Did the Introduction of Food Stamps Affect Birth Outcomes in California?

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Introduction

Do welfare programs that raise the income of poor mothers affect infant mortality? Over the 1960s, U.S. infant mortality fell dramatically. The white rate fell from 23 to 17 per 1,000, while the African-American rate fell from 43 to 32 per 1,000. These declines are *coincident* with the introduction of federal transfer programs including Medicaid and the Food Stamp Program (FSP). But it is not clear whether there is an actual link between welfare programs and improvements in infant mortality.

While there is little doubt that improving maternal nutrition can lead to healthier babies, it is less clear that the introduction of a program like the FSP will have significant effects either on maternal nutrition, or infant health outcomes. To the extent that transfers made under the FSP are fungible, they may or may not lead to improvements in nutrition. It is possible, for example, that FSP transfers could lead to increases in smoking or alcohol consumption. Even if the FSP improves maternal nutrition, it is possible to have negative effects on average *measured* infant health. For example, if more unhealthy fetuses survive, or if fertility increases among those women who are most likely to have poor birth outcomes, average infant health could decline.

Hence, the effect of the FSP is theoretically ambiguous and must be examined empirically. Almond and Chay (2003) find that the narrowing of the gap in infant mortality between blacks and whites was concentrated in the South, and coincided with the introduction of Medicaid and FSP. However, the hypothesis that declines in mortality were related to the introduction of specific programs has not been directly tested.

This paper uses individual-level data from birth certificates in California to assess the impact of the introduction of the Food Stamp Program (FSP) on fertility, the probability of fetal survival, and the incidence of low birth weight. The FSP was introduced on a county-by-county basis in California, and we argue that in many cases the exact timing of its introduction was beyond the control of the local authorities. Hence, the phased-in introduction offers a useful research design for determining the effects of the program.

We find that the introduction of the FSP increased the number of births, particularly in Los Angeles. Some of this Los Angeles-specific effect may actually measure the in-migration of young women in response to Los Angeles' relatively early adoption of the new benefit. However, among blacks, we also find increases in the number of births in response to the introduction of the FSP in other counties, and among mothers with higher parity births who may be less likely to have migrated than new mothers.

We find some evidence that the FSP increased the probability of fetal survival among the lightest infants among whites, but the effect is very small, and only detectable in Los Angeles (L.A.). Notably, we find that the FSP *increased* (rather than decreased) the probability of low birth weight but the estimated effect is small, and concentrated among teenagers giving birth for the first time. Thus, it appears that the FSP increased fertility, especially among black teens, but that this increase in fertility was not strongly concentrated among the women most likely bear low birth weight infants.

Conceptual Model

Low birth weight has long been considered to be an important indicator of infant health, and a predictor of future outcomes. Currie and Hyson (1999), Black, Devereux and Salvanes (2005), and Oreopolous and Stabile (2006) all show that low birth weight is linked to lower educational attainment and probabilities of employment in adulthood. Currie and Moretti (2005) show that low birth weight is also transmitted intergenerationally and that such transmission is more likely if the mother is also poor.

Although birth weight has a genetic component, it is strongly affected by maternal nutrition. Poor nutrition during pregnancy increases both the probability of miscarriage, and the probability of low birth weight (defined as birth weight less than 2500 grams) in a pregnancy that results in a live birth.

The introduction of Food Stamp Program could have affected fertility and birth outcomes through several channels. First, by improving the quality of the diet available to people with a given level of resources, the program may have increased the probability of fetal survival. Infants under 1,500 grams at birth were unlikely to survive in the 1960s. By pushing some infants about this survival threshold, the program could have increased the number of live births. We will call this the “survival effect”. But unless the program pushed infants from below 1,500 grams to more than 2,500 grams, most of the infants “saved” by the program will still be low birth weight. Hence, the survival effect could lead to an increase in the number of low birth weight live births.

Second, a variety of income effects are possible. As discussed above, increases in income could be spent on goods harmful to infant health such as cigarettes or alcohol. Alternatively, if children are a normal good, then to the extent that the program increased people’s income, we might expect to see an increase in the number of children born. We will call this a fertility effect. The fertility effect may be larger among the people who were most likely to be constrained by lack of income prior to the introduction of the program. For example, Dehejia and Lleras-Muney (2003) show that African-Americans have fewer births during times of high unemployment, which may reflect credit constraints that are binding on women of child-bearing age. If the persons who are most likely to be constrained in the absence of the program are also most likely to bear low birth weight children, other things being equal, then the fertility effect will also increase the number of low birth weight children.

Third, it is possible that the introduction of the Food Stamp Program improved the fetal nutrition of infants who would have survived in any case. We call this a nutrition effect. To the extent that some infants who would have been in the 1,500 to 2,500 gram range are pushed above the 2,500 gram threshold, the nutrition effect will reduce the probability of low birth weight.

Finally, migration in response to the Food Stamp Program may also lead to increases in measured fertility and negative measured effects on birth weight, if those who migrate in response to the new benefits are more likely to have poor birth outcomes. There are two reasons why migration is a particular concern in this study. First, since the benefits were introduced county-by-county, it may have been relatively easy for women to cross county lines to take advantage of the new program. For instance, Los Angeles may have seen an influx from nearby counties in response to its relatively early adoption of the benefit.

Second, California as a whole grew tremendously over the period under study as people migrated from other states. About a third of net population increase in California over the 1960s was due to migration from other states. Many of these migrants were black. Between 1940 and 1970 the black population of Los Angeles climbed from 63,744 to almost 763,000 (Sides, 2004). In the 1970s, U.S. migrants lost their importance while immigrants accounted for about half of the net increase in population (McCarthy and Vernez, 1997). Los Angeles, in particular, became the preeminent destination for immigrants to the U.S. in the 1970s--the share of all immigrants locating in LA rose from between 12 and 15 percent in the 1960s to over 20 percent by 1974 (Pitkin, 2004).

While it is difficult to control for migration in our data, we do include county-specific time trends that will control for trends in immigration. We will also keep the potential impact of migration in mind and use the fact that many of the new migrants located in Los Angeles in order to explore the sensitivity of our results.

In summary, the effect of the introduction of the Food Stamp Program on birth outcomes is theoretically ambiguous: If the nutrition effect is large, then it may have a positive effect on balance. However, there are several reasons to expect negative measured effects, particularly if there are large impacts on survival probabilities, fertility and/or migration.

Background: The FSP

The Federal Food Stamp Program was established in fall 1964. It made permanent a pilot program that began in 1961. As of Dec. 1968, the program worked in the following way: Families paid a set amount (the purchase requirement) for coupons based on adjusted net income and the number of persons in the household. The purchase requirement varied with the household's income. For example, in 1974, a household with four people and monthly income of less than $100 per month would pay $22 for coupons worth $142, while a similar household with monthly income of less than $500 would pay

$118 for the same coupons (Food Stamp Management Branch, 1975). The coupons could be redeemed for most foods at local stores. Alcohol, tobacco, other non-food items, and imported foods (except coffee, tea, cocoa, and bananas) were prohibited. Re-certification was required every 3 months for households not on public assistance (Smith and Jensen, 1968).

The FSP was introduced on a county-by-county basis, as shown in Table 1. In California, the exact timing of its introduction was beyond the control of the local authorities. This is important, because it offers a useful research design for determining the effects of the program.

The introduction began with a pilot in Humboldt County in 1963, and ending with all counties joining the program in 1974 (by federal mandate). Note that Humboldt was the only county that participated in the pilot program. Larger counties tended to join earlier, but some large counties entered late, and vice-versa (Food Stamp Management Branch, 1975).

In order to join, a county's Board of Supervisors needed to pass a resolution and develop a plan for operating a program. The names of counties that had developed a plan were forwarded to the U.S. Department of Agriculture (USDA) by the state, and placed on a "pending" list by the USDA, since the funds available to add counties were limited in each year. There were initially some "glitches" in this process: Three California counties had drafted plans by the beginning of 1965, but the state did not pass their plans on to USDA because it had not yet passed its own enabling legislation (Smith and Jensen, 1968). The state finally passed the necessary legislation on June 30, 1965. Los Angeles and Contra Costa counties were able to start operations in December 1965, with San Francisco following in September 1966. At the other end of the spectrum, 17 counties did not join until 1974, when they were compelled to do so by federal legislation. Hence, for "early adapters" the exact timing of adoption was determined both by the state bureaucracy and by the availability of USDA funding, while for "late adapters" the timing was determined largely by federal mandate.

In some counties, the FSP replaced a free surplus commodity distribution program (counties could not operate both). To the extent that Food Stamps replicated an existing program, the estimated effects of its introduction may be biased downwards. However, USDA studies of eight pilot county programs suggested that even in households that had previously been receiving surplus commodities, receiving Food Stamps increased consumption levels. Moreover, 80 percent of increased consumption was of livestock products and fresh fruit and vegetables, products not generally included in the surplus commodities program. For example, families in Detroit consumed 50% more fresh fruits and vegetables and increased their intakes of both Vitamins A and C when they went on the FSP. Changes in dietary quality have been linked to higher birth weight infants, holding calories constant (Mannion et al., 2006). Retail sales of food also increased about 8 percent in the pilot areas, suggesting that many people may have been severely constrained in terms of their food purchases (Smith and Jensen, 1968).

The Data

a) Information about the Food Stamp Program

We have several independent sources of information about the FSP. Starting dates for each county are from state reports (Food Stamp Management Branch, 1975, 1976). Data on FSP expenditures are from the Bureau of Economic Analysis' Regional Economic Information System data on transfer programs (data prior to 65 is available on microfiche). Data on FSP participation comes from annual state forecasts of participation by county that were sent to the U.S. Food and Nutrition Service. Figure 1 shows the sharp rise in both participation and expenditures in the state as a whole after the introduction of the program. Figures 2a and 2b show however, that Los Angeles county dominated FSP participation because its population was so much greater than that of any other county. That is, even though per capita participation was similar in the four largest counties, Los Angeles still had far and away the largest number of participants. Figure 3 shows that the same pattern holds for FSP expenditures.

b) Birth Records

Individual birth records are available in California from 1960 to the present. We have data from

1960 to 1974. These files have maternal age, race, parity, birth weight, and county of residence. Figure 4 shows that median birth weights increased over the 1960 to 1974 period for both whites and blacks, though the increase is most noticeable after about 1970. Rates of low birth weight (defined as birth weight less than 2,500 grams) start to fall earlier, trending downwards beginning in about 1967. However, large gaps remain between blacks and whites, and there is little sign of convergence in these data. It is important to note that Hispanics are not identified in these data, so that the increasing numbers of Hispanic immigrants who were coming to California towards the end of our sample period are classed with other “whites”. Since Hispanic immigrants tend to have good birth outcomes, we do not believe that this biases our results.

Figures 5a and 5b show rates of low birth weight and median birth weight, respectively, for California’s four largest counties. The data for blacks is noisy and shows little clear trend. In contrast, the data for whites shows a clear, though modest, reduction in the incidence of low birth weight, and an increase in median birth weights. On the whole then, the raw data suggest that events during the 1960s and early 1970s improved birth outcomes among whites, but that the effects among blacks are less clear.

Table 2 provides some additional summary statistics for all births, first births, teen births, and teen, first births. The rationale for examining these sub-groups is that they may be more likely to have low birth weight births. Table 2 shows that this is certainly the case among teen mothers. Table 2 also shows large racial differences in the probability of being exposed to the FSP – blacks were more likely to live in the large urban counties that were early adopters.

c) Aggregate Data

In order to study trends in the number of births, we aggregate the individual-level data into cells defined using county, race, year of birth, maternal age group, parity, and the third of the year. The maternal age groups are: 14 to 19, 20 to 25, 26 to 30, 31 to 35, and 36 to 40 (births to women over 40 are omitted, as they are a small fraction of total births and including them results in small cell sizes). The parity groups were first births, second births, and third or higher parity births. If there are no births in a particular cell, then we assign zero births to that cell. There are 38,475 cells.

Methods:

In individual-level data we estimate models of the following form:

(1) low_bw $= a_0 + a_1$FSP $+ a_2$log(Pop) $+ a_3$Year $+ a_4$ County*Year $+ a_5$ County*Age $+ a_6$Parity $+ a_7$Gender $+ e$,

where low_bw=1 if individual was low birth weight; FSP is a measure of the food stamp program, either a dummy=1 if the program had been introduced; log expenditures, or log participation. These three measures of the program capture somewhat different timing effects since participation grew rapidly but not instantaneously after the program was introduced. In all cases, the FSP indicator refers to nine months prior to the birth.

Pop is county population.[1] Year is a vector of year dummies that control for state-level trends (for example Medi-Cal, the state Medicaid program was introduced state-wide in 1965. It replaced a previous state program available to categorically eligible persons); County*Year is a county-specific time trend that controls, for example, for differential migration trends in different counties, and differential trends in other forms of public assistance[2]; County*Age is a vector of fixed effects for each county and maternal age group which would pick up differences, for example, in county resources available to teen mothers; Parity is a vector of dummy variables indicating birth order (from first born to tenth born or higher), and

[1] The state of California constructs county-level estimates of population using data from a variety of sources including the Census, birth records, and school records.

[2] Expenditures for AFDC increased dramatically over the time period of our study, particularly in Los Angeles County. The McCone commission of inquiry into the Los Angeles riots noted that "expenditures for the AFDC program have been incrasing dramatically, far outrunning the population trends. Between 1960 and 1964, when county population increased 13%, expenditures for the AFDC program rose by 73%..." (McCone, 1965). It is important to control for differing trends in these variables.

Gender is a dummy variable equal to one if the child is male. These latter variables are included because they are known to affect birth weight.

In the data aggregated to cells we estimate:

(2) $N = a_0 + a_1FSP + a_2\log(Pop) + a_3Year + a_4\ County*Year + a_5\ County*Age + a_6Parity + e$,

where N is the number of births. These regressions are weighted by county population, given the large differences in cell sizes.

We estimate these models separately for blacks and whites given the large gap in the incidence of low birth weight between the groups. Given average differences in socio-economic status between blacks and whites, it is also possible that blacks will be more affected by the FSP than whites. Unfortunately, few indicators of socio-economic status are available in these data since income has never been reported in the Vital Statistics records and parents' education has not been reported until quite recently. However, we do use teenage motherhood as a proxy for lower socioeconomic status, and examine teen mothers separately.

The preceding paragraphs describe a standard difference-in-difference analysis. We also conduct a "pre-post" analysis of Los Angeles county only, as well as analyses excluding Los Angeles county from our difference-in-difference specification. We look at L.A. separately first because it is the only county large enough to bear this type of analysis. Second, there are many indications that Los Angeles was quite different than the other counties, and it is also much larger. Hence, it is important to understand the extent to which difference-in-difference estimates based on the whole sample may be driven by the experience of this single large county.

Results:

Table 3 shows models of the effect of the FSP on the number of births, using the grouped data.

While we do not see any statistically significant effects for whites as a whole, there are large, positive and statistically significant effects for the white subgroups of special interest (first births, teen mothers, teen first births) and for all groups of black infants. Given that these are cell-level regressions and the cells for the different groups are of different sizes, it is somewhat difficult to directly compare coefficients. Hence, we also show the coefficient divided by the mean cell size. For example, the first panel of the table suggests that the introduction of the FSP was associated with increases in the number of first births to white teens of about 10 percent. The results for black teens with first births are even larger at 24 percent. These effects are much larger than those for all blacks, though these are still substantial at 12 percent.

Panels (2) and (3) of Table 3 show similar results for our two additional measures of FSP generosity: log expenditures and log participation. Here the coefficient divided by the mean cell size can be interpreted as the percent change in the number of births with a percent change in expenditures. Hence, for example, a one hundred percent increase in expenditures would be associated with a 1.5 percent increase in the number of white teen first births, and with a 3.3 percent increase in the number of black teen first births. Similarly, a 100 percent change in participation would lead to a 1.1 percent increase in the number of white teen first births, and a rise of 2.6 percent in the number of black teen first births. These comparisons suggest that the implied effect of a 100 percent increase in program expenditures or participation is much smaller than the estimated effect of introducing the program. One interpretation is that the effects of the FSP on fertility are greatest for the poorest women.

The fourth panel of Table 3 shows the effect of excluding L.A. from the calculations. Mean cell sizes are much reduced by this exclusion (from 940.77 to 229.0). What is more striking however, is that outside of L.A., the FSP has no statistically significant effect on the number of births among whites. For blacks, the estimated effects of the FSP remain strongly statistically significant. For “all blacks” and for “black first births” the effects are of roughly similar magnitude to those shown in panel 1 (at least relative to the relevant cell mean). However, for black teens, the effects are much smaller outside of L.A..

The contrast between the results with and without L.A. suggests that the effects for L.A. may be driven by city-specific factors. An obvious suspect is migration. If, for example, many young women migrated to L.A. at the time of the introduction of the FSP (perhaps because of the generosity of other welfare programs such as AFDC), then one might see that the FSP was associated with large increases in the number of births without any change in individual-level fertility. However, the relative stability of the coefficients for blacks suggests to us that there was a fertility effect for this group. Moreover, the fact that effects on fertility are found among blacks for all parities as well as for first births can be construed as additional evidence that the effect is real, if we think that young women without children (and therefore at risk for a first birth) are more likely to migrate than older women who already have children.

Table 4 uses the individual-level data for Los Angeles county to look for the survival and nutrition effects. The table presents a series of linear probability models for the probability that infants were less than 1,500 grams, less than 2,000 grams, less than 2,500 grams, and less than 3,000 grams. The data is restricted to conceptions that took place between one year before the implementation of the FSP and one year afterwards in order to abstract from any trends in the data. The regressions are similar to (1) and control for the child's gender, parity, and mother's age.

In our data, very few children less than 1,500 grams survived. If the FSP moved some infants who would not have survived above the 1,500 threshold, then we should see an increase in the number of infants in the lowest low birth weight category: 1,500 to 2,000 grams. Alternatively, if the FSP increases fertility AND if the increases are concentrated among women who would be more likely to have low birth weight infants in the absence of the program, then we should see a more general increase in the number of lower birth weight infants, rather than an increase concentrated only in the lowest categories. Finally, if the FSP simply improved the outcomes of infants at risk of lower birth weight, then we should see a reduction in the number of infants in this category.

Table 4 suggests that the FSP had a statistically significant, but very small, effect on fetal survival. The estimated coefficients and standard errors are multiplied by 100, so column one implies that among whites, the FSP increased the probability that a surviving infant was in the 1,500 to 2,000 gram category by about one tenth of one percent. Among white teen first births, there is also a somewhat larger positive effect on the probability that a surviving infant was in the less than 3,000 gram category. As discussed above, this is what one would expect if the FSP encouraged fertility among a relatively negatively selected group of white L.A. teens. The coefficient suggests that in this group the probability of an infant being less than 3,000 grams increased about 1 percent.

There is no evidence of a survival effect among blacks. But among teen blacks, the probability that a surviving baby was less than 3,000 grams declines by 4 percent. The effect is slightly larger for teen first births, at 5 percent. This pattern is consistent with improved nutrition reducing the fraction of low birth weight births.

Table 5 extends the analysis of the micro data to all counties, by estimating equation (1). The first five panels focus on the probability that a child is low birth weight, while the sixth and seventh panels examine the probabilities that they were below 2,000 grams, and below 3,000 grams, respectively. In this table, results are also shown for models using log(expenditures) and log(participation) as the FSP variables.

The estimated effects are typically positive, but very small (recall that coefficients and standard errors are multiplied by 100). The FSP coefficients are all statistically significant for whites in the model for teen births, and in the models of teen first births (see Panel 4). Among blacks however, the dummy for the introduction of the program is never statistically significant although increases in expenditures and participation are estimated to have significant effects on black teen first births.

A comparison of Panels 4 and 5 shows that the results are very similar for the whole sample, and for the sample of counties excluding L.A.. The point estimate in column 1 of Table 4 suggests that among whites, the introduction of the FSP increased the probability of low birth weight by .00285. Relative to the baseline probability of low birth weight among infants of white, teen, first-time mothers, this represents an increase of about 4 percent.

However, Panels 6 and 7 show no impact of the FSP on the probability of birth weight less than 2,000 grams, or of the probability of birth weights less than 3,000 grams. This suggests that if the FSP did affect birth weights, then it resulted in relatively marginal changes, perhaps due to an increase in births among the women who were most likely to have infants in the 2,000 to 2,500 gram range in any case.

Extensions

We have explored several possible extensions. First, we have examined the fetal death records. In California, a fetal death is defined as a "product of conception" that does not show signs of life at the time of the birth. If fetal deaths were accurately reported, then we could use the fetal death data to directly examine the hypothesis that the FSP improved fetal survival. However, it is clear from an examination of the data that fetal deaths are grossly under-reported. For example, most fetal deaths are thought to occur in the first trimester, yet most reported fetal deaths occur in the last trimester of pregnancy (reporting of fetal deaths before 20 weeks is not even required). It is likely in fact that only fetal deaths requiring medical intervention are systematically reported.

We have also explored alternative lag structures. It might be for example, that it was necessary to improve nutrition before women became pregnant in order to have optimal effects on birth outcomes. Conversely, it might be nutrition in the last trimester (when the infant gains the most weight) that has the largest effect on birth outcomes. However, given the very small effects that we find on outcomes other than fertility, we were not able to say anything convincing about optimal timing of nutrition support under the FSP.

We also asked whether effects of low birth weight in the mother's generation had effects on the distribution of birth weights in the child's generation. It would be of great interest if we could show that an intervention, such as the introduction of the FSP, helped to break the inter-generational cycle of low birth weight. Currie and Moretti (2005) show using these data that low birth weight is strongly heritable–

mothers who are low birth weight are about 50 percent more likely to bear low birth weight children than other mothers even in models that compare sisters who are mothers. However, low birth weight is still a relatively rare condition. The estimated effect of the introduction of the FSP on birth weight in the first generation are very small. So it is not surprising that a very small increase in the prevalence of a condition that is rare to begin with does not appear to have any statistically significant effect in the second generation.

Discussion and Conclusions

Lack of data places severe constraints on our ability to assess the effects of the introduction of many of the programs that were launched as part of the “War on Poverty”. Perhaps the greatest difficulty in the current study is our inability to measure migration. Current Vital Statistics data includes information about the mother’s state of birth (or country of birth if she was born abroad). But even this limited information is not available in the early years of the data. It is also impossible to assess the effects on birth defects known to be affected by nutrition (such as neural tube defects) or pregnancy complications affected by maternal nutrition such as gestational diabetes.

Despite these limitations, we conclude that the introduction of the FSP was associated with increases in the number of births among blacks in the state as a whole, and among whites in L.A. county. The increases in the number of births to teen, first-time mothers were particularly pronounced. Among whites, there is evidence that the FSP was associated with small positive effects on the probability of fetal survival in L.A., though no effect is found in the state as a whole. These increases in fetal survival probabilities are not large enough however, to have much impact on the overall number of births. Among blacks, the FSP was associated with a relatively large decline in the probability that a surviving infant was less than 3,000 grams in L.A., though again, we do not find this effect in the rest of the state.

When we focus on the 2,500 gram cutoff, we find that although the FSP had little overall effect, it increased the probability of low birth weight slightly among infants born to teen, first-time mothers. For blacks in the state as a whole, and for whites in L.A., this is likely due to increases in the number of infants born to mothers likely to have negative birth outcomes. Whether these increases are due to increased fertility among existing residents, or to increased in-migration after the introduction of the FSP is hard to say.

Among whites outside of Los Angeles, we see increases in low birth weight, even though there were no increases in the numbers of births. Taken at face value, this result suggests that the white women giving birth outside Los Angeles became more negatively selected after the introduction of the FSP. It is possible for example, that better educated women were leaving smaller counties either for L.A. or other states, and that the introduction of the FSP attracted other, less well off women to take their places.

The most striking finding of our study is a negative one in that the introduction of the FSP did not have any large, obvious positive effect on birth outcomes, as measured by the incidence of low birth weight. This does not preclude the possibility that the FSP had more subtle positive effects, or that it improved other health outcomes. Our simple analysis highlights the fact that programs like the FSP can have effects on many different margins, such that the overall effect may not be the one that was intended. In the case of the FSP, it is possible that the program did improve the outcomes of infants who would have been conceived in any case. We do for example, find a reduction in the probability that surviving black infants in Los Angeles were less than 3,000 grams at birth. However, these positive effects may have been dominated by increases in fertility and/or migration among women with poorer average birth outcomes.

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U.S. Bureau of Economic Analysis, Regional Information System

Table 1
California Food Stamp Program Entry Date, by County
1969 County Population & Poverty Rate

County	Entry Date	1969 Population	1969 Pov Rate	County	Entry Date	1969 Population	1969 Pov Rate
Humboldt	3/63	98,868	0.132	Riverside	11/69	450,477	0.135
Contra Costa	12/65	546,362	0.077	San Luis Obispo	11/69	102,648	0.145
Los Angeles	12/65	6,989,910	0.108	Yuba	12/69	44,660	0.171
San Francisco	9/66	726,294	0.134	Yolo	6/70	89,817	0.154
Santa Clara	3/67	1,033,442	0.077	Madera	7/70	41,079	0.213
Modoc	4/67	7,261	0.147	Tehama	9/70	29,044	0.133
San Mateo	4/67	552,230	0.056	Santa Barbara	11/70	261,991	0.112
Sonoma	6/67	200,920	0.132	Tulare	7/72	185,701	0.191
Solano	12/67	168,394	0.109	Kern	9/72	325,549	0.160
Lassen	4/68	16,611	0.083	Butte	11/72	101,057	0.168
Shasta	4/68	76,290	0.128	Santa Cruz	12/72	122,243	0.144
Alameda	8/68	1,060,099	0.112	Merced	9/73	101,255	0.170
Monterey	2/69	255,128	0.109	Inyo	4/74	15,417	0.099
Del Norte	3/69	14,224	0.123	San Joaquin	4/74	284,769	0.142
Sacramento	3/69	618,673	0.107	Amador	5/74	11,240	0.100
Marin	4/69	203,506	0.064	El Dorado	5/74	43,168	0.116
Stanislaus	4/69	191,271	0.148	Kings	5/74	65,647	0.184
San Benito	7/69	18,103	0.136	Tuolumne	5/74	21,286	0.114
Imperial	8/69	73,604	0.204	Colusa	6/74	12,334	0.126
Mariposa	8/69	5,868	0.132	Mendocino	6/74	49,733	0.141
Nevada	8/69	25,264	0.129	Ventura	6/74	369,811	0.092
Placer	8/69	75,693	0.116	Alpine	7/74	398	0.111
Siskiyou	8/69	33,022	0.120	Glenn	7/74	17,207	0.131
Calaveras	9/69	13,328	0.116	Lake	7/74	18,799	0.189
Sierra	9/69	2,387	0.144	Napa	7/74	76,688	0.094
Fresno	10/69	408,304	0.188	Plumas	7/74	11,637	0.114
Mono	10/69	3,780	0.144	San Bernardino	7/74	671,688	0.119
Orange	10/69	1,376,796	0.066	San Diego	7/74	1,340,989	0.101
Trinity	10/69	7,261	0.134	Sutter	7/74	41,775	0.111

Table 2: Sample Means

1. 1960-1974 Individual Level Data	**All Parities White**	**All Parities Black**	**1st births White**	**1st births Black**	**Teen White**	**Teen Black**	**Teen 1st birth White**	**Teen 1st Birth Black**
% Low Birthweight	0.062	0.121	0.061	0.121	0.072	0.134	0.066	0.126
% exposed to Food Stamps	0.339	0.458	0.39	0.543	0.329	0.507	0.345	0.539
Mean Expenditure on FS	10.7	18.05	12.38	22.17	10.39	20.27	10.82	21.9
in county if exposed ($1,000)	[27.23]	[34.40]	[29.00]	[37.30]	[27.01]	[36.09]	[27.44]	[37.21]
Mean Participation in FS	70.43	118.41	80.92	142.85	68.58	132.06	71.42	141.59
in county if exposed (1,000)	[158.92]	[197.34]	[168.47]	[211.47]	[157.61]	[205.68]	[160.17]	[211.13]
# Observations	4421791	442882	1579079	152907	681959	114630	526210	80181

Note: Standard deviations in brackets.

Table 3: Effects of Food Stamps on Number of Births, 1960-1974

1. Food Stamp Dummy	**White All Parity**	**White 1st Births**	**White Teen Mom**	**White Teen 1st Birth**	**Black All Parity**	**Black 1st Births**	**Black Teen Mom**	**Black Teen 1st Birth**
Food Stamp Variable	30.54	137.77	48.552	169.886	16.62	25.50	42.330	85.568
	[20.20]	[25.71]	[15.473]	[44.505]	[3.50]	[4.41]	[6.426]	[13.810]
Coeff/Cell Size	0.03	0.13	0.069	0.104	0.12	0.09	0.246	0.235
# Observations	38475	12825	7695	2565	38475	12825	7695	2565
R-squared	0.744	0.984	0.673	0.9934	0.664	0.951	0.663	0.9903
2. Log Food Stamp Expenditures								
Food Stamp Variable	5.31	20.72	6.618	23.141	2.20	3.74	5.869	12.206
	[3.20]	[4.04]	[2.434]	[7.036]	[0.548]	[0.699]	[1.015]	[2.178]
Coeff/Cell Size	0.01	0.02	0.0095	0.014	0.02	0.01	0.034	0.033
# Observations	35820	11940	7164	2388	35820	11940	7164	2388
R-squared	0.744	0.985	0.672	0.9938	0.664	0.956	0.664	0.9903
3. Log Food Stamp Participation								
Food Stamp Variable	3.70	15.47	5.133	17.961	1.70	2.81	4.532	9.350
	[2.37]	[2.94]	[1.793]	[5.173]	[0.398]	[0.505]	[0.731]	[1.584]
Coeff/Cell Size	0.00	0.02	0.007	0.011	0.01	0.01	0.026	0.026
# Observations	36225	12075	7245	2415	36225	12075	7245	2415
R-squared	0.744	0.985	0.672	0.9938	0.664	0.956	0.664	0.9905
Cell Size	940.77	1032.05	699.48	1628.5	134.29	280.68	171.5	362.98
4. Food Stamp Dummy - LA not included								
Food Stamp Variable	-2.79	1.94	-5.13	-12.877	1.500	2.74	2.04	6.05
	[2.53]	[3.56]	[2.51]	[6.78]	[.388]	[.794]	[1.14]	[2.89]
Coeff/Cell Size	0.012	0.008	0.03	0.032	0.081	0.136	0.082	0.114
# Observations	37800	12600	7560	2520	37800	12600	7560	2520
R-squared	0.655	0.966	0.746	0.987	0.632	0.945	0.648	0.967
Cell Size	229	255.51	172.33	407.93	18.59	20.14	24.97	53.06

Notes: Standard errors in brackets. Regressions are weighted by county population.
Dep. Var. is number of births in each county/year/race/maternal age/third of the year/parity cell. There are five maternal age categories: 14-19, 20-25, 26-30, 31-35, 36-40 and 3 parity categories: 1, 2, and 3 or more. Regressions include log population, county time trends, county*mother age group effects, and parity. Standard errors are clustered at the county*year*third of the year level.

Table 4: Change in Distribution of Birth Weights in Los Angeles County From One Year Before Implementation of Food Stamps to One Year Afterwards.
(Coefficients and standard errors multiplied by 100).

Effect of Food Stamps on:	**All White**	**All Black**	**1st Birth White**	**1st Birth Black**	**Teen White**	**Teen Black**	**Teen 1st Birth White**	**Teen 1st Birth Black**
1. P(Birthweight < 2000 grams)	0.145	0.396	0.027	-0.355	0.274	0.592	0.328	-0.211
	[.064]	[.383]	[.119]	[.678]	[.110]	[.928]	[.102]	[.938]
2. P(Birthweight < 2500 grams)	0.217	0.366	-0.101	-0.01	0.296	0.254	0.22	0.254
	[.122]	[.420]	[.172]	[1.01]	[.239]	[1.47]	[.170]	[1.80]
3. P(Birthweight < 3000 grams)	0.402	-0.863	0.087	-2.93	0.852	-4.12	1.44	-4.95
	[.234]	[.649]	[.313]	[2.14]	[.705]	[1.69]	[.652]	[2.76]
# Obs.	204887	32716	74882	10840	31938	8379	25004	5696

Notes: Standard errors in brackets. Regressions are linear probability models estimated using LA births from one year before and one year after the introduction of Food Stamps. The reported coefficient is that on a dummy variable indicating that Food Stamps have been introduced nine months prior to the index child's birth. Regressions include controls for child's gender, parity, and mother's age.

Table 5: Effects of Food Stamps on Incidence of Low Birth Weight, 1960-1974
(Coefficient and standard errors multiplied by 100)

Food Stamp variable is: Race:	Dummy White	Dummy Black	Log(Exp) White	Log(Exp) Black	Log(Part) White	Log(Part) Black
1. All						
Food Stamp variable	-0.014	0.471	-0.005	0.055	-0.002	0.043
	[0.050]	[0.247]	[0.006]	[.034]	[0.005]	[.025]
# Observations	4421132	442795	4415787	442769	4411467	442638
R-squared	0.002	0.004	0.002	0.004	0.002	0.004
2. 1st births						
Food Stamp variable	0.062	0.261	0.003	0.065	0.002	0.049
	[.080]	[.365]	[0.010]	[.052]	[0.008]	[.037]
Obs.	1579079	152907	1577419	152901	1575425	1532854
R-squared	0.002	0.005	0.002	0.005	0.002	0.005
3. Teen Mothers						
Food Stamp variable	0.268	0.175	0.028	0.034	0.023	0.032
	[.111]	[.467]	[.013]	[.051]	[.010]	[.040]
Obs.	681891	114607	680928	114601	680207	114560
R-squared	0.002	0.005	0.002	0.005	0.002	0.005
4. Teen Mothers, 1st births						
Food Stamp variable	0.285	0.577	0.036	0.108	0.029	0.082
	[.116]	[.435]	[.014]	[.052]	[.011]	[.040]
Obs.	527529	80185	526884	80181	526210	80154
R-squared	0.004	0.003	0.004	0.003	0.004	0.003
5. All Counties but LA - Teen Mothers, 1st births						
Food Stamp variable	0.254	0.633	0.033	0.142	0.03	0.108
	[.153]	[.578]	[.018]	[.073]	[.015]	[.056]
Obs.	356416	39712	355711	39708	355037	39681
R-squared	0.0004	0.004	0.0004	0.004	0.0004	0.004
6. All Counties - Teen Mothers, 1st births, P(less than 2000 grams)						
Food Stamp variable	0.102	-0.019	0.008	0.017	0.007	0.017
	[.072]	[.268]	[.009]	[.035]	[.007]	[.027]
Obs.	527289	80185	526884	80191	526210	80154
R-squared	0.0003	0.0008	0.0003	0.0008	0.0003	0.0008
7. All Counties - Teen Mothers, 1st births, P(less than 3000 grams)						
Food Stamp variable	0.166	0.215	0.05	0.039	0.032	0.029
	[.238]	[.740]	[.029]	[.092]	[.022]	[.072]
Obs.	527529	80185	526884	80181	526210	80154
R-squared	0.005	0.011	0.005	0.011	0.005	0.011

Notes: Standard errors in brackets. Standard errors are clustered at the county-year level.
All regressions include dummy variables for: parity, gender, county time trends, county*
mother age group effects, and the log of county population.

Figure 1
California Food Stamp Participation and Expenditure Levels, 1963-1974

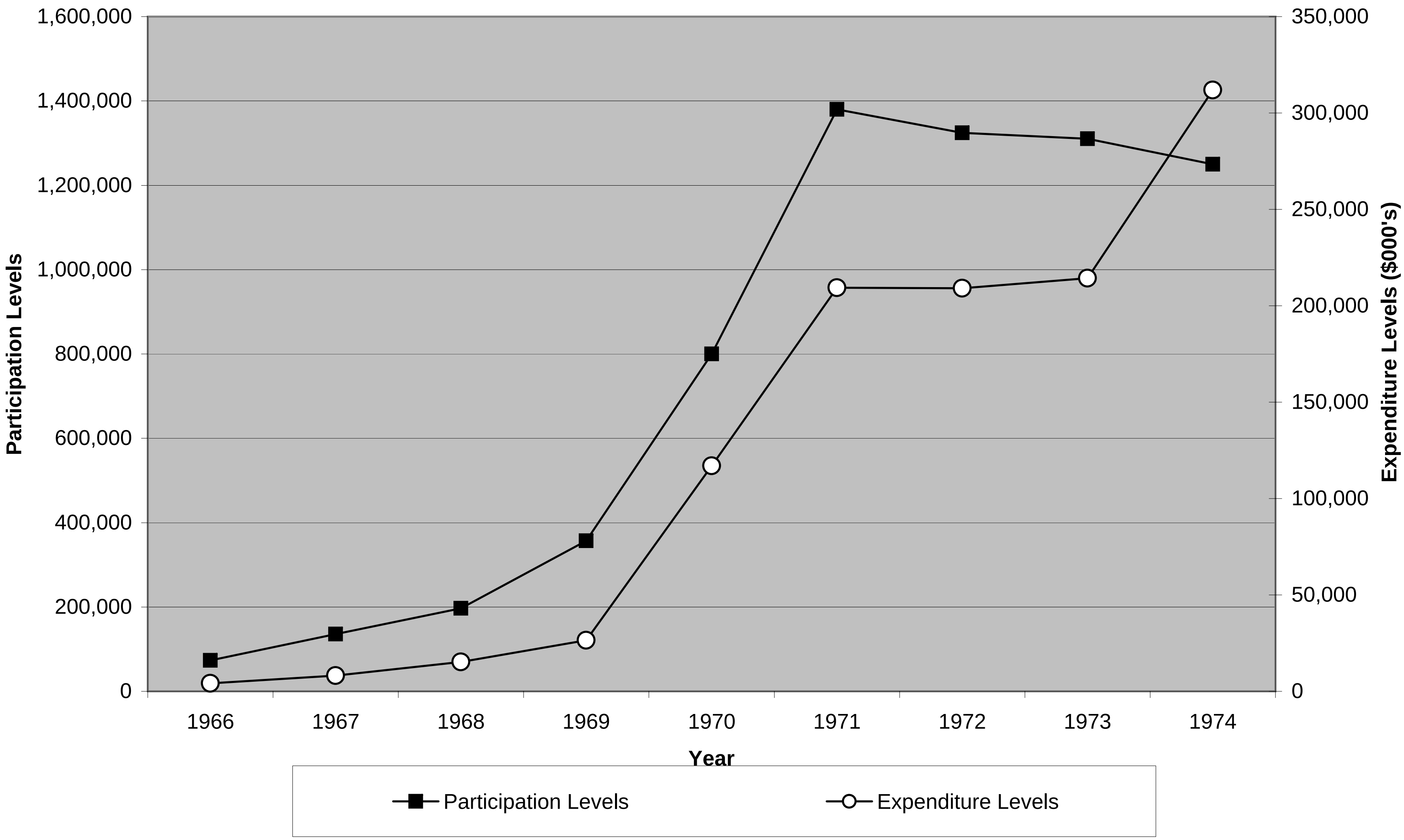

Figure 2A
Food Stamp Program Participation, 1963-1974
Selected Large California Counties

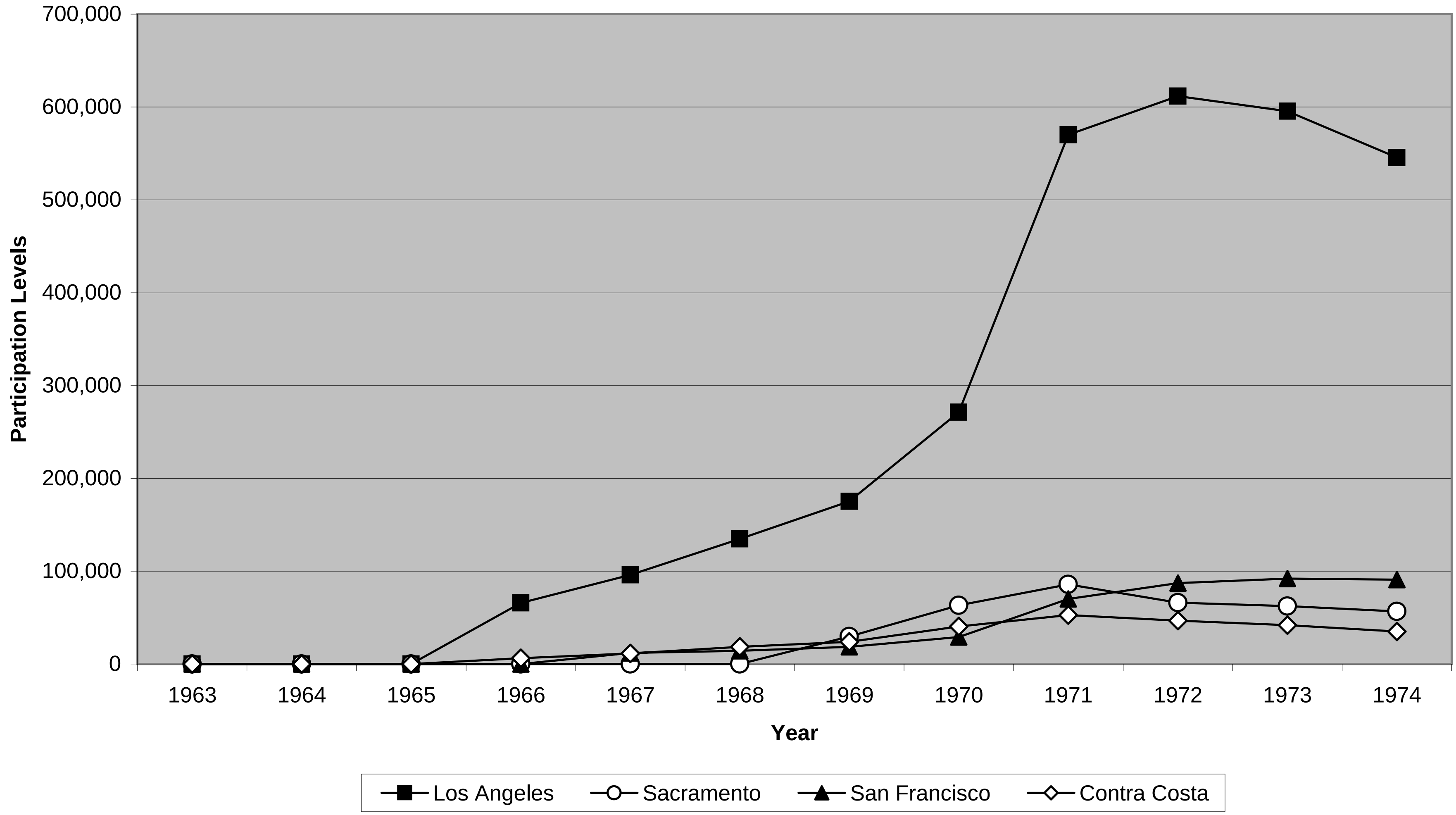

Figure 2B
Food Stamp Program Participation, 1963-1974
Ratio of Participation Levels to County Population
Selected Large California Counties

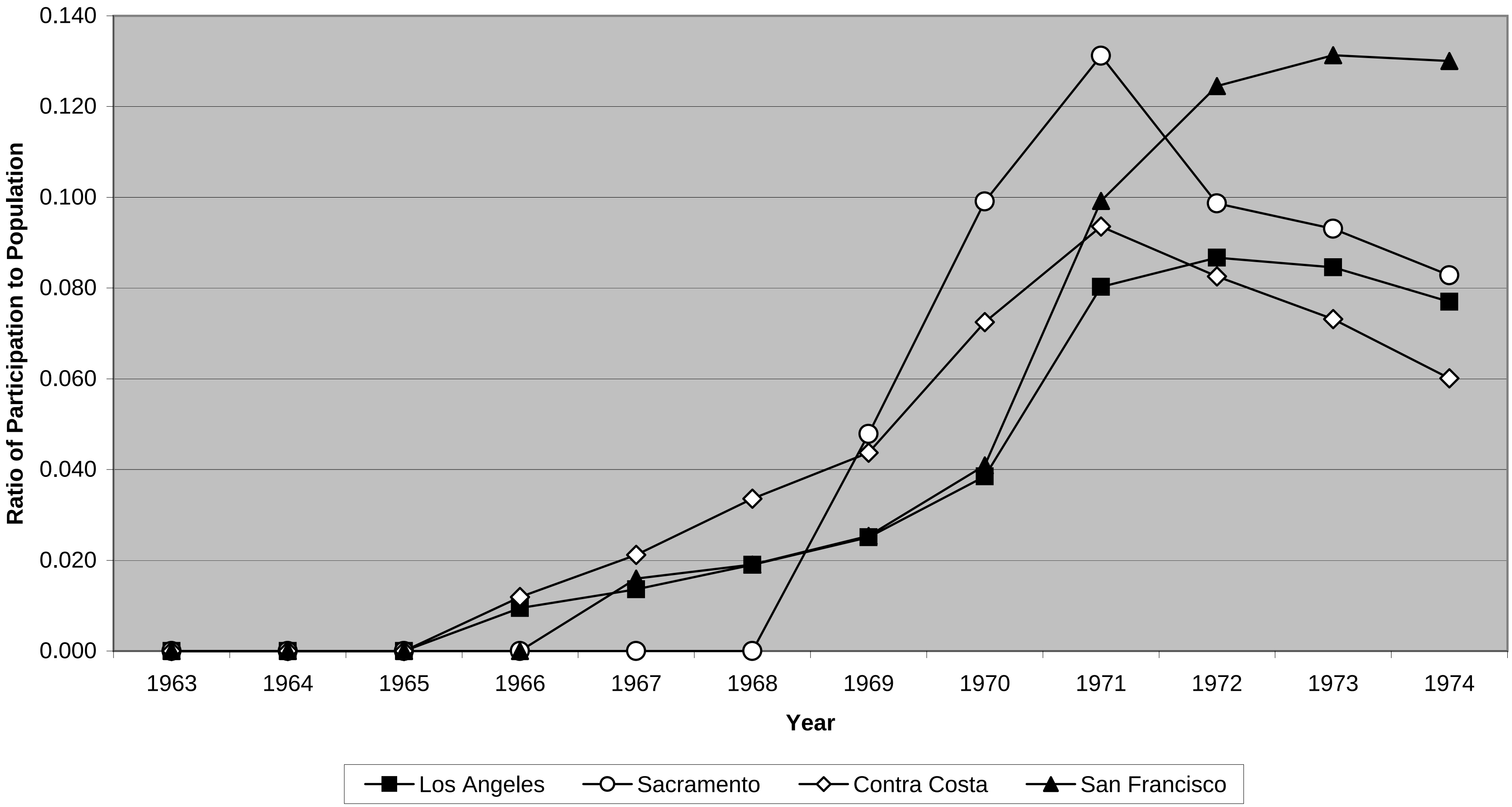

Figure 3
Food Stamp Program Expenditures, 1963-1974
Selected Large California Counties

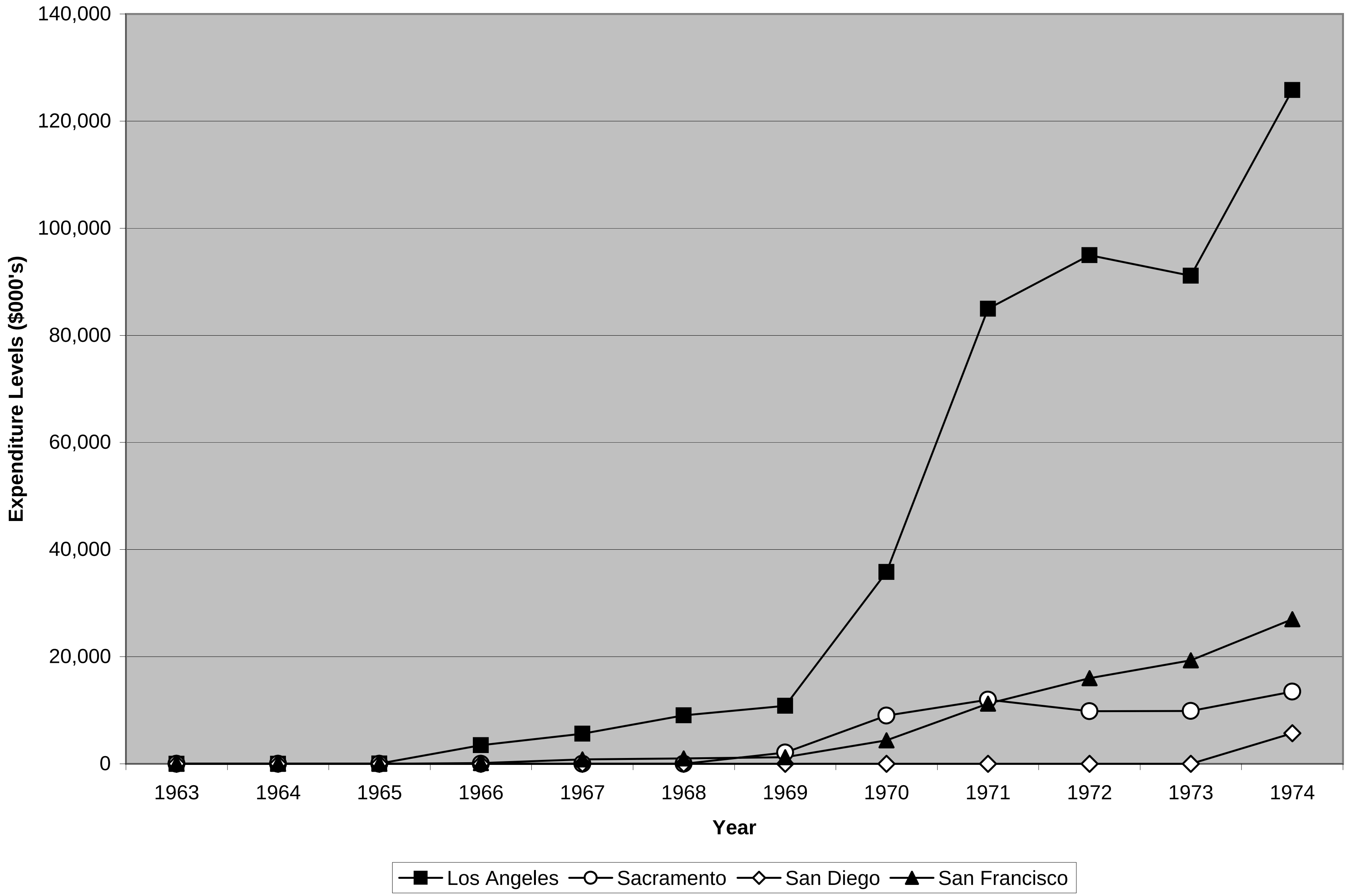

Figure 4
Rates of Low Birthweight and Median Birthweight by Race, 1960-1974

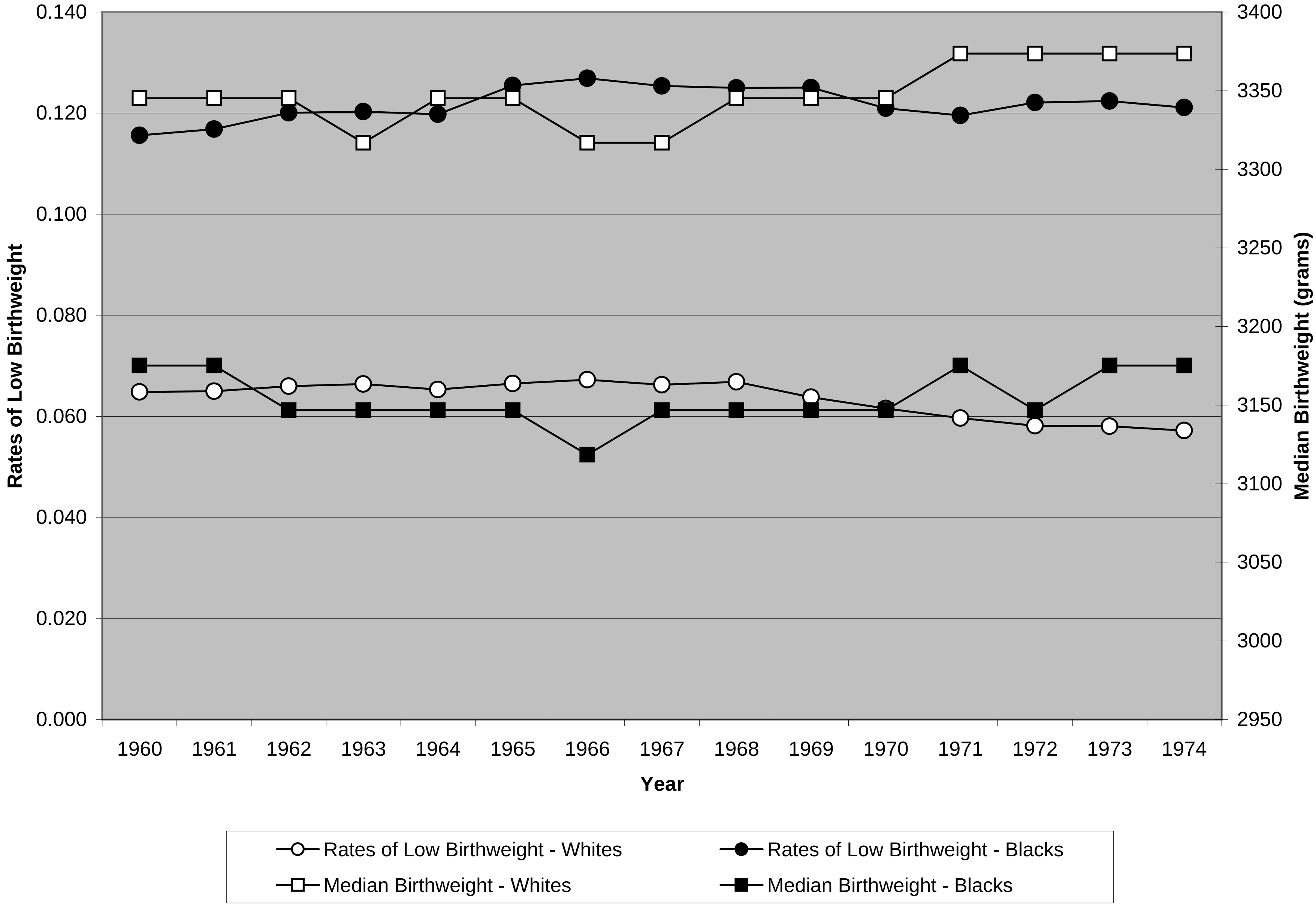

Figure 5A
Rates of Low Birthweight by Race, 1960-1974
Selected Large California Counties

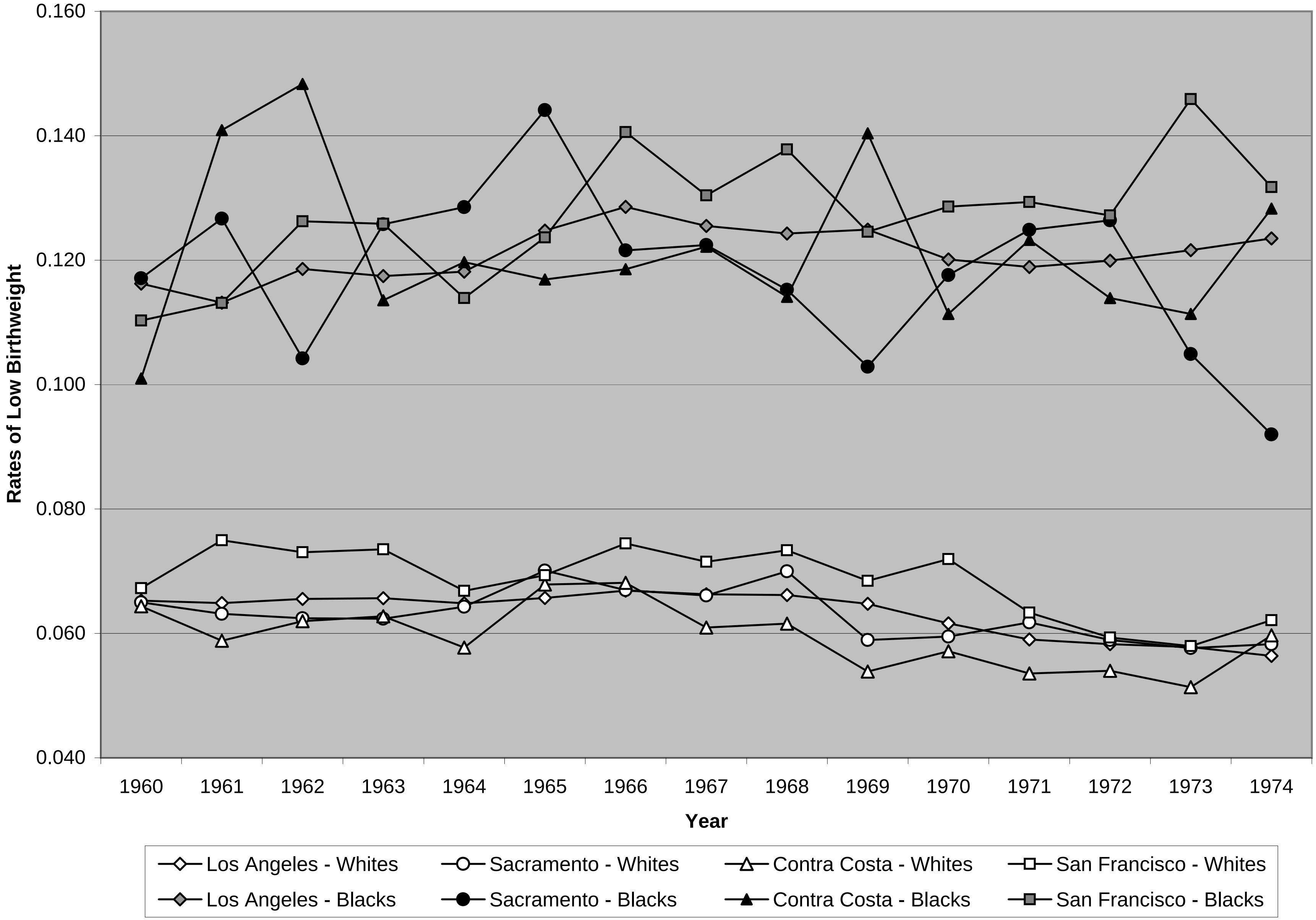

Figure 5B
Median Birthweight (in Grams), 1960-1974
Selected Large California Counties