicate substance abuse. In addition, the data contain patient-level demographic characteristics, information on the expected source of payment and discharge status (which lets us identify within hospital deaths). The hospital discharge data are linked to Medi-Cal eligibility

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[6] These files contain individual records for every admission to hospitals regulated by the California Office of Statewide Health Planning and Development (OSHPD). The only hospitals excluded are federally regulated hospitals. The data are maintained by the California Department of Health Services.

[7] The codes used in California in this period are the International Classification of Diseases 9th Revision (ICD-9). These codes identify drug or alcohol dependence/psychosis, and often specifically identify the substance. See the notes to Table 1 for the specific codes used.

data. The Medi-Cal eligibility codes reveal if a patient is covered by either AFDC/TANF/ CalWORKs ("welfare") or Supplemental Security Income. The Medi-Cal Codes do not reveal if a patient receives DI. However, a patient under age 65 who is covered by Medicare and is admitted with a mention of drug use is very likely to be receiving DI.

Drug-related hospital admissions are common. Table 1 presents summary statistics on patients' age, length of stay, insurance status and cash aid receipt. There are a considerable number of cocaine, heroin and amphetamine-related admissions though alcohol-related admissions are much more common. In approximately 15% of admissions in which drugs are mentioned, the patient has sustained an injury. More than 30% of the admissions with a drug mention are for patients who receive cash aid from the state or federal government. This is largely due to SSI disability recipients who have a much higher per capita rate of drug-related admissions than any of the other groups we can directly identify. Though SSI disability recipients account for only 9.3% of overall hospital admissions, they account for 25.5% of drug-related admissions.

5. Results

The results are divided into three sections. In the first section, we document the existence and magnitude of the monthly cycle in cocaine, heroin, amphetamine- and alcohol-related hospital admissions. In the second section, we determine which government transfer programs are driving the cycles in hospital admissions. In this section we also exploit Los Angeles' change to staggered disbursement to provide corroborating evidence that government transfers cause the monthly cycle. In the third section, we examine the impact of government transfers on mortality.

5.1. Measures of the monthly cycle in drug-related hospitalizations

Using a census of admissions to California hospitals, we calculate the average number of drug- and alcohol-related admissions for each day of the month.[8] Fig. 1 shows average daily admissions with a mention of either drug or alcohol use. These averages are plotted over the number of days from the first of the month (i.e. Day 0 is the first of the month, Day 1 is the 2nd of the month, and Day −1 is either the 31st, 30th, 29th or 28th depending upon the month). Fig. 1 reveals a pronounced monthly cycle in hospital admissions with a mention of cocaine, heroin and amphetamines and a weaker cycle in admissions with a mention of alcohol.[9] The cycles peak between the fifth and seventh day of the month for each substance. Admissions steadily decline in the days after the peak. Cocaine admissions have the most pronounced cycle with a peak on the fifth day of the month that is 37% above the level on the first day of the month. Amphetamine admissions have a slightly less pronounced cycle and peak a few days later. Heroin has the least pronounced cycle.

The more pronounced monthly cycle for cocaine may be partially explained by the pharmacological effects of the drugs. While dependence on opiates and alcohol can generate

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[8] The majority of patients with drug and alcohol admissions present at the emergency department and then are admitted to the hospital. We do not observe patients who are treated only in the emergency department. If those patients also exhibit a monthly cycle, then the social costs of the monthly cycle in substance abuse are larger than the hospital discharge data suggest.

[9] We have examined the monthly cycle of admissions for primary and secondary cause of admission separately, and the patterns are very similar. The alcohol series includes admissions with a mention of alcohol but no mention of drugs.

daily consumption, cocaine dependence is more likely to create binge and crash patterns. Studies in the addiction literature of the relative effects of different drugs are consistent with a relatively strong monthly cycle for cocaine. Gawin characterizes cocaine binges as being followed by a "crash" lasting 9 h to 4 days, which is followed by a withdrawal period of 1 to 10 weeks (Gawin, 1991).[10] During the withdrawal phase, environmental cues such as specific persons, events, locations or objects can increase cocaine cravings and trigger a relapse and another binge. In addition, binges can be triggered by a combination of drug availability, environmental stimuli, and the withdrawal status of the user. Although cravings can trigger relapse for a variety of drugs, the cravings can be more intense for cocaine.[11] Gawin argues that the cycle of drug use among cocaine users varies to a much greater extent than the cycle among users suffering from opiate or alcohol withdrawal. Also, Johanson and Fischman (1989) document that heroin is more likely to be used on a daily basis while cocaine is likely to be used in a cyclic pattern. These clinical findings are consistent with a stronger monthly cycle in hospital admissions for cocaine than for other substances.

5.2. Causes of the monthly cycle in drug-related hospitalizations

A variety of factors could cause the observed cycle in drug and alcohol-related admissions. One possibility is that the early month disbursement of cash aid creates "full wallets" at the beginning of the month that exacerbate substance abuse problems. But other factors could also create such a cycle. For example, the frequent occurrence of weekends or holidays at the beginning of the month could create this pattern. Also, the cycle could be driven by the cycle in paycheck receipt. Another possible cause is a monthly cycle in drug supply. However, we find strong evidence that the timing of cash aid disbursement is driving the cycle.

The cycle is unlikely to be caused by increased drug consumption on the weekend because the weekends are fairly evenly distributed over the month when we average over 7 years of hospital admissions. However, it is plausible that certain early month holidays (e.g. New Year's or July 4th) or late month holidays (e.g. Thanksgiving or Christmas) could contribute to the monthly cycle, though this explanation is inconsistent with the smoothness of the cycle in admissions. However, as a direct test of this possibility, we created a figure (not shown but available on request) where the average daily admissions are regression adjusted for the day of the week and major holidays. This figure is very similar to Fig. 1.

Our data on Medi-Cal eligibility allow us to identify patients who receive various forms of cash aid. Table 1 presents counts and rates of alcohol and drug-related admissions for welfare recipients, SSI recipients and the total population. SSI recipients in the disability category account for many more admissions than welfare recipients. SSI recipients also have a much higher rate of alcohol and drug admissions than welfare recipients. However, it is worth noting that the majority of admissions are for people covered by neither program.

SSI recipients significantly contribute to the total monthly cycle. Fig. 2 shows the monthly cycle in drug-related admissions broken out into three categories: welfare, SSI and other. SSI recipients exhibit a much stronger cycle in admissions than either of the other groups with a peak

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[10] In addition, cocaine users have reported that during a binge, it is very difficult to resist ingesting all the cocaine that is available (Cornish and O'Brien, 1996).

[11] Methamphetamine is much more similar pharmacologically to cocaine than to heroin which may explain the fairly pronounced cycle we observe in methamphetamine hospitalizations.

Table 1
Demographics of hospital admission by type of drug mentioned on admission record

	All admission	Alcohol	Opioid	Cocaine	Amphetamines
Primary cause of admission (based on ICD-9)					
External causes (injury)	0.110	0.186	0.132	0.140	0.152
Respiratory problems	0.069	0.054	0.062	0.045	0.029
Delivery	0.217	0.005	0.037	0.088	0.143
Circulatory problems	0.152	0.086	0.046	0.075	0.046
Neoplasm	0.057	0.019	0.007	0.005	0.004
Other	0.395	0.650	0.716	0.647	0.626
Hospital stay					
Admitted through ER	0.421	0.639	0.533	0.508	0.450
Length of stay (in days)	4.4	6.0	6.7	6.7	6.2
Charges (in dollars)	17,189	18,710	15,890	13,769	13,541
Left against medical advice	0.011	0.052	0.122	0.096	0.075
Died	0.023	0.032	0.017	0.011	0.009
Insurance coverage					
Medicare	0.33	0.28	0.17	0.17	0.12
Medi-Cal	0.20	0.18	0.27	0.29	0.31
Private	0.37	0.31	0.22	0.22	0.28
Self pay	0.04	0.12	0.11	0.12	0.13
County indigent	0.02	0.07	0.11	0.08	0.08
Demographics of patients					
Age (in years)	50.7	49.5	41.2	37.3	32.5
Male	0.37	0.72	0.59	0.62	0.53
White	0.60	0.66	0.59	0.37	0.73
Black	0.09	0.10	0.16	0.43	0.06
Hispanic	0.23	0.20	0.22	0.17	0.17
Proportion of patients enrolled in each program					
Welfare	0.049	0.021	0.051	0.076	0.131
SSI aged	0.037	0.016	0.005	0.001	0.000
SSI blind	0.004	0.002	0.002	0.003	0.001
SSI disabled	0.093	0.176	0.273	0.281	0.196
Admissions per month per 10K recipients					
Welfare rate	48.176	0.727	0.486	0.628	0.810
SSI aged rate	238.799	3.741	0.294	0.065	0.019
SSI blind rate	323.026	7.336	2.139	1.937	0.825
SSI disabled rate	287.914	19.368	8.315	7.434	3.871
Total admissions	18,249,548	645,204	178,970	155,275	115,815

Admissions records are included in the table above if the drug is the primary cause of admission or if it is mentioned in one of the other ICD-9 CM codes. We use the following ICD-9 CM codes; cocaine (304.2, 305.6), opioid (304.0, 304.7, 305.5), amphetamines (304.4, 305.7), alcohol (291, 303, 305.0), and drug dependence or psychosis (304, 292). Admissions are only coded as alcohol if there is no mention of cocaine, opioid or amphetamines. All the numbers are proportions unless otherwise labeled. The opioid category is largely heroin and the amphetamine category is largely methamphetamine. Charges and LOS are for the first unit the patient is admitted to.

on the fifth of the month that is 50% above the level on the first of the month. Given that the SSI recipients typically have very little earned income, the cycle is likely to be driven by the receipt of cash aid on the first of the month. These results suggest there is a strong "full wallet" effect among

SSI recipients.[12] Welfare recipients show a weaker cycle with a peak on the third of the month that is 18% above the level on the first day of the month. One might expect that this weaker cycle for welfare recipients could be driven by the fact that Los Angeles County uses a staggered disbursement scheme after June 1997. However, the cycle is only slightly stronger if we drop welfare recipients who are residents of LA County and are admitted after June 1997—the peak in admission on the third of the month is 19% above the level on the first of the month rather than 18%. Finally, the residual group also shows a cycle with a peak on the sixth of the month that is 15% above the level on the first of the month.

This residual group contains a substantial number of people who are covered by programs such as Disability Insurance (DI) and General Relief. Although we cannot directly identify patients covered by these programs, we can infer their status based on their health insurance. Patients under 65 who have a mention of drug use on their admission record and are covered by Medicare are very likely to be receiving DI. The General Relief recipients are likely to be covered by Medi-Cal or County Indigent programs. Fig. 3 shows the monthly cycle in drug admissions by primary insurance coverage for those receiving neither SSI nor welfare. The cycles in admissions for patients covered by Medi-Cal and County Indigent programs are modest. However, there is a very pronounced cycle for Medicare recipients with a clear jump after the third of the month which is when the DI checks arrive for the majority of DI recipients in our sample. The fact that the admission surge for this group begins after the 3rd rather than the 1st provides further evidence that cycles are caused by aid disbursement rather than other factors unique to the first of the month.

It is unlikely that the aggregate monthly cycle is substantially driven by paycheck receipt at the beginning of the month. First, as seen in Fig. 2, a large fraction of the cycle is driven by SSI recipients who receive very little earned income. Also, we can use private insurance (e.g. PPO, HMO) as a proxy for being employed. Fig. 3 shows that there is very little evidence of an increase in early month admissions for people with private insurance. Finally, the monthly pattern of admissions is not consistent with the monthly pattern in paycheck receipt. Skiba and Tobacman (2005) report the prevalence of pay frequencies among individuals using a proprietary data set from a financial services company. Their data set includes individuals who sought payday loans, so people with longer pay periods and lower incomes are likely to be overrepresented. They find that most people are paid on the days around the 1st and the 15th of the month. If the arrival of a paycheck induced significant numbers of drug admissions, we would expect the monthly cycle for those not on welfare or SSI to exhibit a surge in admissions after the 15th. However, in unreported figures, we graph the daily admissions for each day of the month, and find the pattern in the days surrounding the 15th to be relatively flat.

Any cycle in hospital admissions induced by the personal income of government transfer recipients is likely to be small because their personal income is small. Table 2 documents the average personal and family income for welfare, SSI and Medicare recipients in California from the March 1997 CPS. As can be seen in Table 2, SSI and welfare recipients have little earned income. The CPS does not allow us to separate DI from other Social Security payments, but total Social Security payments comprise a large share of personal income for those likely to be receiving DI (the non-elderly covered by Medicare). Because cash aid recipients have low levels of earnings and these earnings do not all arrive at the beginning of the month, it is likely that these earnings make only a small contribution to the monthly cycle.

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[12] We find the monthly cycle for SSI recipients is very similar before and after the Welfare Reform Act.
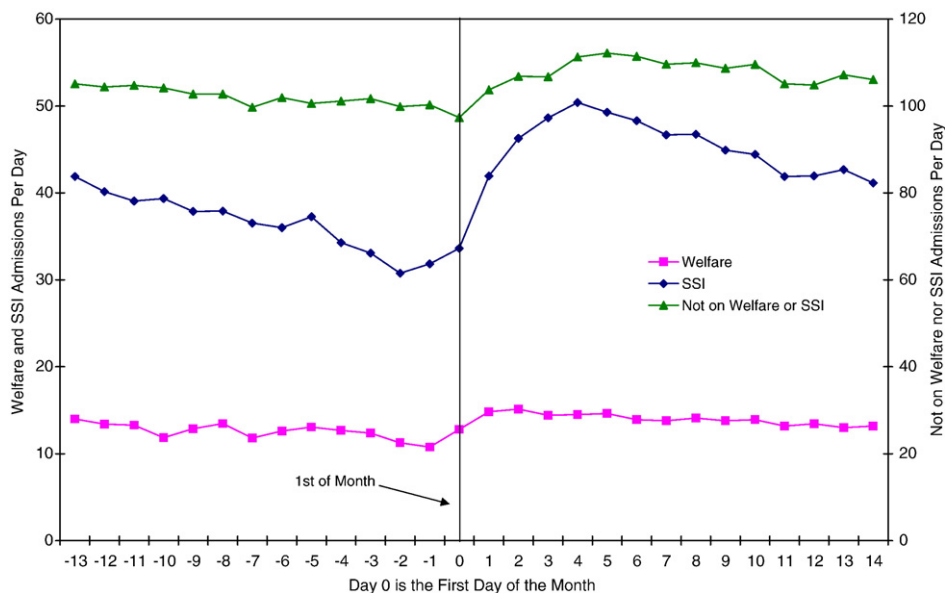
Fig. 2. Average daily hospital admissions with mention of cocaine, heroin or amphetamine by cash aide program (California 1994–2000).

The differing monthly patterns for various subsets of the population suggest that supply side factors are unlikely to drive the monthly cycle. If drugs are generally more available at the beginning of the month, one might expect consumption to increase across all subsets of the population. However, patients not receiving cash aid comprise a large fraction of admissions yet do not exhibit a monthly cycle. We present further evidence against supply-side explanations below when we analyze the change in the timing of disbursement for welfare in Los Angeles County that occurred in 1997.[13]

5.2.1. Additional evidence that once-a-month cash aid disbursement contributes to the monthly cycle

The surge in drug-related hospital admissions occurring immediately after aid recipients with very low earnings receive their transfer checks strongly suggests a causal relationship. In this section, we offer additional corroborating evidence that this is a causal relationship. We examine an abrupt change in the timing of the disbursal of welfare checks that occurred in Los Angeles County in June 1997.

Ideally, we would like to observe a change in the timing of disbursement for SSI, the program that drives the majority of the monthly cycle. Unfortunately, there were no changes in SSI check disbursal in the period we examine. But there was a change in welfare disbursement that we can exploit. In California, welfare is managed at the county level. In the middle of our sample period, Los Angeles County, which accounts for approximately one-third of the state's welfare recipients, changed its disbursal schedule. Prior to June 1997 in Los Angeles, all welfare (CalWORKs) monthly aid checks were disbursed to recipients on the first of the month. Since June 1997, the

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[13] Alcohol related admissions follow a pattern very similar to the pattern of the drug related admissions. The figures are available on request.
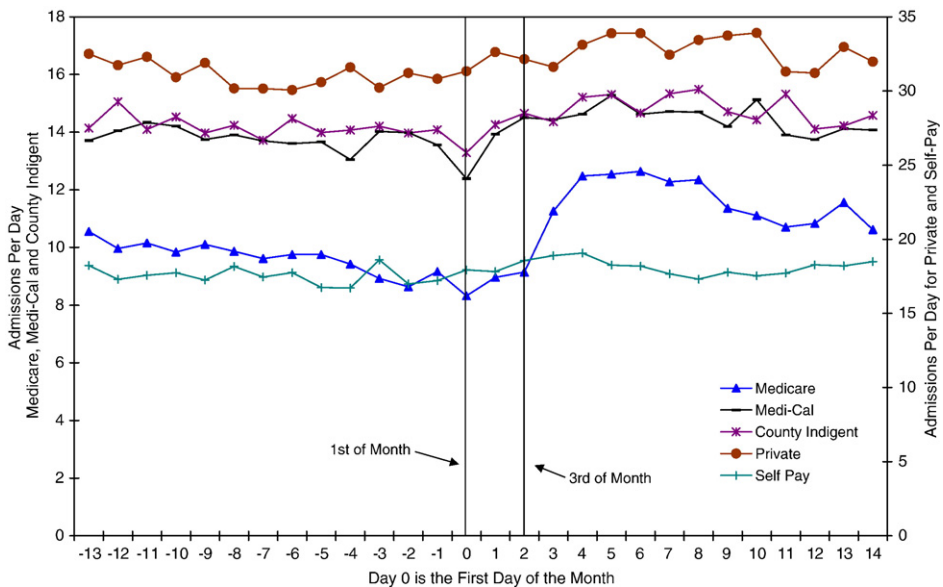
Fig. 3. Average daily hospital admissions with mention of cocaine, heroin or amphetamine by insurance type for those not receiving welfare or SSI (California 1994–2000). Note: This figure includes only patients covered by one of these five insurance categories who are not covered by either welfare or SSI.

majority of the LA County controlled cash aid programs (including CalWORKs) switched to disbursing aid to individuals based upon a designated stagger day, spread over the first 10 days of each month based upon the case number.[14] Each recipient may pick up his/her full monthly benefits at the contracted issuance outlet any day of the month after his/her designated stagger day. Recipients typically claim their benefits on their designated day. We refer to the pre-June 1997 regime as "Day 1" disbursement and the post-June 1997 regime as "Days 1–10" disbursement.

We analyze the effect of the disbursement change on the aggregate cycle of drug admissions among welfare recipients in Los Angeles County. If welfare disbursement is affecting the cycle, a switch from Day 1 disbursement to Days 1–10 disbursement should shift the peak several days later in the month and smooth the cycle. We test for such a change by comparing the monthly cycle in Los Angeles pre- and post-June 1997. In order to allow for the possibility of changes in other factors that might effect the cycle in admissions, we use other large urban counties as a comparison group and employ a differences-in-differences approach.

It is important to be aware that this is a low power test. The welfare population that we examine has only a small monthly cycle in drug-related admissions as compared to SSI; welfare admissions increase only 18% over the first few days of the month while SSI admissions increase by 50%. Moreover, drug and alcohol admissions are much more common among SSI recipients than among welfare recipients. Therefore, we are not likely to find a practically significant change

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[14] Although the change in disbursement also affected other programs including General Relief, Refugee Cash Assistance and Cash Assistance Program for Immigrants, we do not include these programs because we do not observe individual's eligibility for these programs.

Table 2
Size and sources of income by program in 1997 for Californians aged 20–47

	Program individual covered under					
	Welfare/public assistance		SSI		Medicare	
Income source	Personal	Family	Personal	Family	Personal	Family
Earnings	$1900	$4995	$1489	$7468	$3437	$15,374
SSI	$266	$580	$5842	$6449	$1113	$1483
Social Security (including DI)	$418	$768	$2415	$3712	$4373	$8338
Unemployment and workers comp	$153	$302	$160	$202	$194	$471
Welfare/public assistance	$5479	$6199	$480	$1013	$598	$924
Disability (excluding Social Security)	$32	$32	$330	$488	$642	$968
All other	$407	$509	$722	$1528	$1559	$4136

Notes: In order to proxy the subpopulation that corresponds to the hospital admissions, we select individuals aged 20–57 which is the 5th and 95th percentile of the age distribution among the patients in the hospital admission data. The March CPS does not separate DI income from other Social Security income. Source: March 1997 Current Population Survey.

in the monthly cycle. Nevertheless, a statistically significant shift in the cycle is further evidence of a causal link between aid disbursement and drug consumption. Such evidence would suggest that staggered disbursement would smooth the monthly cycle for a population with both large cycles and high levels of drug admissions (e.g. SSI). To test this hypothesis we compare admission rates in the "early" part of the month with those in the "middle" part of each month, and look for a statistically significant shift in their ratio using a differences-in-differences approach. We pool monthly data for two types of counties: (1) Los Angeles and (2) other large counties combined.[15] For county type i in month t, where $i = \{$LA, Other Large Counties combined$\}$ and t indexes the 83 months between January 1994 and November 2000, we estimate:

$$\frac{\text{Admits Early}_{it}}{\text{Admits Middle}_{it}} = \beta_0 + \beta_1 LA_{it} + \beta_2 \text{Post97}_{it} + \beta_3 LA^* \text{Post97}_{it} + \varepsilon_{it}$$

where *Admits Early* (*Admits Middle*) is the number of admissions with a mention of cocaine, heroin or amphetamine in "early" ("middle") days of the month. Under the null hypothesis that the change in disbursement did not shift the cycle in Los Angeles, $\beta_3 = 0$. A statistically significant reduction in the ratio in Los Angeles relative to other large counties after June 1997 is evidence in favor of the existence of a full wallet effect driven by government transfers.[16]

One method for selecting the "early" and "middle" of the month days is to assume that switching to a staggered disbursement schedule does not change the distribution of the lag time between the receipt of aid and a hospitalization. As a result, 1/10th of the recipients would follow this distribution starting on Day 1, 1/10th would follow this distribution starting on Day 2, …, and 1/10th would follow this distribution starting on Day 10. Using the data on Day 1 disbursement from before June 1997, we simulate the resulting counterfactual pattern. To find the appropriate

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[15] Other large counties include: Orange, San Diego, San Bernardino, Santa Clara, Riverside, Alameda, Sacramento, Contra Costa, Fresno, and San Francisco. These are the California counties with the most welfare recipients after Los Angeles.

[16] Note that any factors that affect the level of admissions (e.g. time trend in number of welfare recipients or seasonality of drug consumption) are factored out by taking the ratio of early to mid-month admissions.

Table 3
Testing effect of change from Day 1 to Days 1–10 staggered disbursement for welfare recipients in Los Angeles county

Dependent variable: ratio of drug admissions in "early" days to "middle" days for each month in county type i

	7 day window (Days 4–10/ Days 11–17)		6 day window (Days 5–10/ Days 11–16)		8 day window (Days 3–10/ Days 11–18)	
Constant	1.10 [0.04]**	1.19 [0.11]**	1.13 [0.05]**	1.21 [0.14]**	1.09 [0.03]**	1.17 [0.10]**
LA County	0.13 [0.07]	0.13 [0.07]	0.10 [0.08]	0.10 [0.08]	0.13 [0.07]*	0.13 [0.07]
Post97	−0.02 [0.05]	−0.02 [0.05]	−0.05 [0.06]	−0.05 [0.06]	0.02 [0.05]	0.03 [0.05]
LA*Post97	−0.20 [0.09]*	−0.20 [0.09]*	−0.21 [0.11]	−0.21 [0.11]	−0.23 [0.09]*	−0.23 [0.09]*
Month effects	No	Yes	No	Yes	No	Yes
Observations	166	166	166	166	166	166

Notes: An observation is each month between January 1994 and November 2000. The dependent variable is the ratio of the number of county welfare recipients' hospital admissions with mention of cocaine, heroin or amphetamine for "early" and "middle" days of each month. The algorithm for calculating the appropriate "early" and "middle" days is described in Section 5.2.1. There are two types of counties: (1) Los Angeles and (2) other large counties combined (Orange, San Diego, San Bernardino, Santa Clara, Riverside, Alameda, Sacramento, Contra Costa, Fresno, and San Francisco). Standard errors (reported in brackets) are calculated using the Newey–West correction allowing for 1st order serial correlation. We also estimate standard errors allowing for nonzero covariance of order 1, 2, 6, and 12 (months), and the coefficient of LA*Post97 is still significant. * significant at 5%; ** significant at 1%.

"early" and "middle" days for a window of X days, we find the set of X consecutive days where the difference in the ratio is largest between the "Day 1 disbursement" data and the simulated Days 1–10 disbursement.[17] This set of "early" and "middle" days is the most appropriate definition of "early" and "middle" days to identify a shift in the cycle due to a change in disbursement. Note that we use no data from post-June 1997 (the actual Days 1–10 disbursement period) to choose these days. We find that for a 7 day window, the "early" days are Days 4–10 and the "middle" days are Days 11–17.[18]

Results of the differences-in-differences regressions are reported in Table 3. With a 7 day window, we find that other large counties have 10% more admissions in early than middle days ($\beta_0 = 1.10$), and despite no change in disbursement policy, this slightly decreases to 8% more admissions after June 1997 ($\beta_2 = -0.02$). However, the reduction in early month admissions was substantially larger in Los Angeles County after June 1997 ($\beta_3 = -0.20$). This relative reduction in Los Angeles County is statistically significant at the 5% level. Regressions with 6 and 8 day windows produce very similar estimates.

The statistically significant reduction in the ratio in Los Angeles relative to other large counties is consistent with reducing the full wallet effect in the first few days of the month. Again, we note that this is a fairly low power test and the ideal policy experiment would stagger the disbursement

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[17] Suppose we want to use a window of 7 days (i.e. "early" $\equiv t_0$ to $t_0 + 6$ and "middle" $\equiv t_0 + 7$ to $t_0 + 13$.). Then, we can use the data from pre-June 1997 on Day 1 disbursement and the simulated Days 1–10 (which uses only pre-June 1997 data), to find:

$$t_o = \arg\max \left\{ \frac{\sum_{t=t_0}^{t_0+6} \text{Admits}_t^{\text{Day1 Disbursement}}}{\sum_{t=t_0+7}^{t_0+13} \text{Admits}_t^{\text{Day1 Disbursement}}} - \frac{\sum_{t=t_0}^{t_0+6} \text{Admits}_t^{\text{Day1-10 Simulated}}}{\sum_{t=t_0+7}^{t_0+13} \text{Admits}_t^{\text{Day1-10 Simulated}}} \right\}$$

[18] For a 6 day window, the optimal "early" is Days 5–10 and "middle" is Days 11–16. For an 8 day window, the optimal "early" is Days 3–10 and "middle" is Days 11–18.
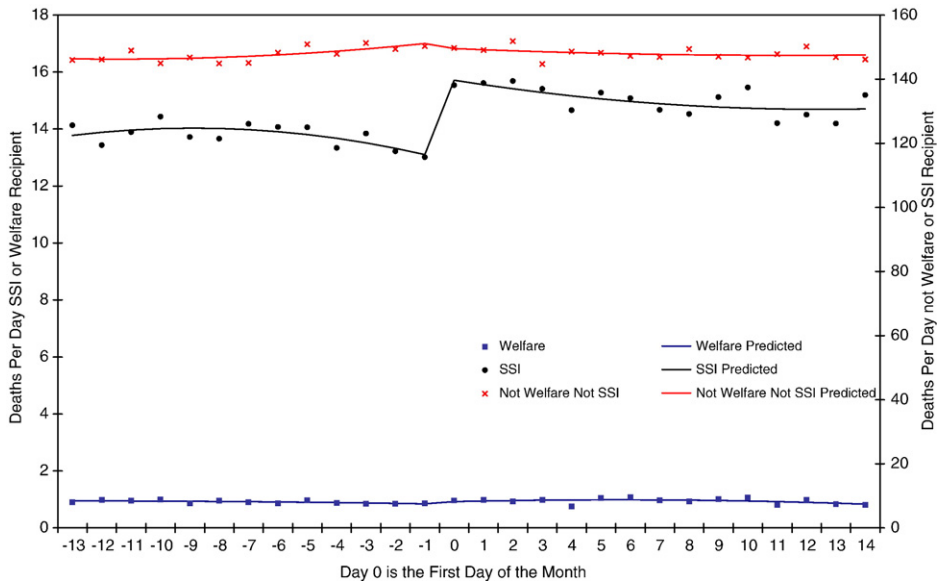
Fig. 4. Average daily deaths within the hospital in California by coverage type. Note: The counts are based on day of admission rather than day of death. The line laid over the daily means is a quadratic polynomial in days fully interacted with a dummy for after the first of the month.

of SSI. Nevertheless, these results suggest that staggering disbursement will smooth the overall cycle in admissions. Under such a regime, individual recipients may still suffer from a "full wallet" effect. But the effect is not concentrated at the first few days of the month, so the aggregate cycle is smoothed.

5.3. Monthly cycles in mortality

We also find evidence of a distinct monthly cycle in within hospital mortality among SSI recipients. Fig. 4 shows average daily number of deaths due to all causes that occur within the hospital by type of cash aid program. The means have a regression line superimposed. The regression has the following form

$$\text{Mort}_i = \beta_0 + \beta_1 \text{Post}_i + \beta_2 \text{Days}_i + \beta_3 \text{Days}_i^2 + \beta_4 \text{Days}_i {}^* \text{Post}_i + \beta_5 \text{Days}_i^2 \text{Post}_i + \Pi X_i + \varepsilon_i$$

where i indexes days, Mort_i is the count of the number of deaths that occurred on that day, Post_i is an indicator variable that takes on a value of 1 for admissions occurring between the 1st and the 14th of the month, Days_i is the number of days from the date to the nearest first of the month and ε_i is an idiosyncratic error term.[19] We also interact the indicator variable Post_i with both Days_i and Days_i^2. In some specifications we also include covariates X_i. The coefficient β_1 is the estimate of how much the adverse events increase on the day that the checks arrive. The regression model takes advantage of the two weeks before and after the checks arrive to increase the precision of

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[19] We include the 13 days before the 1st of the month and the 14 days after the 1st of the month in the regressions.

Table 4
Regression estimates of the daily number of within hospital deaths in California 1994–2000

	Welfare			SSI disability			Non-welfare non-SSI		
Post	0.094	0.094	0.084	2.861	2.872	3.018	−2.528	−2.466	−2.649
	[0.129]	[0.126]	[0.126]	[0.625]	[0.545]	[0.515]	[4.297]	[2.868]	[2.482]
Days	−0.018	−0.018	−0.012	−0.266	−0.267	−0.285	1.012	1.010	0.894
	[0.035]	[0.034]	[0.034]	[0.161]	[0.140]	[0.139]	[1.112]	[0.729]	[0.669]
Days Sq	−0.001	−0.001	0.000	−0.015	−0.015	−0.016	0.044	0.045	0.036
	[0.002]	[0.002]	[0.002]	[0.011]	[0.009]	[0.010]	[0.074]	[0.048]	[0.047]
Days*Post	0.041	0.041	0.033	0.102	0.103	0.102	−1.386	−1.384	−1.096
	[0.042]	[0.042]	[0.041]	[0.195]	[0.171]	[0.170]	[1.316]	[0.854]	[0.819]
Days Sq*Post	−0.001	−0.001	−0.002	0.022	0.022	0.024	−0.027	−0.028	−0.032
	[0.003]	[0.003]	[0.003]	[0.013]	[0.012]	[0.012]	[0.088]	[0.056]	[0.057]
Constant	0.83	0.362	0.334	12.853	8.898	8.892	152.068	173.858	173.332
	[0.106]	[0.138]	[0.146]	[0.528]	[0.690]	[0.599]	[3.657]	[4.500]	[2.888]
Day of week dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Month dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Year dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Holiday	No	No	Yes	No	No	Yes	No	No	Yes
Avg deaths last day of month	0.87	0.87	0.87	13.01	13.01	13.01	150.34	150.34	150.34
Observations	2324	2324	2324	2324	2324	2324	2324	2324	2324
R-squared	0.00	0.06	0.06	0.02	0.27	0.28	0.00	0.60	0.61

Notes: Robust standard errors in brackets. The dependent variable is the number of deaths per day within the hospital. The regressions include a second order polynomial in days from the first of the month fully interacted with a dummy equal to 1 for the first 14 days of the month. The first column of each panel is the regression corresponding the to figure for that particular outcome. The second and third columns in each panel include dummies for day of the week, month and year. The final column in each panel includes dummies for major holidays including 4th of July, Cinco de Mayo, Thanksgiving, Christmas and New Years.

this estimate. We have allowed the derivatives of the adverse event profile to change after the arrival of the checks because models that keep the derivative constant under fit the data.

To increase precision, the regression is fitted to the underlying daily observations rather than the means presented in the figure. An examination of the figure reveals that the second order polynomial fits the data well. The figure reveals a striking increase in within hospital deaths per day among SSI recipients and little evidence of an increase in deaths for either welfare recipients or people who receive neither welfare nor SSI. In Table 4 we present the regression estimates corresponding to the lines in Fig. 4. The first panel presents the results for welfare recipients. The first column of this panel corresponds directly to the regression line for welfare recipients in Fig. 4. The estimate of β_1 is statistically insignificant suggesting that there is no discrete increase in mortality among welfare recipients in the beginning of the month. In the second column we add dummies for day of the week, month and year. In the third column we add dummies for the major holidays. All the results in the table are robust to the inclusion of these covariates. In the second panel we present the results for recipients of SSI disability. SSI recipients experience about a 22% increase in mortality on the first of the month. People who receive neither welfare nor SSI do not experience a statistically significant increase in mortality at the beginning of the month.[20]

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[20] It is possible that there are increases in deaths for DI and General Relief recipients after their checks arrive, but we do not observe them because these groups are small relative the rest of the population with which they are included.

6. Policy implications: alternative policies for the disbursement of cash aid

We have presented evidence that for a particular subpopulation, the receipt of government transfer checks causes a large, abrupt increase in the probability of a drug-related hospitalization or death. The 22% increase in the death rate of SSI recipients is particularly striking. It is worth exploring the possibility that alternate disbursement regimes will reduce both the cycle and the levels of these adverse events.

One possible alternative disbursement scheme is to stagger the monthly payments throughout the month, as Los Angeles County did for welfare in 1997. Staggered disbursement would still create full wallets at the individual level, but it would smooth the aggregate cycle in drug-related hospitalizations. This would reduce stress on health providers that are constrained by fixed resources.

A second possible policy is to substitute in-kind aid for cash aid for individuals with severe drug-related problems. Such policies have been proposed in the past. Most recently in November 2002, San Francisco passed the "Care Not Cash" initiative that reduces General Assistance cash aid from approximately $320 to $59 and converts the difference to in-kind support of food and housing. Because this disbursement scheme could be expensive to implement, it would be particularly effective to carefully target recipients with a history of severe substance abuse problems. Table 5 documents the number of times that particular recipients are admitted with a drug mention between 1994 and 2000. Table 5 reveals that a very small number of recipients account for a disproportionately large number of drug admissions, particularly among SSI and DI recipients. Among the nearly 45 thousand SSI recipients who are ever admitted with a drug-related diagnosis, 19 thousand (43%) are admitted more than once with drug-related conditions over the 7 year period. The 1004 SSI recipients that are admitted to the hospital more than 11 times account for 16 thousand (or 16%) of the SSI admissions. DI patients (proxied by Medicare) exhibit similar frequencies. Eleven thousand of nearly 28 thousand DI patients (41%) are admitted more than once with a drug-related diagnosis; 681 patients are admitted more than 11 times and comprise 17% of DI admissions. By contrast, only 4 thousand of 27 thousand welfare patients (16%) are admitted more than once, and only five recipients are admitted more than 11 times. The DI recipients with repeat admissions generate similar patterns in hospital charges.

One other interesting alternative worthy of future study is to make several small transfers throughout the month rather than a single large one. For example, the monthly aid could be divided into weekly or biweekly payments. The 1996 welfare reform act required states to convert to electronic benefit transfer (EBT) by 2002. This should make the policy relatively inexpensive for the state administered programs to implement. Unfortunately, we have no evidence of the effect of such disbursement. If a jurisdiction used such high frequency disbursement, future research could study the impact on hospital admissions and deaths.

These results suggest that it is worth testing alternative disbursement policies that could reduce drug bingeing. If they are effective, these policies could significantly reduce drug-related hospitalizations and mortality among SSI and DI recipients.

7. Conclusions

This work complements the literature on consumption smoothing. Unlike previous work that has found limited evidence of utility or welfare losses, we find that surges in consumption of illicit drugs and alcohol cause serious problems. We present evidence that there is a pronounced monthly cycle in drug and alcohol-related hospital admissions among participants in some

Table 5
Patients with repeated drug-related admissions from 1994 to 2000 by cash aid category

Number of admissions	SSI				Welfare				Medicare (proxy for DI)				Other			
	Patients	Admissions	Pct of total admits	Avg. charges per patient	Patients	Admissions	Pct of total admits	Avg. charges per patient	Patients	Admissions	Pct of total admits	Avg. charges per patient	Patients	Admissions	Pct of total admits	Avg. charges per patient
1	25,451	25,451	24%	$18,919	23,015	23,015	69%	$9901	16,294	16,294	25%	$18,760	120,617	120,617	55%	$14,359
2–3	12,164	28,237	27%	$37,602	3938	8582	26%	$22,410	7009	16,240	25%	$38,119	27,360	61,460	28%	$27,302
4–5	3459	15,183	15%	$68,090	300	1293	4%	$49,921	2052	9009	14%	$66,172	4458	19,360	9%	$48,220
6–10	2586	19,053	18%	$107,292	76	513	2%	$66,144	1671	12,380	19%	$103,391	1947	14,002	6%	$78,676
11–20	850	11,740	11%	$180,154	5	61	0%	$154,145	550	7644	12%	$175,777	333	4489	2%	$133,757
20+	154	4472	4%	$332,804	0	0	0%	-	131	3760	6%	$327,582	43	1238	1%	$278,173
Total	44,664	104,136	100%		27,334	33,464	100%		27,707	65,327	100%		154,758	221,166	100%	

Notes: This table includes the frequency of drug-related hospital admissions by each patient and the number of total admissions that such patients comprise. For example, among SSI recipients who were admitted with a drug-related mention, 3459 of those individuals were admitted 4 or 5 times over our sample period and these patients account for 15,183 admissions, or 15% of all drug-related admissions by SSI recipients. Individuals who change program status during the sample are only counted during the time they are on a particular cash aid program. The patient record locator number used to track patients admitted more than once is missing for about 5% of admissions; those admissions are excluded from this table but included in the other analysis. Hospital list charges have the limitations that many insurers have negotiated discounts, charges may cover other conditions treated during the hospital stay, and charges do not cover ambulance rides.

government transfer programs. We also present evidence that SSI recipients experience a very large increase in within hospital mortality rates after they receive their transfer checks. These results suggest that government transfer programs significantly affect the timing and possibly also the levels of drug-related hospitalization and deaths.

Our results suggest that "full wallets" can exacerbate impulse control problems; money, at least in certain quantities, can adversely affect some aid recipients. It is likely that staggering the disbursement of aid or distributing the aid in-kind will smooth the cycle in adverse events. It is also possible that these alternate regimes, particularly the second, will reduce the number of drug-related hospitalizations and drug-related deaths. Implementing and evaluating the effectiveness of policy changes intended to reduce adverse drug-related events is an area for future research.

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