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# **Sweetening the Pot: How American Sugar Buys Protection**

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**Abstract** — Sugar growers have been capturing substantial rents from the U.S. sugar program. Despite well-documented huge welfare losses of this program, legislators have always voted against phasing it out. This paper uses Tobit analysis to explore the determinants of campaign contributions from the sugar industry to Senators from 1989 to 2002. It finds that the *power* and *willingness* of the Senators to protect influence the campaign contributions significantly: Membership on the Senate Agriculture, Nutrition and Forestry Committee attracts \$4,266 of sugar contributions per two-year election cycle. The membership on the relevant subcommittee that deals with sugar legislation is even more important than membership of the agriculture committee: membership on the Agricultural Production, Marketing, and Stabilization of Prices Subcommittee is worth an additional \$6,445. These results suggest the strength of the subcommittee in drafting specialized legislation and attracting interested members. Moreover, while the particular party affiliation does not make any difference, membership in the majority party is worth \$1,235. Finally, an impressionable freshman Senator from a sugar cane state receives \$8,366 more than a more senior senator from a non-sugar state.

**Key Words** — Sugar Industry, Lobbying, Trade Protectionism

**JEL Classification** — F13

# Sweetening the Pot: How American Sugar Buys Protection <sup>1</sup>

## 1. INTRODUCTION

*“Kraft Foods is moving Life Savers production and its 600 jobs, to Canada. One reason: Sugar is cheaper there. Unlike the U.S. government, Canada doesn’t prop up prices to protect a handful of domestic sugar growers.”*

*USA Today, 2002*

*“When economics collide with politics in the halls of Congress, politics usually wins.”*

*Smith, 2002*

The U.S. sugar program is a case in point to show that indeed trade policies redistribute domestic wealth, in particular what happens when the beneficiary of a protectionist policy is a small and concentrated group and the losers are large and widely disbursed all over the country. Sugar growers have been capturing rents from tariffs and quotas since the 1790s. Taussig (1931) described sugar protection in his *Tariff History of the United States*. The U.S. General Accounting Office (2002) estimated that the sugar program cost consumers about \$1.5 billion in 1996 and about \$1.9 billion in 1998. As Groombridge (2001, p. 1) has written: “nowhere is there a larger gap between the U.S. government’s free trade rhetoric and its protectionist practices than in the sugar program.”

A number of researchers have examined the U.S. sugar program. See, for instance, Harper and Aldrich (1991), Borrell and Pearce (1999), Lopez (2001), and the articles in Marks and Maskus (1993).

In this paper, after briefly describing the U.S. sugar program and reporting on its welfare consequences, we focus on an overlooked aspect of it: The institution of rent seeking, in particular how the sugar industry—an interest group—picks legislators to

support with campaign contributions. We examine sugar industry contributions to the reelection campaigns of U.S. Senators for the last 14 years, from 1989 to 2002. During this period of time, as part of three consecutive Farm Bills, those in 1991, 1996 and 2001, both Houses voted against phasing out price supports for sugar, and they extended the federal sugar program. We attempt to shed light on the relationship between sugar industry contributions and incumbent Senators' attributes. In particular, we analyze the premium attached to *power* and *willingness* of Senators to maintain protectionist sugar policies, and consequently to supply the rent collected by sugar producers. Our analysis shows that there is a systematic targeting by sugar industry in the allocation of the contributions among the incumbent Senators. Membership in the majority party, membership in the Senate Agriculture, Nutrition and Forestry Committee, and membership in the Senate Agricultural Production, Marketing, and Stabilization of Prices Subcommittee (which oversees the sugar program) all attract money.

## 2. THE U.S. SUGAR PROGRAM

The Coalition for Sugar Reform provides a succinct description of the U.S. sugar program:

The Federal Government has operated the current price support program since 1981 to subsidize sugar beet and sugarcane producers and processors by maintaining high sugar prices. The government supports the price by restricting the supply of sugar made available to consumers. It does so by limiting imports. There are no restrictions on domestic sugar production or marketing. [There are two main components of the program: Price support loans and import restrictions.]

### **Price Support Loans**

Under the program, the Government makes loans available to sugar beet and sugarcane processors. Sugar loans are unique in that they are made to processors (corporations or cooperatives) rather than to individual farmers, as under other farm programs. In order to be eligible for a loan, the processor must pay the producer a Government-specified minimum price for sugar beets or sugarcane. Processors pledge the sugar as collateral to obtain a so-called "non-recourse" loan from the Government. ... When the loan matures, the processor must decide whether he will make more money by (1) paying off the loan, plus interest, and redeeming the

pledged sugar; or (2) forfeiting the sugar and keeping the Government's money. ... (T)o avoid loan forfeitures ... [the U.S. Department of Agriculture] restricts imports to maintain the ... price of sugar high enough so that processors will have an incentive to redeem every pound of sugar placed on loan.

### **Import Restrictions**

As mentioned earlier, the Government supports the price of sugar by restricting imports. It is able to do so because sugar is a deficit crop -- we consume more than we produce. Every quota year (October/September) USDA establishes an overall Tariff Rate Quota (TRQ) for sugar, which is prorated among some forty nations by the U.S. Trade Representative on the basis of import history during the period 1975/81. If during the course of the year more sugar is needed, the quota can be increased. If a nation cannot fill its quota, a deficit can be declared and reassigned to other quota holding nations. ... Sugar can enter in excess of the TRQ, but the importer would have to pay a duty of around 16 cents a pound, which normally would make it unprofitable.

## **3. CONSEQUENCES OF THE PROGRAM**

*“The Agriculture Committee is writing a new farm bill, and we cannot afford to have the sugar lobby write the sugar policy. Until the Sugar Subsidy Program is phased out, costumers will pay more for products containing sugar. Taxpayers will continue to pay more to buy surplus sugar. Workers in the candy and the cane refining industry will continue to lose their jobs. The sugar program will continue to benefit a few, without solving the problems of family farmers. We must insist on real reform in the sugar program, and end the regulations that are costing Americans money and American jobs.”*

*Congressman W. O. Lipinski, 2001*

The gap is wide between U.S. and world sugar prices. As Figure 1 (drawn from Table 1 of Appendix I of USGAO, 2002) shows, in 1998 the U.S. raw sugar price was more than double the world price. Between 1985 and 1998, on average the U.S. raw sugar price was 3.2 times the world raw sugar price.

**Welfare Implications:** The U.S. General Accounting Office (2002) recently examined the U.S. sugar program. We quote their statement of their major findings.

### **Increases Users' Costs**

We estimate that the sugar program cost domestic sweetener users about \$1.5 billion in 1996 and about \$1.9 billion in 1998. Sweetener users included (1) sugarcane refiners that bought raw cane sugar, (2) food manufacturers that bought refined sugar and other sweeteners, and (3) final consumers who bought sweeteners and sweetener-containing products. ...

### **Benefits for Producers**

The primary beneficiaries of the sugar program's higher prices are domestic sugar beet and sugarcane producers who, we estimate, received benefits of about \$800 million in 1996 and about

\$1 billion in 1998. About 70 percent of the benefits went to sugar beet growers and processors. Sugarcane producers received about 30 percent of the benefits.

HFCS [High Fructose Corn Sweetener] producers received little, if any, benefit from the sugar program in either 1996 or 1998, according to our current model's estimates. This result contrasts with our finding in 1993. At that time, HFCS cost a few cents per pound less than domestic sugar, and both products cost about twice as much as sugar on the world market. ...[T]he possibilities for substitution between sugar and HFCS are more limited than in prior years because technological advances have improved HFCS products and created more specialized sweetener markets. As a result, even if the sugar program were removed and the price of domestic sugar fell substantially, the impact on the price of HFCS would be limited. ... Executives from the Corn Refiners' Association, which represents HFCS manufacturers, agreed with our model's results as they pertained to HFCS, stating that HFCS producers do not benefit from the sugar program because domestic HFCS prices are no longer linked to sugar prices.

### **Net Effect**

We estimate that the sugar program resulted in net losses to the U.S. economy of about \$700 million in 1996 and about \$900 million in 1998. Our net loss estimates include economic inefficiencies and transfers to foreign producers. Economic inefficiencies occurred, for example, when the sugar program's artificially high domestic prices encouraged farmers to grow sugar beets instead of another crop, such as wheat, that, without the sugar program, might have been relatively more profitable. Inefficiencies also occurred when artificially high sugar prices discouraged consumers from purchasing sugar. The cost of these inefficiencies totaled about \$300 million in 1996 and about \$500 million in 1998. Transfers from the U.S. economy to foreign producers occurred because foreign producers received artificially high prices for the raw sugar they exported to the United States. We estimate that these transfers amounted to about \$400 million in both 1996 and 1998.

## **4. SUGAR INTEREST GROUPS' CONTRIBUTIONS**

*"The industry makes so much money through federal price supports that it can afford to spend a lot to win political influence in Washington ... Just plain and simple, it's money to a small group of growers. When you are getting that kind of money, you can work hard to preserve it. What they are doing is protecting money, protecting wealth, and protecting higher incomes."*

*A Capitol Hill Sugar Expert, 1998*

Despite its relatively small size, the U.S. sugar growing industry (henceforth sugar) is one of Congress' main campaign contributors. On average, from 1989 to 2002, sugar contributed \$3,090,710 in each election cycle, i.e., \$1,545,355 annually, to incumbents in their campaigns.<sup>2</sup> Table 1 summarizes the total sugar contributions for the last seven congresses, i.e., The 101<sup>st</sup>—107<sup>th</sup> Congresses. In addition to the total contributions, this table gives the type of contributions, i.e., individual, PACs, and Soft Money. It also

shows how the total contributions were allocated between two parties. An examination of the aggregate sugar campaign contributions since 1989 reveals interesting patterns.

First, clearly, soft money has become more important. This is an interesting pattern because “soft money” contributions are not subject to the limits and regulations of federal election laws. Soft money contributions are described as the main vehicle for wealthy individuals, corporations, and labor unions to deliver millions of dollars to political parties without regard for the limits and other requirements of the law (Center for Responsive Politics, 1998). Sugar has utilized this vehicle intensively. Second, incumbent representatives from the Democratic Party have received 57% of the contributions to incumbents.

However, as is presented in Figure 2, whether the party is majority or not also played a role. Our regression analysis shows that, 52% of contributions were allocated to the Democratic Party, 36% to the Republican Party, and the remaining 13% to the majority party, which is either the Democratic or Republican party. In other words, sugar does take into account the *potential influence (power)* of an incumbent in allocating its contributions.

There is a substantial literature in the political science and public choice areas on campaign contributions and how interest groups allocate the contributions among legislators, (e.g., Munger, 1989; Grier, Munger and Torrent, 1990). In the next section, we adopt a model, which is built on the premise that the size of contributions for reelection depends on a legislator’s characteristics. In particular, in the next section, we explore the relationship between campaign contributions and the incumbent Senators’ party affiliation, state, seniority, relevant committee and subcommittee memberships.

## 5. DETERMINANTS OF SUGAR'S CAMPAIGN CONTRIBUTIONS

In this section we check the association between campaign contributions and different characteristics of an incumbent Senator. We are effectively testing the validity of four prior assertions, which were developed by reviewing the literature on campaign contributions by interest groups to incumbent Senators.

First, we examine the relationship between campaign contributions and party affiliation. To capture both Senators' *power* and *willingness* to provide what sugar interests want, we conduct two sets of analyses. We examine the contributions to Democratic and Republican Senators. As is presented in Table 2, incumbent Senators affiliated with the Democratic Party received 43% more than incumbent Republican Senators. We take this as an indicator of the premium attached to the 'ideology or reputation for particular policy belief,' e.g., Democrats are protectionist and Republicans support market solutions. We also examine the contributions to incumbent Senators according to their membership in the Majority party: Incumbent Senators who were members of the majority party received 40% more than incumbent Senators in the minority party. We interpret this as an indicator of the premium collected for the 'institutional power or productivity,' of the Senator due to his party affiliation.

Second, we explore the relationship between campaign contributions and the state a Senator represents. We hypothesize that the Senators who have a large presence of sugar producers in their states receive larger campaign contributions than the other Senators, because it is easier to get them to vote on behalf of sugar, i.e. they are more willing. In particular, we check to see if there is a difference between Senators from the four Sugar Cane States—Florida, Hawaii, Louisiana, and Texas, and Senators with no sugar industry

among their constituency; and whether there is a difference between Senators from the eleven Sugar Beet States—California, Colorado, Idaho, Michigan, Minnesota, Montana, Nevada, North Dakota, Oregon, Washington, and Wyoming, and Senators with no sugar industry among their constituency. As Table 2 shows, Senators from Sugar Cane States receive 124% more, and Senators from Sugar Beet States receive 92% more than the Senators with no sugar industry within their constituency.

Third, we assess the relationship between campaign contributions and seniority in the Senate. Seniority could be seen as a proxy for electoral security and also procedural expertise and collegial respect. There is empirical evidence that freshmen Senators are perceived overall as being less secure and they usually receive more than the others (Endersby and Munger, 1992; Grier, Munger, and Roberts, 1986; and Grier and Munger, 1993). Sugar gives almost 50% more money per capita and more frequently to Freshman Senators than the others.

Finally and fourth, we explore the relationship between committee and also subcommittee memberships and campaign contributions. “Each committee has significant power to veto, or at a minimum delay substantially, legislation within its jurisdiction, to an extent determined by specific rules of the Senate, particularly when committee control over the conference stage of bills is taken into account. Committees therefore have both agenda and proposal control denied to nonmembers. Further, even after a bill is passed and is being administered or regulated by the bureaucracy, the committee with oversight jurisdiction has substantial power to influence the administrative agency through hearings, agency appointments, and appropriations.”



(Grier and Munger, 1993: p. 619). In particular, we focus on the Agriculture, Nutrition and Forestry Committee and the Production and Price Competitiveness Subcommittees.

“The Senate Committee on Agriculture, Nutrition, and Forestry has helped establish, guide, and examine agricultural policies here and abroad. It has had a hand in fashioning the research and teaching of the 1860s, the price and income support controls of the 1930s, and the international trade of the 1990s.” (U.S. Government Printing Office, 1998, p.2.) In particular, as part of the Farm Bill, every five years, the committee revisits the sugar price-support program. As a result of the division of labor within the committee the sugar price-support program is in the responsibility area of the Production and Price Competitiveness Subcommittee.<sup>3</sup> As Table 2 presents, the committee members receive 177 % more; and subcommittee members receive 201 % more than non-committee members.

These preliminary cross-tabulations provide supporting evidence on all four of our prior assertions. Clearly, sugar knows what it is doing: Make the most out of the money contributed by a systematic targeting according to Senators’ *power* and *willingness* to provide what the sugar wants.

To focus on and magnify this pattern, we further divide our sample into groups. As Figure 3 shows, sugar targets the *powerful*: A non-committee member minority party Senator receives only \$3,329 from sugar; a Senator from the majority party who is also a member of the subcommittee receives 4.06 times as much, i.e., \$13,530 in an election cycle. Figure 4 summarizes another salient feature of targeting by the sugar industry, namely targeting *willing* incumbent Senators: Contribute more to both the incumbent Senators from a Sugar Cane State and to freshmen Senators. For instance, an incumbent

freshmen Senator from a Sugar Cane State receives \$24,009. On the other hand, an incumbent Senator who is neither a freshman nor from a sugar state receives only \$3,567.

The analysis in this section shows that indeed, Senators' attributes matter—they impact the contributions from sugar industry to the reelection campaigns of the incumbent Senators. However, it doesn't answer the following critical questions: How much does each one of these attributes impact campaign contributions? In other words, what is the marginal impact of different attributes on campaign contributions?

Accordingly, the next section represents an attempt to move beyond this section's finding that attributes of Senator matter, and to open up consideration of partial effects of different attributes. In other words, we examine the effect of attributes, holding other attributes constant. First, we examine the partial impact of Senators' attributes on the probability of receiving contributions from sugar industry. Second, we examine the partial impact of Senators' attributes on the amount of contributions received from the sugar industry.

## 6. MARGINAL EFFECTS OF DIFFERENT ATTRIBUTES ON THE PROBABILITY OF GETTING MONEY AND THE AMOUNT OF MONEY RECEIVED BY INCUMBENT SENATORS

First, we ask the simple question: How do different attributes affect the probability of getting contributions from sugar? To answer this question we estimate a probit model.

An incumbent Senator either receives contributions ( $C=1$ ) or does not ( $C=0$ ) in an election cycle.<sup>4</sup> As is argued in the previous section, we believe that each Senator is unique and possesses a certain combination of attributes. We believe that a set of attributes, such as PARTY, FRESHMAN, SUGAR CANE STATE, SUGAR BEET

STATE, COMMITTEE, and SUBCOMMITTEE, gathered in a vector  $\mathbf{x}$  explain the decision of the sugar industry whether to contribute, so that

$$Pr ob (C = 1) = F(x, \beta),$$

$$Pr ob (C = 0) = 1 - F(x, \beta),$$

where the set of parameters  $\beta$  reflects the impact of  $\mathbf{x}$  on the probability.<sup>5</sup>

Briefly, REPUBLICAN is dummy variable, which takes on the value of 1 for a Republican and the value of 0 for others. The variable, MAJORITY PARTY, is also a dummy variable, which takes the value of 1 for a Senator who is a member of the majority party during the election cycle and the value of 0 for the others.<sup>6</sup> FRESHMAN dummy takes on the value of 1 for a Senator who is in her first term. SUGAR CANE STATE dummy takes the value of 1 for Senators who are from four states with significant sugar cane production. These states are Florida, Hawaii, Louisiana, and Texas. Similarly, SUGAR BEET STATE dummy variable takes the value of 1 for Senators who are representing eleven states with a significant sugar beet production. These states are California, Colorado, Idaho, Michigan, Minnesota, Montana, Nevada, North Dakota, Oregon, Washington, and Wyoming. Finally, the vector  $\mathbf{x}$  includes two Committee membership dummy variables: AGR. COMMITTEE dummy takes the value of 1 for Senators who are members of the Senate Agriculture, Nutrition and Forestry Committee, and 0 otherwise; and PR. SUBCOMMITTEE dummy takes the value of 1 for Senators who are members of the Senate Agriculture, Nutrition and Forestry Committee and serve on the Agricultural Production, Marketing, and Stabilization of Prices Subcommittee.

Table 3 presents the estimated coefficients and marginal effects for the probit model.<sup>7</sup> The model predicts that changing party affiliation from Republican to Democratic increases the probability of getting contributions from sugar by 5 percentage points; being a member of the majority party increases the probability of getting contributions by 4 percentage points; a freshman has a 17 percentage points higher probability of getting money for her reelection campaign from sugar; A Senator from a sugar beet state has a 20, and a Senator from a sugar cane state has a 33 percentage points higher probability of getting contributions; Finally, in their reelection campaigns members of the Senate Agriculture, Nutrition and Forestry Committee have a 17 percentage points higher probability of getting money. If a member of this committee is also a member of the Agricultural Production, Marketing, and Stabilization of Prices Subcommittee, the probability of getting sugar money goes up by another 19 percentage points.<sup>8</sup>

Although the findings of these estimation results are revealing, they do not tell the whole story: First, the contributions show variations within a wide range. Although the mean and median are \$10,516 and \$7,229, respectively, the maximum and the minimum amounts of contributions are \$68,793 and \$129, respectively. (The standard deviation is \$3,441.)

Those who don't receive money cannot be put into the same category as those who do: Even if the sugar interest hates an incumbent Senator, and it would like to punish him by taking money out of his campaign (or contributing negative dollars to his reelection campaign), this is not possible. To deal with this issue, while estimating the

impact of different attributes of incumbent Senators on the amount of money they receive from sugar, we propose the following Tobit model:

We follow the convention and assume that there is a latent variable  $C^*$ , desired contribution, which could be negative, and it is linearly related to the attributes of Senators, and that  $C$  is only observed when  $C^*$  is positive (because actual contributions must be non-negative).<sup>9</sup> In other words, if the desired contribution is negative, we only observe a zero contribution. Accordingly,

$$C^* = x\beta + \varepsilon,$$

and

$$C = C^*, \text{ if } x\beta + \varepsilon > 0;$$
$$C = 0, \text{ otherwise.}$$

Table 4 presents the estimated coefficients and marginal effects for the Tobit model. The model predicts that a Republican Senator gets only \$9 less than a Democratic Senator. In other words, party affiliation does not make an important difference.<sup>10</sup> However, if a Senator is a member of the majority party, the sugar industry contributes \$1,235 more than for a minority party member. An impressionable Freshman Senator gets significantly more: A Freshman Senator receives an additional \$2,181 from sugar. A Senator from a sugar beet state receives an additional \$2,982, and a Senator from a sugar cane state gets an extra \$5,187 in campaign contributions. Finally, per two-year election cycle, a member of the Senate Agriculture, Nutrition and Forestry Committee gets \$4,266 more than a Senator who is not a committee member. If a member of this committee is also a member of the Agricultural Production, Marketing, and Stabilization of Prices Subcommittee that translates into additional \$2,179 of sugar money. In other

words, membership in the Subcommittee reaps an additional \$6,445 contribution (compared to a Senator who is not a member of the Agriculture Committee).

## 7. CONCLUDING REMARKS

It is revealing to examine the systematic way contributions from the sugar industry are directed to the reelection campaigns of incumbent Senators. It explains the longevity of the U.S. sugar program despite its huge welfare losses. It is not a surprise to see how Sugar growers have been capturing substantial rents from tariffs and quotas. A close examination of the determinants of campaign contributions to Senators from the sugar industry from 1989 to 2002 reveals interesting points. We find that the *power* and *willingness* of the Senators to support sugar influence the campaign contributions significantly: The membership on the relevant subcommittee that deals with sugar legislation is more important than membership on the agriculture committee.

Membership on the Senate Agriculture, Nutrition and Forestry Committee attracts \$4,266 of sugar contributions per election cycle, but membership on the Agricultural Production, Marketing, and Stabilization of Prices Subcommittee is worth \$7,445. These results suggest the strength of subcommittees in drafting specialized legislation and attracting interested members. Moreover, Tobit analysis also shows that while the party affiliation does not make any difference, membership in the majority party is worth \$1,235. Finally, an impressionable, insecure freshman Senator receives \$2,180 more.

So, are campaign contributions productive? As mentioned above, in 1998, the sugar program transferred roughly \$1 billion dollars to sugar growers. From Table 1, in the 1997-1998 election cycle they contributed \$3,059,715, adjusted for inflation. We reverse

the inflation adjustment and divide the contribution by two to put it on an annual basis.

We discover that sugar producers receive a reward of 714 dollars for each dollar they spend on electoral campaign contributions!

## NOTES

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<sup>1</sup> Knowles started this project as part of his senior honors thesis and masters' thesis at Duke. Holger Sieg and Tower were the advisors. Gokcekus refined and updated the project, and drafted the present version of the paper. We would like to thank the following for their help: John Aldrich, John Brehm, Paul Gronke, Craufurd Goodwin, Bill Kaempfer, Sheila Krumholz, Michael Munger, David Price and Holger Seig.

<sup>2</sup> The source of the data is the web page of the Center for Responsive Politics, [www.opensecrets.com](http://www.opensecrets.com), which utilizes reports filed to the Federal Election Committee. They are based on contributions of \$200 or more from Sugar grower PACs and individuals to federal candidates and from individual and soft money donors to political parties, as reported to the Federal Election Commission. Consistently, more than 90% of the contributions were made by a small number of organizations. For instance in the 107<sup>th</sup> Congress, these organizations are Flo-Sun Inc, American Crystal Sugar, American Sugar Cane League, US Sugar Corp, Southern Minn Beet Sugar Co-op, American Sugarbeet Growers Assn, Florida Sugar Cane League, Minn-Dak Farmers Co-op, Great Lakes Sugar Beet Growers, Florida Sugar Cane League, Snake River Sugar, Sugar Cane Growers Co-op of Florida, US Beet Sugar Assn, Rio Grande Valley Sugar Growers, and Amalgamated Sugar. The contributions are in real terms, i.e., in 107<sup>th</sup> congress dollars. We use the consumer price index (CPI relative to the average CPI in 2001 and 2002) as the deflator.

<sup>3</sup> Until early 1990s, the name of the same subcommittee was Agricultural Production, Marketing, and Stabilization of Prices.



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<sup>4</sup> For details, see Greene, 2003, pp. 665-668.

<sup>5</sup> We use the normal distribution in our analysis, i.e.,  $Pr ob(C = 1) = \int_{-\infty}^{\beta'x} \phi(t)dt = \Phi(\beta x)$ , where  $\Phi(\cdot)$  is the notation for the standard normal distribution.

<sup>6</sup> Democrats were the majority for four of the congress, namely 101<sup>st</sup>, 102<sup>nd</sup>, 103<sup>rd</sup>, and 107<sup>th</sup>; and Republicans were the majority for three times: 104<sup>th</sup>, 105<sup>th</sup>, and 106<sup>th</sup> Congresses.

<sup>7</sup> To capture potential impact of the number of years in Senate, we included an incumbency variable in a various functional forms, e.g., linear or second order polynomial. We could not get any significant results. Therefore, for simplicity, we decided not to include them in the model that we present.

<sup>8</sup> We should keep in mind that these marginal effects are only suggestive because, marginal effects are computed at the means of the explanatory variables. Endnote 10's caveats also apply.

<sup>9</sup> For details, see Greene, 2003, pp. 762-766.

<sup>10</sup> Each  $\beta$  coefficient in Table 4 shows the effect on  $C^*$  of a change in an  $x$  variable. For example, switching from being a Democrat to a Republican decreases desired contributions,  $C^*$ , by \$19. Each marginal effect shows the effect on  $C$  of an incremental change in an  $x$  variable, for an individual whose initial  $x$ 's are the sample means. In other words, each marginal effect recons with the probability of receiving a contribution being less than one. Thus, loosely speaking, the marginal effects show the effect of a change in each  $x$  variable for a 'typical' Senator. However, since all  $x$  variables are dummies, there is no 'typical' Senator: For example no one is half a Republican and half

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a Democrat. Moreover, since dummies take the values of only one or zero, in the real world there is no such thing as an incremental change in one of the  $x$ 's. Bearing these caveats in mind, the reader should glean from Table 4 that if the 'typical' Senator switches from being a Democrat to being a Republican, he loses \$9 in campaign contributions.

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**Table 1 Campaign contributions by sugar interest: 1989-2002**

<b>Congress</b>	<b>Total*</b>	<b>Individual</b>	<b>PACs</b>	<b>SOFT</b>	<b>To: Democrats</b>
101 <sup>st</sup>	\$ 2,571,056	9%	91%	NA	60%
102 <sup>nd</sup>	\$ 2,729,790	17%	71%	11%	67%
103 <sup>rd</sup>	\$ 2,841,146	9%	79%	12%	65%
104 <sup>th</sup>	\$ 3,916,350	12%	61%	26%	46%
105 <sup>th</sup>	\$ 3,059,715	9%	65%	25%	52%
106 <sup>th</sup>	\$ 3,561,589	9%	47%	44%	52%
107 <sup>th</sup>	\$ 2,955,323	8%	67%	25%	56%

\* Totals are in real terms, i.e., in 107<sup>th</sup> congress dollars. The deflator is the CPI. All tables, figures, and discussion refer to a typical two-year election cycle.

**Table 2 Determinants of campaign contributions by sugar interest to incumbent Senators**

	Average (in 2002 dollars)	Percent of Senators Received	Average (among those who received)
<u>PARTY:</u>			
Democrat	\$ 6,061	52%	\$ 11,661
Republican	\$ 4,230	46%	\$ 9,121
<i>Ratio:</i>	<i>1.43</i>	<i>1.12</i>	<i>1.28</i>
<u>SUGAR STATES:</u>			
Sugar Cane State	\$ 8,923	71%	\$ 12,583
Not a Sugar state	\$ 3,979	42%	\$ 9,412
<i>Ratio:</i>	<i>2.24</i>	<i>1.68</i>	<i>1.34</i>
Sugar Beet	\$ 7,643	64%	\$ 11,933
Not a Sugar state	\$ 3,979	42%	\$ 9,412
<i>Ratio:</i>	<i>1.92</i>	<i>1.52</i>	<i>1.27</i>
<u>MAJORITY PARTY:</u>			
Majority Party	\$ 5,940	52%	\$ 11,405
Minority Party	\$ 4,230	46%	\$ 9,219
<i>Ratio:</i>	<i>1.40</i>	<i>1.14</i>	<i>1.24</i>
<u>COMMITTEES:</u>			
Agr. Committee	\$ 10,778	69%	\$ 15,568
Not Agr. Comm.	\$ 3,889	45%	\$ 8,693
<i>Ratio:</i>	<i>2.77</i>	<i>1.55</i>	<i>1.79</i>
Sub-committee	\$ 11,722	75%	\$ 15,629
Not Agr. Comm.	\$ 3,889	45%	\$ 8,693
<i>Ratio:</i>	<i>3.01</i>	<i>1.68</i>	<i>1.80</i>
<u>SENIORITY</u>			
Freshman	\$ 6,800	61%	\$ 11,068
Sophomore	\$ 5,683	49%	\$ 11,650
Junior	\$ 4,508	42%	\$ 10,805
Senior +	\$ 2,687	38%	\$ 7,023
<b><u>ALL MEMBERS:</u></b>	<b>\$ 5,168</b>	<b>49%</b>	<b>\$ 10,487</b>

**Table 3 Probit model maximum likelihood estimates: Probability of receiving sugar campaign contributions in each two-year election cycle**

<i>Variable</i>	<i>Coefficient (<math>\beta</math>)</i>	<i>t ratio</i>	<i>Marginal effect</i>	<i>t ratio</i>
Constant	-0.463	-4.43		
REPUBLICAN	-0.128	-1.28	-0.050	-1.32
MAJORITY PARTY	0.104	1.04	0.041	1.03
FRESHMAN	0.442	4.13	0.174	4.14***
SUGAR BEET STATE	0.499	4.07	0.196	4.05***
SUGAR CANE STATE	0.848	4.37	0.334	4.31***
AGR. COMMITTEE	0.427	2.30	0.168	2.30***
PR. SUBCOMMITTEE	0.494	2.08	0.194	2.08***

Log L = -440.27

$\chi^2 = 89.72$

Frequencies of actual and predicted outcomes<sup>†</sup>

		<i>Predicted</i>		
		Received = No	Received = Yes	Total (actual)
<i>Actual</i>	Received = No	257	98	355
	Received = Yes	140	205	345
	Total (predicted)	397	303	700

Notes: Marginal effects are computed at the means of the explanatory variables; \*\*\* Based on a one-sided test t-test, statistically significant at 1% level; <sup>†</sup> The model predicts 66% of the recipients accurately (462 out of 700): In particular, the model accurately predicts 257 out of 355 of those who did not receive; and 205 out of 345 of those who received.

**Table 4 Tobit model maximum likelihood estimates: Sugar campaign contributions to incumbent Senators**

<i>Variable</i>	<i>Coefficient (<math>\beta</math>)</i>	<i>t ratio</i>	<i>Marginal effect</i>	<i>t ratio</i>
Constant	-9001.33	-7.37		
REPUBLICAN	-19.43	-1.37	-8.95	-1.37 *
MAJORITY PARTY	2681.19	2.18	1235.27	2.18 **
FRESHMAN	4733.73	3.68	2180.91	3.69 ***
SUGAR BEET STATE	6472.91	4.45	2982.18	4.46 ***
SUGAR CANE STATE	11257.58	5.20	5186.56	5.20 ***
AGR. COMMITTEE	9259.54	4.25	4266.03	4.24 ***
PR. SUBCOMMITTEE	4730.36	1.78	2179.36	1.78 **

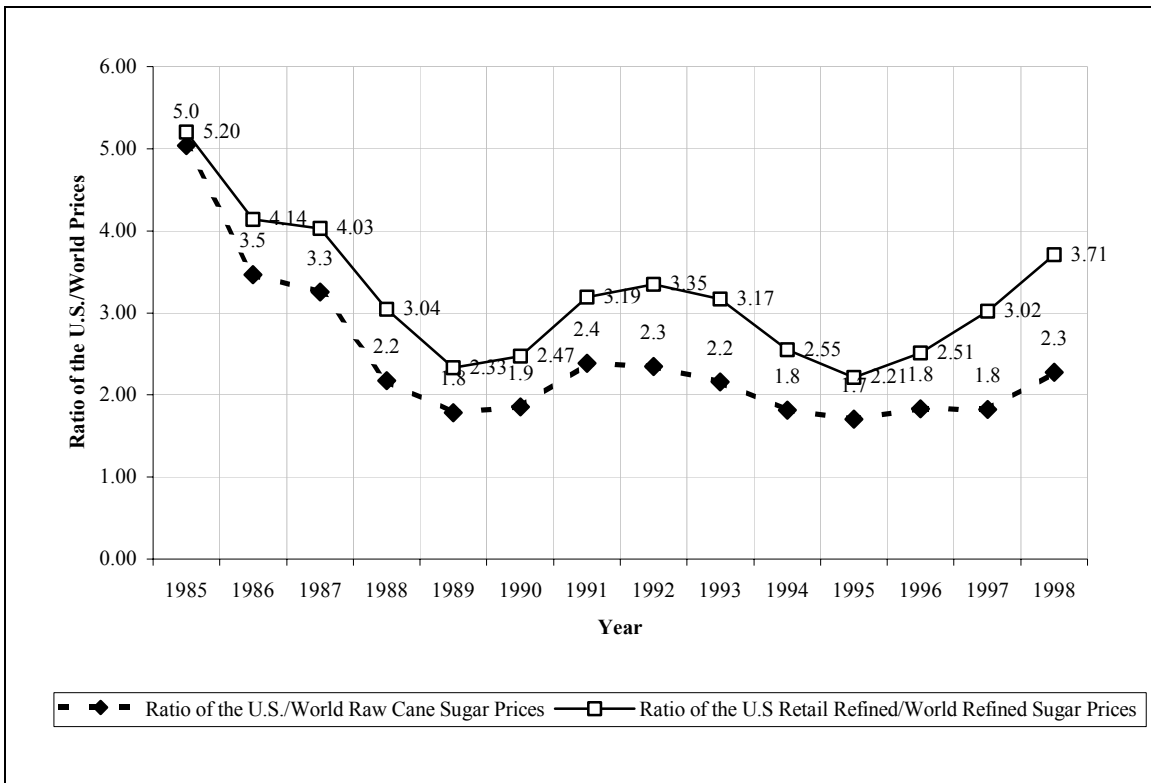
Log L = -3996.77

N = 700

\* Based on a one-sided test t-test, statistically significant at 10% level; \*\* Based on a one-sided test t-test, statistically significant at 5% level; \*\*\* Based on a one-sided test t-test, statistically significant at 1% level.

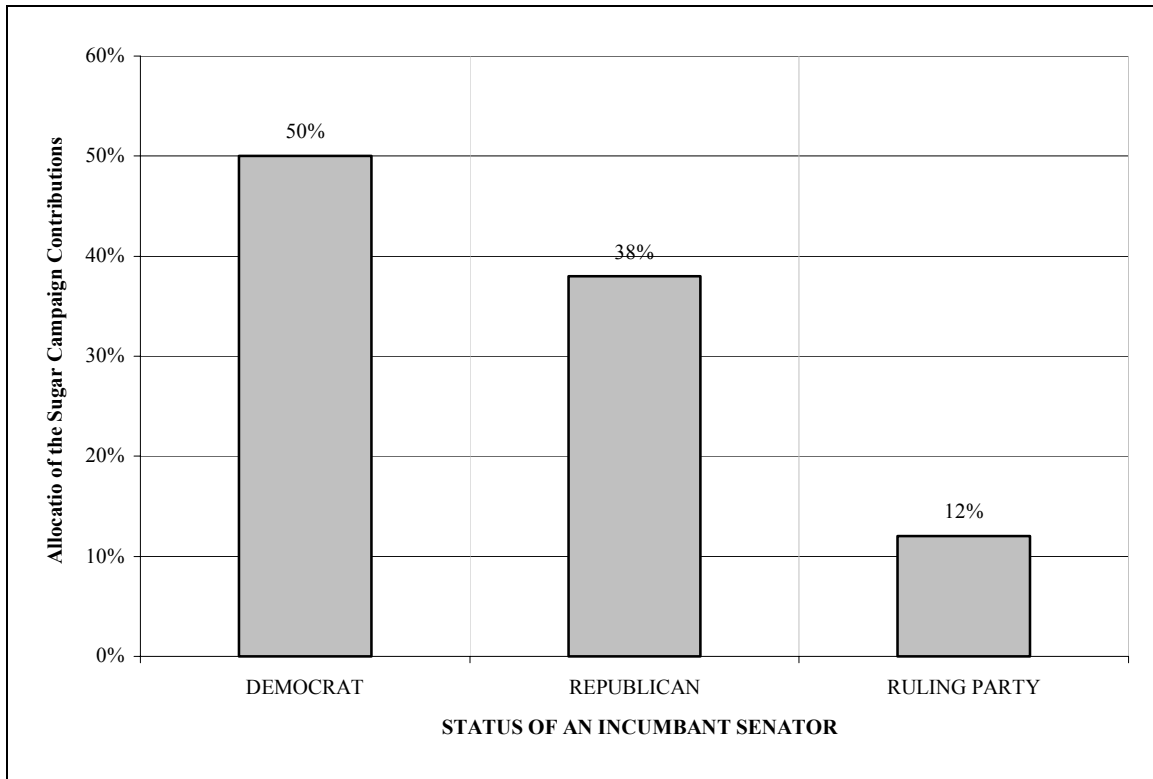


**Figure 1 The world and U.S. sugar prices**



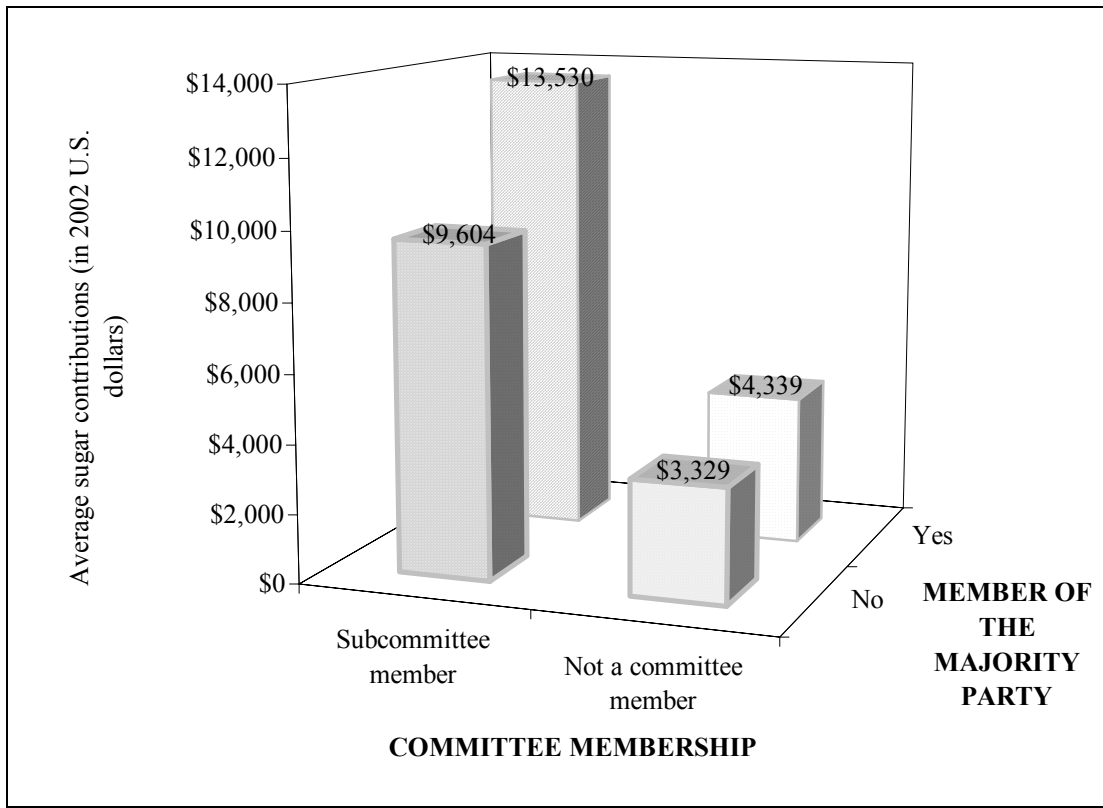
Source: GAO/RCED-00-126, p. 14

**Figure 2 Allocation of sugar campaign contributions between two political parties**



Results from regressing each party's *Share of Contributions* over the 7 Congresses (14 observations) on *Majority Party*, which is one for the ruling party in the Senate and zero otherwise, and *Democrat*, a dummy which is 1 or 0 depending on whether the party is Democratic. The intercept is 38%, and both coefficients of the *Democratic* and *Majority Party* dummies are 12%.

**Figure 3 Sugar contributions and 'Power'**



**Figure 4 Sugar contributions and 'Willingness'**

