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Modernizing the Iowa Bottle Bill

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Introduction

In 1979, Iowa put in place the Iowa Beverage Container Deposit Law (The Bottle Bill). Under this law, distributors of carbonated beverages charge a five cent deposit on containers sold to the public. This deposit is fully refunded when customers return the container. Retailers and redemption centers that collect these containers refund the deposit and then return the containers to the distributors for six cents. The retailers and redemption centers receive this extra penny for handling the containers and the distributors pay this handling fee with reimbursements collected on the recycled materials. This system is a self-driven, self-funded recycling system that keeps containers out of landfills and roadside ditches while at the same time generating employment at redemption centers and retailers.

When the system was implemented the vast majority of consumers recycled and for them there was no cost. The law achieved its objectives and as late as 2000, 93% of all carbonated containers sold in Iowa were recycled.

The five cents deposit and one cent handling fee were not indexed to inflation and with the passage of time, the Bottle Bill redemption rate diminished. Had the $0.05 and $0.01 been indexed for inflation, as measured by the CPI, these values would now be $0.17 and $0.03 respectively[1]. The gradual erosion of the buying power of the deposit and the handling fee has introduced major distortions into the system. First, the recycling rate has fallen to

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[1] See https://data.bls.gov/cgi-bin/cpicalc.pl?cost1=0.01&year1=197905&year2=201711

about 71%. These unredeemed containers are ending up in landfills or in roadside ditches. Second, the one cent handling fee has fallen below actual handling costs. This has reduced the number of recycling centers and it has imposed a burden on retailers who have become increasingly opposed to the law. Third, the law did not anticipate the surge in sales of non-carbonated drinks where the recycling rate is estimated to be 26%. Fourth, the failure of the system has generated windfall profits for the distributors who keep the deposit on unredeemed containers. Looking forward, the system needs to be updated.

This document evaluates ways in which the system can be modernized. It first explores the handling fee that would allow retailers and redemption centers to cover costs. It then provides a detailed analysis of the cash flows and economic incentives in the system as it runs today as well as in some alternative versions that would remove distortions caused by the lack of indexing and return the system to a sustainable path.

Implementation of the Law

When the law was originally developed it was assumed that a five cent reward would be sufficient to encourage the return of all containers. The one cent handling fee paid to the retailers, as well as the additional handling costs the distributors incur was expected to come from the value of the recycled material. This flow of funds under the current system is shown in Figures 1 and 2.
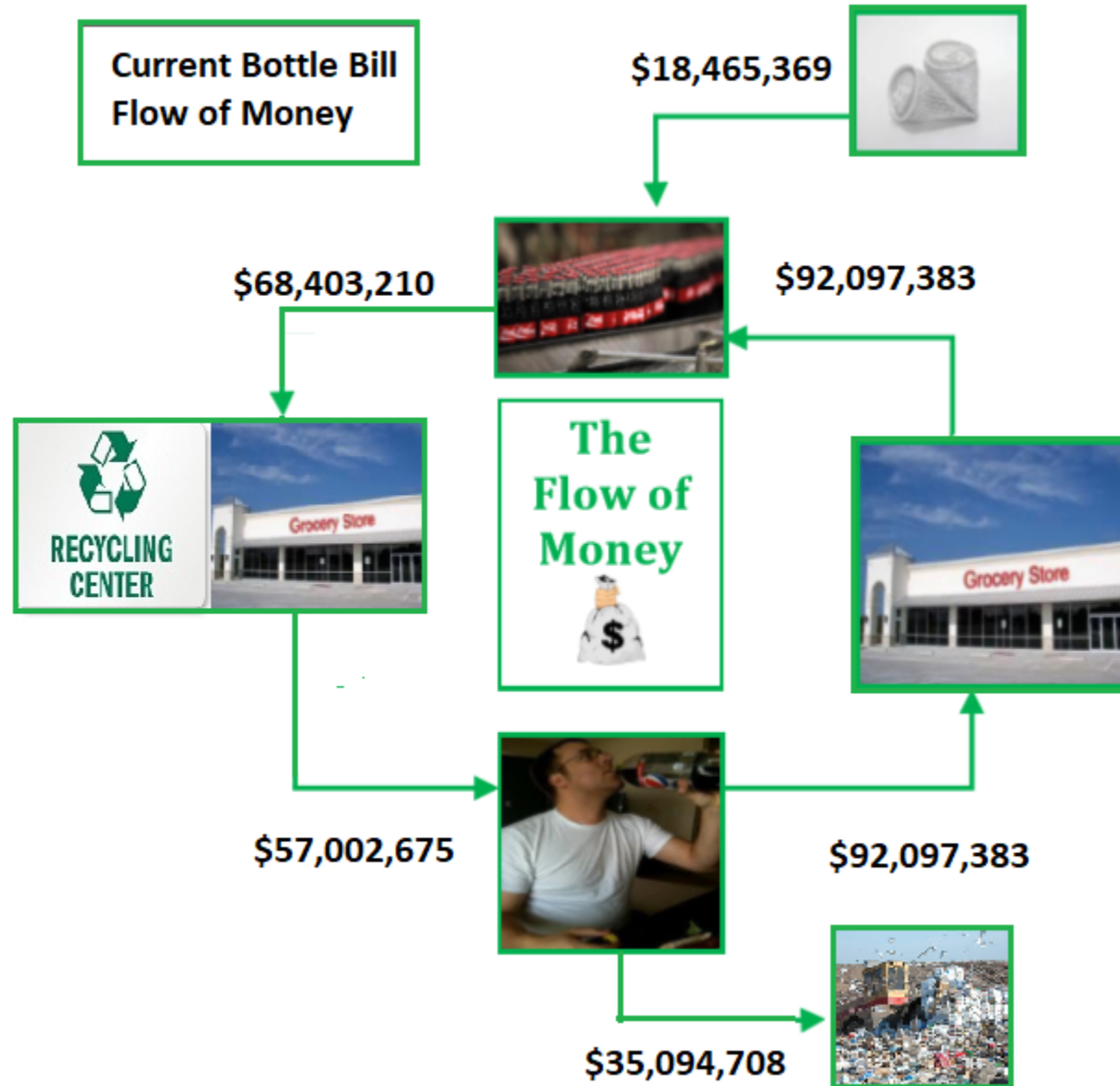
Updating the Handling Fee

In the absence of any barrier to entry, the size of the handling fee will dictate the number, size and efficiency of redemption centers. A fee that is set at a very high level (such as the 3.5 cents in Maine and New York) will encourage thousands of small, inefficient redemption centers that are located too close to each other to achieve economies of scale. As more and more centers enter this market, operating costs will rise to equal the handling fee regardless of the size of the fee. Employees in this system will be underutilized due to the small draw areas in an overcrowded redemption market. In theory, this overcrowding should make things more convenient for the consumer but in reality, many of these centers would operate on a part-time basis.

Figure 1

The empties are picked up by the distributor who pays 5 cents plus a 1 cent handling fee for each container

The distributor charges 5 cents for each container delivered to the retailer

FOLLOW THE NICKEL

The consumer gets 5 cents back from the redemption center or retailer when they redeem empty containers

The retailer charges the consumer 5 cents when the beverage is purchased

Figure 2

Current Bottle Bill Flow of Money

$18,465,369

$68,403,210

$92,097,383

RECYCLING CENTER

Grocery Store

The Flow of Money

Grocery Store

$57,002,675

$92,097,383

$35,094,708

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Given that retailers are unhappy with the current system and that the handling fee can be used to design the type of redemption system that will emerge, the relevant question is what would it cost to run modern redemption centers near supermarkets. This would give retailers the choice of remaining in the redemption business knowing that they are covering full costs or opting out of the redemption business knowing that customers have a convenient alternative.

The Oregon Beverage Recycling Cooperative (OBRC) in Oregon has developed 21 "BottleDrop" stand alone redemption centers. These are typically located in strip malls near retail stores and are about 7,000 square feet and operate 9-11 hours per day for 363 days per year. OBRC was given a monopoly in container recycling in Oregon and has the incentive to build the most efficient system possible.

Containers redeemed at BottleDrops are processed in one of eight processing centers located throughout the state. These centers are larger than the typical retail recycling centers located in Iowa supermarkets but their cost structure serves as a basis for calculating the overall costs of running a modern retail recycling center.

Jules Bailey who heads the OBRC provided the following cost estimates. The facilities themselves cost from $1 million to $1.5 million to set up and require $500,000 to $700,000 per facility in annual operating costs. This puts their average total cost per container in a range of 1.1 cents for larger facilities to 1.9 cents for smaller ones. Note that even though the facilities are designed for maximum efficiency, none of them can operate at the one cent that is currently available in Iowa.

This OBRC cost estimate does not include a risk premium to the investor who constructs the facility. This would be required in Iowa to justify such an investment given the absence of market power in the Iowa system.

Given that these Oregon facilities are larger than the typical supermarket recycling center in Iowa it is safe to assume that the Iowa cost would be close to the 1.9 cent cost for the

smaller of the Oregon facilities. If we use the 1.9 cents and add a 0.1 cent profit margin then a handling fee of 2 cents per container can be justified.

Cash Flows in the Current System

Tables 1 shows the cash flows in the current system. The number of containers sold in Iowa in 2017 is shown in column B. This data is from the Container Recycling institute. The 2017 redemption rate is in column C. This is from a study by the Iowa Department of Natural Resources. These two numbers are used to calculate the number of returned and unreturned containers and are shown in columns D and E. Using the five cent deposit, consumers collected $57 million from returned containers and lost $35.1 million on containers that were not recycled. Distributors paid out $68.4 million to retailers and redemption centers and collected $92.1 million in deposits. This left distributors with an excess of about $23.7 million before costs and before adding the value of the recycled material. The price of deposit quality recycled material in Des Moines for late December 2017 is used to calculate the value of the recycled material[2]. This was approximately $18.5

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[2] This data was provided by Mick Barry at Mid America Recycling

million. It was possible to get data on the costs incurred by distributors because some of these farm this work out to third parties. This estimate of full cost for distributors is about nine tenths of a cent per container[3]. After subtracting distributor costs, the net cash flow to distributors is about $31.9 million. An identical analysis in 2012 calculated that the net flow to distributors in that year was $18 million. The windfall profits to distributors has therefore increased by $13.9 million per year over this five year period. Looking forward, the distributors will continue to gain an additional $2.5 million every year at the expense of the retailers and redemption centers who are no longer covering their costs.

A Two Cent Handling Fee

Table 2 shows the cash flows that would result if the handling fee was increased to two cents. Payments to retailers and redemption centers would double from $11.4 million to $22.8 million. This would come at the expense of distributors who would end up with a net profit of $20.5 million, putting them slightly above the profit level they made five years ago. In this regard, it is interesting to note that under the New York system the distributors are responsible for the 3.5 cent handling fee and 80% of the unclaimed deposits go to the state general fund. In other words, the recycling laws in New York are a significant cost to distributors while the Iowa deposit law has generated large net profits to distributors.

A Two Cent Handling Fee and a Ten Cent Deposit

The increase in the handling fee described above would address the legitimate concerns of retailer and redemption centers but it would not stop the gradual reduction in the recycling rate. Clearly, the higher the deposit, the higher will be the recycling rate. California charges a ten cent deposit on containers over 24 ounces and in 2016 achieved an 81% recycling rate[4]. Michigan charges a ten cents deposit and has a 92% recycling rate[5]. It is conservative to assume that a ten cent deposit fee in Iowa would result in an 80% recycling rate. Table 3 shows the impact of a ten cent deposit and a two cent handling fee. Distributors lose when

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[3] This data came from Troy Willard owner of the Can Shed in Cedar rapids
[4] See: http://www.calrecycle.ca.gov/BevContainer/Rates/BiannualRpt/12MonPeriod.htm
[5] See: http://www.bottlebill.org/legislation/usa/michigan.htm

the recycling rate goes up, but they gain by making ten cents on every unredeemed container. The net impact is very close to the second scenario.

An Expanded System

The system described above excludes containers used for non-carbonated soft drinks, sports drinks, and water. The redemption rate on these containers is only 26%. These non-recycled containers end up in landfills or as litter, and the value of the raw material in these containers is lost to society.

Table 4 shows what would happen if these containers were included in the law, the deposit rate stayed at five cents and the handling fee was increased to two cents. These results assume that the redemption rates for the newly included containers would rise to the current redemption rate for each container type.

Retailers benefit from the doubling of the handling fee and the increase in volume of containers. Society gains because 20,522 tons of these containers are recycled rather than ending up in landfills or as litter in public spaces. Distributors make $3.3 million less than they do under the current system though the number of unredeemed containers increases and they sell more recycled material.

Table 5 shows the cash flows if we use a one cent handling fee on existing containers and a two cent handling fee on non-carbonated containers. Under this system the weighted average handling fee is 1.6 cents. This would not be enough to cover the full costs of handling, but it would forestall the elimination of existing standalone recycling centers. Distributors make $21.4 million under this system which is again slightly greater than the net profit they were making in 2012.

Table 1. Current System

	A	B	C	D	E	F	G	H	I
Container Type	**Number of Refundable Containers Sold**	**Proportion Returned**	**Number Returned for Deposit**	**Consumer Loss from Unreturned Containers**	**Consumer Receipts from Returned Containers**	**Distributor's Income from Deposits**	**Distributor's Payment of Deposits plus Handling Fee**	**Amount Paid to Retailers to Cover their Handling Costs**
Glass	255,381,893	0.74	188,982,601	$3,319,965	$9,449,130	$12,769,095	$11,338,956	$1,889,826
Plastic	362,220,916	0.53	191,977,085	$8,512,192	$9,598,854	$18,111,046	$11,518,625	$1,919,771
Aluminum	1,224,344,849	0.62	759,093,806	$23,262,552	$37,954,690	$61,217,242	$45,545,628	$7,590,938
Total	1,841,947,658		1,140,053,493	$35,094,708	$57,002,675	$92,097,383	$68,403,210	$11,400,535

	J	K	L	M	N	O	P
Container Type	**Distributor's Balance before Adding Value of Recovered Material**	**Number of Containers per Ton**	**Tons Recycled**	**Value of Recycled Material Per Ton**	**Value of Recycled Material**	**Distributor's Profit Before Distributor Handling Cost**	**Distributor's Profit Allowing for $0.009/unit Handling Cost**
Glass	$1,430,139	4,000	47,246	$20	$944,913	$2,375,052	$674,208
Plastic	$6,592,421	20,000	9,599	$265	$2,543,696	$9,136,117	$7,408,323
Aluminum	$15,671,614	69,945	10,853	$1,380	$14,976,760	$30,648,374	$23,816,529
Total	$23,694,173		67,697		$18,465,369	$42,159,542	$31,899,061

Table 2. Current System with a Two Cent Handling Fee

	A	B	C	D	E	F	G	H	I
	Container Type	Number of Refundable Containers Sold	Proportion Returned	Number Returned for Deposit	Consumer Loss from Unreturned Containers	Consumer Receipts from Returned Containers	Distributor's Income from Deposits	Distributor's Payment of Deposits plus Handling Fee	Amount Paid to Retailers to Cover their Handling Costs
	Glass	255,381,893	0.74	188,982,601	$3,319,965	$9,449,130	$12,769,095	$13,228,782	$3,779,652
	Plastic	362,220,916	0.53	191,977,085	$8,512,192	$9,598,854	$18,111,046	$13,438,396	$3,839,542
	Aluminum	1,224,344,849	0.62	759,093,806	$23,262,552	$37,954,690	$61,217,242	$53,136,566	$15,181,876
	Total	1,841,947,658		1,140,053,493	$35,094,708	$57,002,675	$92,097,383	$79,803,744	$22,801,070

	J	K	L	M	N	O	P
Container Type	Distributor's Balance before Adding Value of Recovered Material	Number of Containers per Ton	Tons Recycled	Value of Recycled Material Per Ton	Value of Recycled Material	Distributor's Profit Before Distributor Handling Cost	Distributor's Profit Allowing for $0.009/unit Handling Cost
Glass	-$459,687	4,000	47,246	$20	$944,913	$485,226	-$1,215,618
Plastic	$4,672,650	20,000	9,599	$265	$2,543,696	$7,216,346	$5,488,552
Aluminum	$8,080,676	69,945	10,853	$1,380	$14,976,760	$23,057,436	$16,225,591
Total	$12,293,638		67,697		$18,465,369	$30,759,007	$20,498,526

Table 3. A Ten Cent Deposit and Two Cent Handling Fee

	A	B	C	D	E	F	G	H	I
	Container Type	Number of Refundable Containers Sold	Proportion Returned	Number Returned for Deposit	Consumer Loss from Unreturned Containers	Consumer Receipts from Returned Containers	Distributor's Income from Deposits	Distributor's Payment of Deposits plus Handling Fee	Amount Paid to Retailers to Cover their Handling Costs
	Glass	255,381,893	0.925	236,228,251	1,915,364	23,622,825	$25,538,189	$28,347,390	$4,724,565
	Plastic	362,220,916	0.6625	239,971,357	12,224,956	23,997,136	$36,222,092	$28,796,563	$4,799,427
	Aluminum	1,224,344,849	0.775	948,867,258	27,547,759	94,886,726	$122,434,485	$113,864,071	$18,977,345
	Total	1,841,947,658		1,425,066,866	41,688,079	142,506,687	$184,194,766	$171,008,024	$28,501,337

	J	K	L	M	N	O	P
Container Type	Distributor's Balance before Adding Value of Recovered Material	Number of Containers per Ton	Tons Recycled	Value of Recycled Material Per Ton	Value of Recycled Material	Distributor's Profit Before Distributor Handling Cost	Distributor's Profit Allowing for $0.009/unit Handling Cost
Glass	-$2,809,201	4,000	59,057	$20	$1,181,141	-$1,628,060	-$3,754,114
Plastic	$7,425,529	20,000	11,999	$265	$3,179,620	$10,605,149	$8,445,407
Aluminum	$8,570,414	69,945	13,566	$1,380	$18,720,950	$27,291,363	$18,751,558
Total	$13,186,742		84,622		$23,081,711	$36,268,453	$23,442,851

Table 4. Expanded Bill with Two Cent Handling Fee and Five Cent Deposit

	A	B	C	D	E	F	G	H	I
	Container Type	Number of Refundable Containers Sold	Proportion Returned	Number Returned for Deposit	Consumer Loss from Unreturned Containers	Consumer Receipts from Returned Containers	Distributor's Income from Deposits	Distributor's Payment of Deposits plus Handling Fee	Amount Paid to Retailers to Cover their Handling Costs
	Glass	294,002,341	0.74	217,561,732	$3,822,030	$10,878,087	$14,700,117	$15,229,321	$4,351,235
	Plastic	839,408,168	0.53	444,886,329	$19,726,092	$22,244,316	$41,970,408	$31,142,043	$8,897,727
	Aluminum	1,306,826,754	0.62	810,232,587	$24,829,708	$40,511,629	$65,341,338	$56,716,281	$16,204,652
	Total	2,440,237,263		1,472,680,649	$48,377,831	$73,634,032	$122,011,863	$103,087,645	$29,453,613

	J	K	L	M	N	O	P
Container Type	Distributor's Balance before Adding Value of Recovered Material	Number of Containers per Ton	Tons Recycled	Value of Recycled Material Per Ton	Value of Recycled Material	Distributor's Profit Before Distributor Handling Cost	Distributor's Profit Allowing for $0.009/unit Handling Cost
Glass	-$529,204	4,000	54,390	$20	$1,087,809	$558,604	-$1,399,451
Plastic	$10,828,365	20,000	22,244	$265	$5,894,744	$16,723,109	$12,719,132
Aluminum	$8,625,057	69,945	11,584	$1,380	$15,985,717	$24,610,773	$17,318,680
Total	$18,924,218		88,219		$22,968,269	$41,892,487	$28,638,361

Table 5. Expanded Bill with Five Cent Deposit, Two Cent Handling Fee on Non-Carbonated Containers and One Cent Handling Fee on Carbonated Containers

	A	B	C	D	E	F	G	H	I
	Container Type	Number of Refundable Containers Sold	Proportion Returned	Number Returned for Deposit	Consumer Loss from Unreturned Containers	Consumer Receipts from Returned Containers	Distributor's Income from Deposits	Distributor's Payment of Deposits plus Handling Fee	Amount Paid to Retailers to Cover their Handling Costs
	Glass	294,002,341	0.74	217,561,732	$3,822,030	$10,878,087	$14,700,117	$14,042,387	$2,662,235
	Plastic	839,408,168	0.53	444,886,329	$19,726,092	$22,244,316	$41,970,408	$44,921,733	$11,463,516
	Aluminum	1,306,826,754	0.62	810,232,587	$24,829,708	$40,511,629	$65,341,338	$51,319,362	$9,240,576
	Total	2,440,237,263		1,472,680,649	$48,377,831	$73,634,032	$122,011,863	$110,283,482	$23,366,327

	J	K	L	M	N	O	P
Container Type	Distributor's Balance before Adding Value of Recovered Material	Number of Containers per Ton	Tons Recycled	Value of Recycled Material Per Ton	Value of Recycled Material	Distributor's Profit Before Distributor Handling Cost	Distributor's Profit Allowing for $0.009/unit Handling Cost
Glass	$657,730	4,000	54,390	$20	$1,087,809	$1,745,538	-$212,517
Plastic	-$2,951,324	20,000	22,244	$265	$5,894,744	$2,943,419	-$1,060,557
Aluminum	$14,021,976	69,945	11,584	$1,380	$15,985,717	$30,007,693	$22,715,600
Total	$11,728,381		88,219		$22,968,269	$34,696,651	$21,442,525

Single Stream

Table 6 provides an estimate of the tons recycled and the overall value of the recycled material if the deposit system is eliminated and replaced with single stream. The Container Recycling institute has estimated that only 60% of the current volume of recycled material would be recovered under single stream. In addition, the value of this recycled material is lower due to contamination. This is especially true for glass where the value falls from $20 per ton to $5 per ton. The total tonnage of recycled material falls from 67.7 thousand tons to 35.9 thousand tons and the value of recycled material falls from $18.5 million tons under the current system to $8.3 million under single stream. The $18.5 million in recovered materials is currently used to cover the one cent handling fee and this in turn funds the operation of the entire recycling system. This reduction in value would need to be covered by charging households for this service.

Faced with a dramatic increase in glass contamination, the single stream operators would see a decline in the net value of the materials they process. The value of paper pulp in particular would decline and pulp mills might begin to reject the product.

The cost estimates provided below are based on a study conducted by an Iowa based single stream operator, Mid America Recycling. This operator processes about 26,000 tons of collected materials at a cost of $63.50 per ton. They estimate that their costs will increase by $16.50 per ton or 25% due to glass contamination of paper pulp.

Table 6. Single Stream

Container Type	Number of Containers per Ton	Tons Recycled	Value of Recycled Material Per Ton	Value of Recycled Material
Glass	4,000	28,347	$5	$141,737
Plastic	20,000	5,759	$205	$1,180,659
Aluminum	69,945	6,512	$1,080	$7,032,565
Total	93,945	40,618		$8,354,961

Graphical Summary of the Results

Figure 3 below summarizes the result in graphical form. The area shaded in green represents deposits returned to consumers. Under the current system this is eroding and being replaced by the area in purple, the amount consumers leave on the table when they choose not to return. This consumer lost amount, plus the value of the retuned containers contributes to the net profits of distributors in blue. Notice how large this amount is under the current system when comparted to the amount returned to retailers and redemption centers. This is true even though we are comparing a net profit to distributors to the gross receipts of retailers.

Figure 3. Summary of Bottle Bill Results ($Million)