ENVIRONMENT

TOO MUCH (QUESTIONABLE) INFORMATION?

Do the benefits of California's Proposition 65 "carcinogen right to know" law outweigh its costs?

BY MICHAEL L. MARLOW

California's Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, was approved by state voters to address concerns about exposure to toxic chemicals. Proposition 65 requires the state to publish a list of chemicals known to cause cancer or reproductive harm—a list that now includes well over 800 chemicals. Businesses must notify Californians about significant amounts of these chemicals in the products they purchase, in their homes or workplaces, or that are released into the environment. State businesses are also prohibited from knowingly and intentionally discharging significant amounts of the listed chemicals into sources of drinking water.

Surprisingly, few studies address the efficacy of this long-standing law that requires businesses to apply a "clear and reasonable" warning label to any product carrying a cancer risk—defined as a 1 in 100,000 chance of any person exposed to the product contracting cancer over a period of 70 years ("lifetime risk"). This article argues that the net effects of Proposition 65 on public health are uncertain. The frequency of warnings, the repeating of commonly understood information, the use of complex and confusing labeling, the graphic nature of the warnings, and the frequent public misunderstanding of the risk posed by low-probability events are unlikely to steer consumers toward decisions that improve their welfare. Some consumers simply ignore the warnings, while others overreact and substitute toward high-risk products because other products' labels "scare" them into focusing on avoiding small-probability risks.

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This paper is based on a study conducted for the American Beverage Association.

The empirical section of this article examines whether cancer rates in California have changed in the wake of this law. Little to no evidence is found indicating that Proposition 65 significantly influences cancer incidence in California. This article also argues that the law imposes significant costs on many businesses, including costs associated with legal services and lawsuit settlements. The article concludes with a brief look at two possible reforms to Proposition 65 that could improve both public health and welfare.

INTENTIONS AND LEGAL REQUIREMENTS OF PROPOSITION 65

Proposition 65 resulted from increased public concern during the 1960s and 1970s for the environment and its effects on human health. As a result of that concern, Congress began awarding federal agencies such as the Food and Drug Administration, Environmental Protection Agency, and the Occupational Safety and Health Administration growing responsibility for regulating toxic exposure. Various groups in California believed more restrictive regulation at the state level was necessary to further protect public health. Proposition 65 is a product of that concern and was approved by 64 percent of California voters in 1986.

The law requires the state to publish (and update at least once a year) a list of chemicals known to cause cancer or birth defects or other reproductive harm. The list contains a wide range of naturally occurring and synthetic chemicals, including additives or ingredients in pesticides, common household products, food, drugs, dyes, and solvents. Listed chemicals may also be used in manufacturing and construction, or they may be byproducts of

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chemical processes, such as motor vehicle exhaust. Secondhand tobacco smoke, for instance, is included. The Office of Environmental Health Hazard Assessment (OEHHA), part of the California Environmental Protection Agency, administers the program. Businesses with less than 10 employees and government agencies are exempt from compliance.

As of this writing, the list is up to 862 chemicals. Businesses are required to notify Californians about significant amounts of the listed chemicals in products that people purchase, in their homes or workplaces, or that are released into the environment. Products require warnings whether or not the producers add chemicals from the Proposition 65 list. For instance, restaurant owners must warn customers about olives, bread, and chicken because those foods contain trace amounts of substances known to cause cancer in rodents. The substances, however, are not added by food suppliers, but rather are found naturally in the foods.

Warnings may be communicated through a variety of means that include: labeling consumer products, posting signs at workplaces, distributing notices at rental housing complexes, or publishing notices in newspapers. "WARNING: This area contains a chemical known to the State of California to cause cancer" is probably the most frequently used Proposition 65 language. Despite the requirement to inform the public, businesses are not required to provide OEHHA any information about their products, such as which chemical(s) the warnings refer to, how exposures could occur, or how much of the chemicals consumers are likely to be exposed to. Manufacturers, distributors, and retailers who provide goods to the California marketplace are subject to warning requirements regardless of whether they are located in California or not.

Proposition 65 can be enforced in three ways:

- The California attorney general can bring an enforcement action.
- Any district attorney or city attorney (for cities whose population exceeds 750,000) may enforce the law.
- Any party acting in the public interest may file a lawsuit against a business alleged to be in violation of the law.

Penalties for violating warning requirements can be as high as $2,500 per day for each violation. A party alleging a business is in violation, must first send the business a notice of the alleged violation 60 days before filing suit. OEHHA advises, "Because

Proposition 65 is not enforced by a government agency, a business should seek legal advice upon receiving a 60-day notice letter." In the interim, the attorney general may take over the case.

DOES PROPOSITION 65 IMPROVE RISK COMMUNICATION?

Markets work toward controlling incentives for sellers to hide negative attributes of their products, as evidenced by stock price reactions to product recalls. Yet, markets are imperfect and cannot be expected to fully convey all known information on product risk. One firm conducting research must absorb all costs, but other firms may "free-ride" on benefits without incurring costs, thus indicating such research may exhibit characteristics of public goods. Thus, it becomes less likely any single firm finds such research profitable and private markets may provide information on risk attributes at inefficient levels.

Effective risk communication also requires that consumers receive easily understood information. Research indicates that consumers see health claims as useful, but clarity and conciseness are critical. Labels containing extraneous and repetitive information burden consumers with limited capabilities to process information. Studies assessing the effects of explicit warnings on products generally find that more explicit warnings are associated with greater levels of perceived danger, hazard understanding, injury severity, and manufacturers' concern. On the other hand, explicit warnings do not clearly alter purchases, and "ramping up" warnings may lead consumers to ignore future warnings simply because they believe past warnings were misleading. Consumers, in effect, may treat them like background noise.

Proposition 65 certainly makes warnings common. Attorney Suzanne Henderson demonstrated this in a 2004 hospitality law conference paper describing the warnings that must be issued by a typical California hotel. The warnings include: mercury in seafood; secondhand tobacco smoke; cleaning supplies and related activities; on-site construction; furnishings, hardware, and electrical components, including furniture, window treatment, locks, keys, electrical equipment, and carpeting; personal hygiene and medical supplies, including soaps, shampoos, and first aid supplies; hotel water supply systems, including faucets and other plumbing components; combustion sources, including automobile engines, gas stoves, fireplaces, and candles; office and art supplies and equipment, including carbonless paper, marking pens, copier machine chemicals, glues, crayons, and paints; landscaping supplies and pesticide treatment, including fertilizers, soil amendments, and pesticides; food and beverage service, including broiled and barbecued foods; transportation-related exposures, including motor fuels and engine exhaust; equipment and facility maintenance, including motor oil changes, carburetor cleaning, battery replacement, and facility repairs; retail sales; and recreation facilities, swimming pools, hot tubs and beaches, including beach sand (which can contain quartz sand, a form of carcinogenic crystalline silica).

Communicating imperfect risk information is especially problematic. Consumers have a particularly difficult time making sense of small probabilities or of information about an issue that lacks scientific or political consensus. Individuals may also overestimate small-probability events and underestimate larger risks they face. A case study is the 1980s Tylenol tampering incident that resulted in cyanide poisonings. The incident temporarily devastated nationwide sales of the drug, even though the risk of falling prey to the tainted pain reliever was extremely small.

Government regulation of risk communication is imperfect as well. For example, mandatory calorie-labeling laws at restaurants have not been shown to steer consumers toward "healthier" purchases. No significant change in calories purchased by adolescents (and/or their parents) was determined for New York City and Newark fast food chains that included McDonalds, Burger King, Wendy's, and Kentucky Fried Chicken. A recent review of seven studies concluded that calorie labeling does not decrease calorie purchasing or consumption. Further support comes from a study showing that, even after more than three years, government-mandated warning labels on alcoholic beverages failed to alter risk perceptions of alcohol abuse.

Businesses might protect themselves from lawsuits or bad publicity by posting warnings on any product containing even trace amounts of listed chemicals, irrespective of whether it exceeds the state's threshold. "Over-warning" may reinforce consumer inattention to the information, making it more difficult for consumers to consider risk differentials between products.

Proposition 65 advocates might argue that even if warnings are not effective in communicating risk, there are few to no negative effects, especially when the law prompts businesses to reformulate products to avoid its warning requirements. But is this argument correct? So far, there is no comprehensive study of the frequency of reformulations or, more importantly, whether public health has improved as a result of the law.

DOES PROPOSITION 65 PROMOTE PUBLIC HEALTH?

Traditionally, social science research uses a 95 percent confidence standard (p-value < 0.05) when statistically testing for policy effects. That is, ceteris paribus, the expected policy result should appear at least 19 times in 20 if the policy is to be considered effective. In this context, we examine whether cancer rates in California changed when compared to other locations that did not adopt similar "right-to-know" laws. This strategy controls for factors likely to influence cancer rates nationally and thus allows specific focus on what effect Proposition 65 has exerted on California.

Exposure to environmental substances has been variously estimated to be associated with 2–15 percent of all cancers. Included in this category are exposures to certain viruses and bacteria,

exposures to known workplace carcinogens, and exposures to radiation from sunlight, radon, or medical imaging, which sometimes involves many relatively small doses that accumulate over a long time. Long-term exposures to some consumer products and environmental pollutants, both natural and man-made, may similarly increase the risk of cancer through routes that have not yet been well studied. Although their roles in cancer development remain uncertain, such substances, including some pesticides, plasticizers, and nanomaterials, may cause subtle hormonal or other physiological alterations that could contribute to the development of cancer in later life.

To test the effects of Proposition 65, I use cancer statistics collected by the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute. SEER collects cancer incidence data from population-based cancer registries covering approximately 28 percent of the U.S. population. The population covered by SEER is comparable to the general U.S. population with regard to measures of poverty and education. The SEER population does tend to be more urban and has a higher proportion of foreign-born persons than the general U.S. population.

I specifically use SEER 9 registries because they provide the longest data set for California both before and after Proposition 65. Specifically, SEER 9 registries include data for Atlanta, Connecticut, Detroit, Hawaii, Iowa, New Mexico, San Francisco–Oakland, Seattle–Puget Sound, and Utah. The San Francisco–Oakland data should indicate the effects of Proposition 65 on California while the other areas provide control groups. Data are available for cases diagnosed from 1973 onward, with the exception of Seattle–Puget Sound and Atlanta, which joined the SEER program in 1974 and 1975 respectively.

The cancer incidence rate is the number of new cancers occurring in a specified population during a year, expressed as the number of cancers per 100,000 people at-risk. The number of new cancers may include multiple primary cancers occurring in one patient; however, the primary site reported is the cancer's site of origin and not any metastatic site. In general, the incidence rate would not include recurrences. The population used depends on the rate to be calculated; for cancer sites that occur in only one sex, the sex-specific population (for example, females for cervical cancer) is used. Age-adjusted rates are weighted averages of the age-specific rates, where weights are proportions of persons in corresponding age groups of a standard population. Potential confounding effects of age are reduced when comparing age-adjusted rates computed using the same standard population.

In 1975, SEER 9 data show age-adjusted cancer incidence rates were 400.44 (both sexes), 466.85 (males), and 365.86 (females) per 100,000 people. Rates would climb slowly but steadily for all three groups until the late 1980s, when the rates for males (and, correspondingly, for both sexes) experienced a sharp increase followed by an equally sharp decrease. Since the mid-1990s, the rate for males has drifted downward slightly while the female rate has roughly held steady. In 2009, cancer incidence rates were 464.87 (both sexes), 526.55 (males), and 422.04 (females) per 100,000.

Any effects on cancer incidence from Proposition 65 are unlikely to be contemporaneous. Latency periods of cancer onset associated with toxic chemicals on the Proposition 65 list will be influenced by many factors that include amount and frequency of exposure, age, genetics, and lifestyle. Cancer incidence also stems from a complex set of factors that are independent of whether or not a jurisdiction has adopted a "right-to-know" law such as Proposition 65. The empirical strategy is simply to consider various lags to determine if any statistically significant relationship can be determined between cancer incidence and the introduction of Proposition 65. This strategy controls for other factors affecting incidence across the nation, such as lifestyle, health care, cancer detection, and air and water pollution.

Empirical examination considers lags of 10–19 years after adoption of Proposition 65 in 1986. This strategy removes concerns of "cherry-picking" lag structures in the event that empirical evidence is mixed on whether Proposition 65 has altered cancer incidence. For example, if empirical examination reveals a significant influence after 15 years, but none after 14 years or 16 years, then evidence of a systematic influence is rather unconvincing. This empirical strategy allows the data to reveal lag structure as indicated by a consistent chain of statistically significant effects. Several adjoining time periods with consistent positive or negative effects would suggest convincing evidence of a systematic effect over time.

Prop65 is a dichotomous variable that defines possible lagged effects from Proposition 65 on cancer incidence. The shortest lag starts in year 1996, 10 years following implementation of Proposition 65. That is, *Prop65* takes values of 1 over 1996–2009, and 0 over 1974–1995. The longest lag starts in 2005; i.e., *Prop65* takes values of 1 over 2005–2009, and 0 over 1974–2004.

Effects of Proposition 65 on the cancer incidence gap are examined by differences between three comparison locations and San Francisco–Oakland. Comparison locations are Atlanta, Detroit, and Seattle because they are also large metropolitan areas. For simplicity, in the results, "San Francisco" refers to the San Francisco–Oakland registry and "Seattle" refers to the Seattle–Puget Sound registry. A rising incidence gap indicates that cancer incidence in comparison locations is relatively higher than in California. A positive (negative) coefficient on *Prop65* would indicate Proposition 65 led to a larger (smaller) gap consistent (inconsistent) with its intent of lowering incidence in California.

Preliminary empirical work indicated serial correlation whereby error terms in the empirical model (whereby the cancer gap is regressed on a constant and *Prop65*) are correlated. This violates the ordinary least squares (OLS) assumption of uncorrelated error terms and leads to misestimated standard errors. Durbin-Watson (D-W) statistics far outside acceptable ranges, indicate first-order serial correlation. An autoregressive trend correction—AR(1)—is used, which is a common method of dealing with serial correlation concerns in time series studies. The

results tables also list Ljung-Box Q-statistics for lags of two and three years to test for higher-order serial correlation.

All sexes / Figure 1 displays SEER 9 cancer incidence rates for all sexes over the 1974–2009 time period. Incidence rates rose and peaked around 1993 in all four locations. Rates then fell from peak levels, with the steepest declines in Atlanta and San Francisco. Casual inspection indicates all four locations experienced falling cancer incidence around the same time period, although only San Francisco citizens were living under Proposition 65.

Table 1, Panel A displays OLS regressions of cancer incidence gaps of Atlanta–San Francisco. *Prop65* exerts a statistically significant (p = 0.02) positive effect only under the 2000–2009 lag structure. D-W and Q statistics indicate no concerns of serial correlation.

Figure 1

AGE-ADJUSTED SEER 9 CANCER INCIDENCE RATES ALL GENDERS, ALL RACES

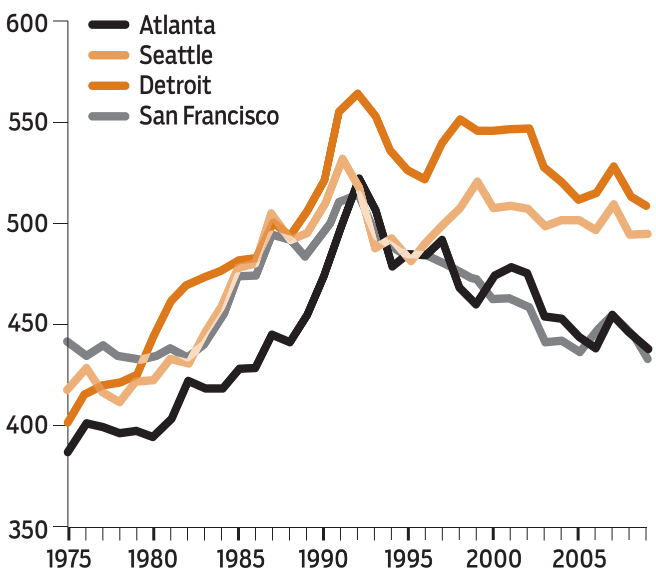

Table 1

OLS RESULTS FOR PROPOSITION 65 AND CONTROL CITIES:

Panel A. Dependent Variable: Atlanta–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	-4.82	-0.84	0.84	0.73	44.87	1.98	0.11	0.19
	(0.77)	(0.95)	(<.001)		(<.001)		(0.74)	(0.91)
1997	-17.21	17.58	0.75	0.75	49.27	1.73	0.67	0.73
	(0.09)	(0.11)	(<.001)		(<.001)		(0.41)	(0.69)
1998	10.54	-15.82	0.90	0.74	47.53	2.01	0.05	0.38
	(0.70)	(0.20)	(<.001)		(<.001)		(0.82)	(0.83)
1999	-7.40	2.55	0.82	0.73	44.94	1.98	0.08	0.19
	(0.59)	(0.82)	(<.001)		(<.001)		(0.77)	(0.91)
2000	-17.55	23.46	0.77	0.77	55.14	1.92	0.15	0.17
	(0.07)	(0.02)	(<.001)		(<.001)		(0.70)	(0.92)
2001	-10.16	7.91	0.80	0.73	45.68	2.03	0.06	0.33
	(0.41)	(0.51)	(<.001)		(<.001)		(0.81)	(0.84)
2002	-8.57	5.53	0.81	0.73	45.28	1.96	0.14	0.29
	(0.51)	(0.64)	(<.001)		(<.001)		(0.70)	(0.87)
2003	-5.61	0.09	0.83	0.73	44.87	1.98	0.08	0.16
	(0.70)	(0.99)	(<.001)		(<.001)		(0.78)	(0.92)
2004	-6.67	2.42	0.83	0.73	44.95	1.98	0.04	0.11
	(0.62)	(0.84)	(<.001)		(<.001)		(0.84)	(0.95)
2005	-4.76	-1.87	0.83	0.73	44.92	2.00	0.09	0.17
	(0.74)	(0.87)	(<.001)		(<.001)		(0.77)	(0.92)

Number of observations = 34, Mean Dependent Variable = -4.02 P-values in parentheses

Figure 2

AGE-ADJUSTED SEER 9 CANCER INCIDENCE RATES MALE, ALL RACES

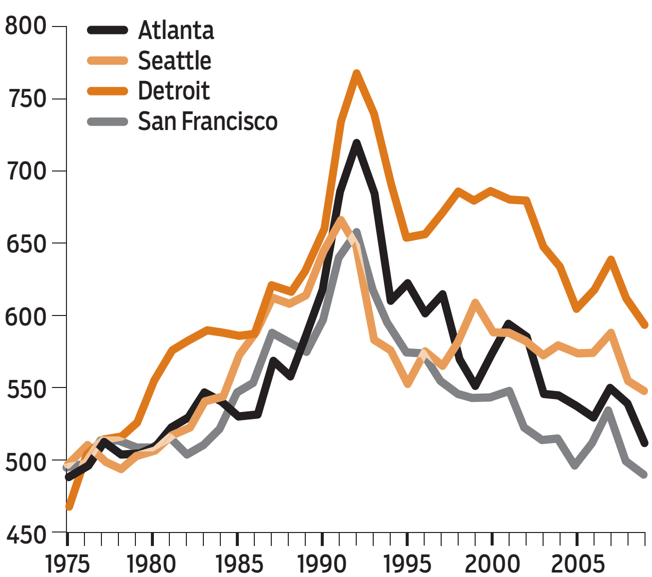

Table 2

OLS RESULTS FOR PROPOSITION 65 AND CONTROL CITIES:

Panel A. Dependent Variable: Atlanta–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	19.31	3.61	0.63	0.40	11.97	2.06	0.66	1.32
	(0.11)	(0.82)	(<.001)		(<.001)		(0.42)	(0.52)
1997	11.57	21.77	0.62	0.44	14.10	1.89	0.34	0.94
	(0.27)	(0.13)	(<.001)		(<.001)		(0.56)	(0.63)
1998	29.57	-17.18	0.75	0.41	12.38	2.13	0.57	0.89
	(0.09)	(0.39)	(<.001)		(<.001)		(0.45)	(0.64)
1999	20.32	1.96	0.64	0.40	11.96	2.04	0.43	1.10
	(0.07)	(0.89)	(<.001)		(<.001)		(0.51)	(0.58)
2000	15.15	16.92	0.62	0.42	13.12	2.03	0.72	1.5
	(0.13)	(0.25)	(<.001)		(<.001)		(0.40)	(0.48)
2001	16.29	14.85	0.62	0.42	12.80	2.09	1.07	1.38
	(0.11)	(0.32)	(<.001)		(<.001)		(0.30)	(0.50)
2002	16.81	14.68	0.63	0.42	12.76	2.02	0.41	1.06
	(0.10)	(0.35)	(<.001)		(<.001)		(0.52)	(0.59)
2003	24.82	-12.34	0.69	0.41	12.33	2.09	0.70	1.49
	(0.05)	(0.51)	(<.001)		(<.001)		(0.40)	(0.47)
2004	21.11	0.01	0.65	0.40	11.95	2.05	0.49	1.16
	(0.05)	(0.99)	(<.001)		(<.001)		(0.48)	(0.56)
2005	19.37	8.67	0.65	0.40	12.18	2.02	0.61	1.59
	(0.06)	(0.61)	(<.001)		(<.001)		(0.43)	(0.45)

Number of observations = 34 Mean Dependent Variable = 19.60 P-values in parentheses

Table 1, Panel B displays OLS regressions of cancer incidence gaps of Detroit–San Francisco. *Prop65* exerts a statistically significant (p = 0.03) positive effect only under the 1997–2009 lag structure. The D-W statistic, however, lies on the border of the inconclusive range, thus calling into question its true significance. Q statistics indicate no higher-order serial correlation.

Table 1, Panel C displays OLS regressions of incidence gaps of Seattle–San Francisco. *Prop65* exerts a statistically significant (p = 0.04) positive effect only under the 1999–2009 lag structure. D-W and Q statistics indicate no concern for serial correlation.

Males / Figure 2 displays SEER 9 cancer incidence gaps for males over the 1974–2009 time period. Inspection indicates incidence

BOTH SEXES, 1974–2009

Panel B. Dependent Variable: Detroit–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	103.02 (0.09)	-11.46 (0.26)	0.95 (<.001)	0.94	251.79 (<.001)	1.50	2.31 (0.13)	3.93 (0.14)
1997	52.46 (0.03)	22.07 (0.03)	0.91 (<.001)	0.94	282.99 (<.001)	1.60	1.98 (0.16)	3.41 (0.18)
1998	59.18 (0.04)	15.97 (0.12)	0.91 (<.001)	0.94	261.86 (<.001)	1.77	1.08 (0.30)	2.54 (0.28)
1999	81.48 (0.07)	-.71 (0.94)	0.93 (<.001)	0.93	242.12 (<.001)	1.62	1.50 (0.22)	3.20 (0.20)
2000	69.22 (0.05)	8.24 (0.43)	0.92 (<.001)	0.93	247.12 (<.001)	2.17	1.20 (0.27)	3.66 (0.16)
2001	81.97 (0.07)	-1.10 (0.92)	0.93 (<.001)	0.93	242.17 (<.001)	1.62	1.44 (0.23)	3.08 (0.21)
2002	73.93 (0.06)	5.03 (0.63)	0.93 (<.001)	0.93	243.97 (<.001)	1.60	1.55 (0.21)	3.05 (0.22)
2003	83.71 (0.07)	-2.46 (0.82)	0.94 (<.001)	0.93	242.53 (<.001)	1.63	1.33 (0.25)	3.05 (0.22)
2004	91.79 (0.09)	-7.81 (0.45)	0.94 (<.001)	0.93	246.53 (<.001)	1.66	1.10 (0.29)	2.76 (0.25)
2005	86.10 (0.07)	-4.47 (0.66)	0.93 (<.001)	0.93	243.59 (<.001)	1.67	1.20 (0.27)	2.99 (0.22)

Number of observations = 36 Mean Dependent Variable = 38.38 P-values in parentheses

Panel C. Dependent Variable: Seattle–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	61.62 (0.35)	0.67 (0.94)	0.95 (<.001)	0.88	126.02 (<.001)	2.24	0.89 (0.34)	1.29 (0.52)
1997	31.70 (0.23)	14.78 (0.12)	0.91 (<.001)	0.89	135.04 (<.001)	2.32	1.59 (0.21)	2.03 (0.36)
1998	29.09 (0.22)	16.51 (0.09)	0.90 (<.001)	0.89	137.02 (<.001)	2.51	3.62 (0.06)	3.82 (0.15)
1999	24.10 (0.22)	21.22 (0.04)	0.88 (<.001)	0.89	144.97 (<.001)	2.29	1.48 (0.22)	1.90 (0.39)
2000	83.08 (0.46)	-5.13 (0.61)	0.96 (<.001)	0.88	127.11 (<.001)	2.20	0.073 (0.39)	0.94 (0.62)
2001	62.74 (0.38)	0.29 (0.97)	0.95 (<.001)	0.88	126.00 (<.001)	2.24	0.88 (0.35)	1.28 (0.53)
2002	56.47 (0.34)	2.61 (0.79)	0.49 (<.001)	0.88	126.28 (<.001)	2.24	0.94 (0.33)	1.47 (0.48)
2003	42.34 (0.26)	18.24 (0.13)	0.93 (<.001)	0.81	75.24 (<.001)	2.02	0.92 (0.34)	0.93 (0.63)
2004	57.16 (0.35)	2.51 (0.81)	0.94 (<.001)	0.88	126.26 (<.001)	2.24	1.01 (0.32)	1.41 (0.49)
2005	53.29 (0.32)	4.54 (0.66)	0.94 (<.001)	0.88	126.90 (<.001)	2.18	0.58 (0.45)	0.88 (0.64)

Number of observations = 36 Mean Dependent Variable = -52.01 P-values in parentheses

MALES 1974–2009

Panel B. Dependent Variable: Detroit–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	105.42 (0.01)	3.74 (0.83)	0.90 (<.001)	0.89	149.91 (<.001)	1.39	2.54 (0.11)	5.12 (0.08)
1997	81.04 (<.001)	33.317 (0.04)	0.88 (<.001)	0.91	171.38 (<.001)	1.46	1.70 (0.19)	3.35 (0.19)
1998	89.15 (0.01)	23.35 (0.18)	0.89 (<.001)	0.90	159.56 (<.001)	1.47	1.74 (0.19)	3.11 (0.21)
1999	111.53 (0.01)	-2.03 (0.91)	0.91 (<.001)	0.89	149.76 (<.001)	1.49	2.71 (0.10)	5.19 (0.08)
2000	104.07 (0.01)	6.22 (0.72)	0.90 (<.001)	0.90	150.36 (<.001)	1.36	2.97 (0.09)	5.60 (0.06)
2001	117.42 (0.01)	-8.48 (0.63)	0.91 (<.001)	0.89	150.92 (<.001)	1.33	3.29 (0.07)	5.90 (0.05)
2002	94.78 (0.01)	23.32 (0.17)	0.89 (<.001)	0.91	160.22 (<.001)	1.16	5.07 (0.02)	7.15 (0.03)
2003	131.29 (0.02)	-23.02 (0.19)	0.93 (<.001)	0.90	159.31 (<.001)	1.33	3.53 (0.06)	6.7 (0.04)
2004	123.03 (0.02)	-16.85 (0.32)	0.92 (<.001)	0.90	154.81 (<.001)	1.49	1.55 (0.21)	4.94 (0.09)
2005	115.77 (0.01)	-9.28 (0.58)	0.91 (<.001)	0.89	151.23 (<.001)	1.42	2.36 (0.13)	4.41 (0.11)

Number of observations = 36, Mean Dependent Variable = 74.73 P-values in parentheses

Panel C. Dependent Variable: Seattle–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	16.66 (0.18)	28.43 (0.04)	0.75 (<.001)	0.75	51.64 (<.001)	1.40	5.26 (0.02)	5.26 (0.07)
1997	19.03 (0.12)	23.96 (0.08)	0.73 (<.001)	0.73	48.11 (<.001)	1.61	2.04 (0.15)	2.06 (0.36)
1998	13.41 (0.15)	36.67 (0.01)	0.67 (<.001)	0.76	55.52 (<.001)	1.62	1.55 (0.21)	1.61 (0.45)
1999	13.94 (0.14)	38.35 (0.01)	0.67 (<.001)	0.77	57.77 (<.001)	1.38	3.96 (0.05)	5.52 (0.06)
2000	51.25 (0.17)	-14.30 (0.41)	0.89 (<.001)	0.73	46.131 (<.001)	1.40	3.24 (0.07)	3.25 (0.20)
2001	32.75 (0.10)	4.96 (0.77)	0.83 (<.001)	0.72	45.25 (<.001)	1.45	3.26 (0.07)	3.26 (0.20)
2002	21.51 (0.08)	28.58 (0.08)	0.75 (<.001)	0.75	51.19 (<.001)	1.35	3.71 (0.05)	4.50 (0.11)
2003	30.91 (0.09)	9.07 (0.59)	0.81 (<.001)	0.72	45.60 (<.001)	1.49	2.79 (0.10)	2.88 (0.24)
2004	29.91 (0.09)	12.36 (0.46)	0.81 (<.001)	0.73	66.11 (<.001)	1.47	2.85 (0.09)	2.88 (0.24)
2005	28.14 (0.08)	19.48 (0.23)	0.81 (<.001)	0.73	47.98 (<.001)	1.37	2.82 (0.05)	3.88 (0.14)

Number of observations = 35, Mean Dependent Variable = 23.38 P-values in parentheses

rates rose and peaked around 1993 in all four locations. Rates then fell from peak levels in all four locations. Casual inspection of the data indicates all four locations experienced falling cancer incidence around the same time period.

Table 2, Panel A displays OLS regressions of cancer incidence gaps of Atlanta–San Francisco. *Prop65* exerts no statistically significant effects. D-W and Q statistics indicate no concerns of serial correlation.

Table 2, Panel B displays OLS regressions of incidence gaps of Detroit–San Francisco. *Prop65* exerts a statistically significant (p = 0.04) positive effect only under the 1997–2009 lag structure. The D-W statistic, however, lies on the border of the inconclusive range, thus calling into question its true effect. Q statistics indicate no higher-order serial correlation.

Table 2, Panel C displays OLS regressions of incidence gaps of Seattle–San Francisco. *Prop65* exerts a statistically significant (p = 0.04) positive effect under the 1996–2009 lag structure; however, D-W and Q statistics indicate serial correlation is a likely problem. *Prop65* exerts a statistically significant (p = 0.01) positive effect under 1998–2009 and 1999–2009 lag structures; however, serial correlation is likely in the latter case (1999–2009) based on D-W and Q statistics.

Females / Figure 3 displays SEER 9 cancer incidence rates of females over the 1974–2009 time period. Inspection indicates incidence rates rose continually in Detroit and Seattle. Incidence peaked around 1986 in San Francisco and around 2001 in Atlanta, with both locations exhibiting reductions following their peaks.

Table 3, Panel A displays OLS regressions of cancer incidence gaps of Atlanta–San Francisco. *Prop65* exerts statistically significant (p = 0.01) positive effects only under the 2000–2009 lag structure. D-W and Q statistics indicate no concerns of serial correlation.

Table 3, Panel B displays OLS regressions of incidence gaps of Detroit–San Francisco. *Prop65* exerts a statistically significant (p = 0.04) positive effect only under the 1996–2009 lag structure; however, D-W and Q statistics indicate serial correlation problems, thus calling this effect into question.

Table 3, Panel C displays OLS regressions of incidence gaps of Seattle–San Francisco. *Prop65* exerts no statistically significant effects. All equations have serial correlation problems.

Summary / In sum, casual inspection of trends indicate that cancer incidence rates of all sexes and for males specifically in all four locations were quite similar even though only San Francisco citizens were subject to Proposition 65. Very weak evidence is indicated that Proposition 65 exerted a positive and statistically significant effect on cancer incidence gaps between three comparison locations and San Francisco for all sexes, males, or females. A few isolated significant effects (p = 0.03) on cancer incidence provides little confidence that Proposition 65 has systematically lowered cancer incidence when the effects vanish with slight changes in lag lengths.

COSTS OF PROPOSITION 65

Assessing the costs of Proposition 65 is a complex task because

FIGURE 3

AGE-ADJUSTED SEER 9 CANCER INCIDENCE RATES FEMALE, ALL RACES

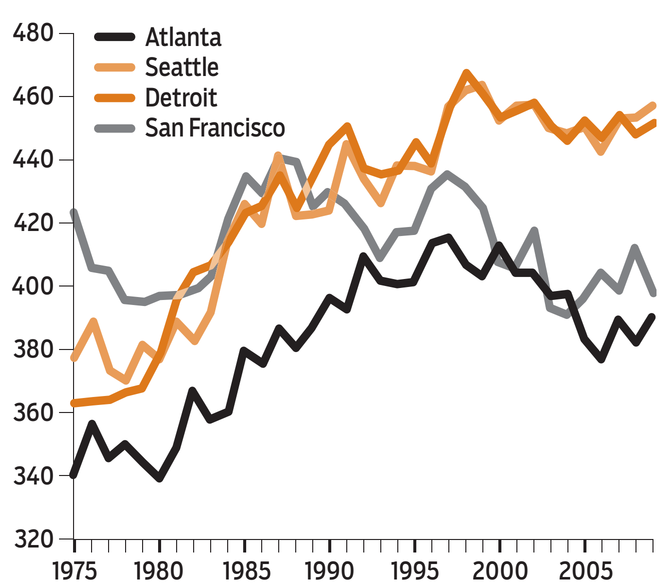

TABLE 3

OLS RESULTS FOR PROPOSITION 65 AND CONTROL CITIES:

Panel A. Dependent Variable: Atlanta–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	-34.57 (<.001)	18.36 (0.07)	0.59 (<.001)	0.64	30.71 (<.001)	1.92	0.01 (0.93)	1.31 (0.52)
1997	-32.48 (<.001)	15.60 (0.15)	0.62 (<.001)	0.64	29.98 (<.001)	1.94	0.13 (0.71)	1.37 (0.50)
1998	-30.82 (<.001)	13.36 (0.23)	0.65 (<.001)	0.63	29.49 (<.001)	1.99	0.41 (0.52)	2.57 (0.28)
1999	-32.39 (<.001)	17.88 (0.08)	0.62 (<.001)	0.65	31.134 (<.001)	2.09	0.28 (0.60)	3.05 (0.22)
2000	-34.40 (<.001)	25.77 (0.01)	0.64 (<.001)	0.69	37.53 (<.001)	1.99	0.10 (0.76)	1.67 (0.43)
2001	-26.45 (.01)	7.12 (0.59)	0.71 (<.001)	0.63	28.79 (<.001)	2.06	0.63 (0.43)	2.64 (0.27)
2002	-22.67 (.05)	-0.22 (0.99)	0.75 (<.001)	0.62	28.46 (<.001)	2.07	0.72 (0.40)	2.54 (0.28)
2003	-29.06 (<.001)	17.91 (0.12)	0.70 (<.001)	0.65	31.96 (<.001)	1.99	0.14 (0.70)	1.65 (0.44)
2004	-25.55 (0.01)	7.94 (0.53)	0.73 (<.001)	0.63	29.04 (<.001)	2.04	0.39 (0.53)	2.05 (0.36)
2005	-17.57 (0.20)	-12.40 (0.36)	0.79 (<.001)	0.63	29.58 (<.001)	2.17	1.15 (0.28)	2.04 (0.36)

Number of observations = 34, Mean Dependent Variable = -29.46 P-values in parentheses

no one compliance strategy works for all businesses. Business owners must determine whether to post warning labels, stop production, reformulate, and/or ignore Proposition 65. Choosing the appropriate course of action involves many complex questions that involve research, legal costs, and tastes for risk. Businesses must determine whether to even test their products for listed toxic chemicals. They must also bear costs associated with determining whether their products meet the legal criteria of mandatory labeling.

Businesses will predict customer reactions to the alternative courses of action. Posting warning signs may weaken demand for their products unless businesses predict consumers will simply ignore the signage. Reformulation may weaken consumer demand if products become less desirable. Reformulation may be costly simply because businesses would have chosen to reformulate previously if they had found it profitable. Tastes, coloring, product longevity, and weight are just a few product attributes that might change following reformulation. Businesses will assess whether price changes stemming from reformulation will weaken consumer demand considerably and compare this against costs of reformulation. Businesses might also simply withdraw products from markets.

Ignoring the law can be costly. Lawsuits can damage reputation, weaken product demand, and result in legal costs and penalties. Proposition 65's enforcement mechanism allows environmental groups or concerned citizens to enforce the law. However, the rise of opportunistic plaintiff lawyers, often referred to as "bounty hunters," is one outcome of this mechanism because they were given significant incentives to work toward earning attorney fees. Proposition 65 allows anyone bringing lawsuits to collect a portion of the civil penalties. Civil penalties of up to $2,500 per day for each violation are allowed, with one-quarter going to the party bringing suit. These payments are not linked to litigation costs, but are in effect "profits" without associated costs from litigation. Plaintiffs threatening litigation have increasingly switched their focus to demanding that businesses surrender payments directly to them rather than paying civil penalties.

Plaintiffs are entitled to reimbursement of their costs of bringing a Proposition 65 suit. Businesses, however, are unlikely to collect their attorneys' fees even if they prevail in court. Businesses are thus likely to be stuck with paying attorney fees on both sides of the case, as well as civil penalties, thus creating significant profit motives for the bounty hunters. Expert witnesses and the indefinite nature of standards make for costly case-by-case litigation. Proposition 65 also burdens businesses to prove exposures to toxic chemicals do not exceed the law.

In reaction to growing public scrutiny over bounty hunting, the California State Legislature amended the law in 1999 to stem the "hiding" of settlements by requiring would-be plaintiffs to file copies of their settlements with the California attorney general. No more private confidential settlements were allowed whereby businesses "paid off" parties bringing threats of lawsuits. Fuller disclosure has likely led to fewer suits or threats of suit, but no data exist on how many such instances occurred prior to 1999.

The Legislature amended Proposition 65 again in 2001 to require litigators to provide "certificates of merit" (attesting that experts had been consulted) prior to proceeding to litigation. The

FEMALES, 1974–2009

Panel B. Dependent Variable: Detroit–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	96.07 (0.23)	-22.54 (0.04)	0.95 (<.001)	0.91	170.08 (<.001)	2.53	5.15 (0.02)	6.22 (0.04)
1997	27.84 (0.22)	14.85 (0.18)	0.89 (<.001)	0.90	157.56 (<.001)	2.54	4.71 (0.03)	5.59 (0.06)
1998	25.48 (0.23)	17.75 (0.11)	0.88 (<.001)	0.90	161.46 (<.001)	2.69	8.00 (<.001)	9.53 (<.001)
1999	45.11 (0.20)	-0.79 (0.94)	0.91 (<.001)	0.89	149.35 (<.001)	2.61	5.65 (0.02)	6.42 (0.04)
2000	33.01 (0.20)	11.164 (0.33)	0.90 (<.001)	0.90	153.96 (<.001)	2.61	5.60 (0.02)	7.52 (0.02)
2001	39.15 (0.20)	5.77 (0.62)	0.91 (<.001)	0.89	150.55 (<.001)	2.59	5.20 (0.02)	6.22 (0.04)
2002	61.58 (0.22)	-9.64 (0.40)	0.93 (<.001)	0.90	152.75 (<.001)	2.55	5.06 (0.02)	6.10 (0.05)
2003	17.71 (0.18)	17.71 (0.11)	0.89 (<.001)	0.90	162.58 (<.001)	2.50	4.36 (0.04)	5.04 (0.08)
2004	47.74 (0.20)	-1.24 (0.91)	0.92 (<.001)	0.89	149.38 (<.001)	2.60	5.43 (0.02)	6.23 (0.04)
2005	45.77 (0.19)	0.45 (0.97)	0.92 (<.001)	0.89	149.33 (<.001)	2.60	5.50 (0.02)	6.30 (0.04)

Number of observations = 36, Mean Dependent Variable = 11.85 P-values in parentheses

Panel C. Dependent Variable: Seattle–San Francisco

Lag	Constant	Prop 65	AR(1)	Adj. R^2	F-Stat	D-W	Q, lag = 2	Q, lag =3
1996	101.52 (0.50)	-17.21 (0.16)	0.96 (<.001)	0.84	91.21 (<.001)	2.92	15.41 (<.001)	15.87 (<.001)
1997	14.61 (0.40)	22.598 (0.07)	0.85 (<.001)	0.84	93.29 (<.001)	2.69	11.07 (0.001)	11.65 (<.001)
1998	24.95 (0.34)	13.18 (0.31)	0.89 (<.001)	0.84	88.25 (<.001)	2.92	16.16 (0.001)	16.59 (<.001)
1999	26.48 (0.34)	12.38 (0.35)	0.89 (<.001)	0.84	88.00 (<.001)	2.87	13.35 (<.001)	13.37 (0.001)
2000	32.19 (0.34)	8.37 (0.53)	0.91 (<.001)	0.83	86.73 (<.001)	2.87	14.23 (<.001)	15.14 (0.001)
2001	32.35 (0.34)	8.71 (0.51)	0.91 (<.001)	0.83	86.88 (<.001)	2.81	11.98 (.001)	12.49 (0.002)
2002	78.03 (0.50)	-11.74 (0.36)	0.96 (<.001)	0.83	88.06 (<.001)	2.86	13.40 (<.001)	13.99 (0.001)
2003	24.18 (0.31)	19.48 (0.13)	0.89 (<.001)	0.84	93.10 (<.001)	2.76	12.37 (<.001)	12.53 (0.002)
2004	43.18 (0.36)	1.68 (0.90)	0.93 (<.001)	0.83	85.65 (<.001)	2.87	13.92 (<.001)	14.44 (0.001)
2005	52.53 (0.41)	-3.72 (0.78)	0.94 (<.001)	0.83	85.85 (<.001)	2.92	14.99 (<.001)	15.69 (<.001)

Number of observations = 35, Mean Dependent Variable = 12.91 P-values in parentheses

California Appellate Court in 2006 noted that bringing a Proposition 65 bounty-hunter action is so "absurdly easy" that the attorneys' fees paid by defendants to avoid litigation are "objectively unconscionable." While the attorney general now opposes some claims, amendments have done little to better connect civil penalties with real health dangers from failing to post warning signs.

Over 2000–2011, there were 2,381 settlements. In 2011 alone, there were 338 settlements—the highest number of any year in this period. No information exists on how many settlements occurred prior to the 1999 amendments. Total settlement amounts over the 2000–2011 time frame totaled nearly $180 million (in 2011 dollars). That figure underestimates total costs to firms because it does not include legal and expert witness costs of defendants or court costs for cases that went to trial. Plaintiffs receive most settlement dollars in the forms of attorney fees and "other" payments made directly to organizations bringing suits or other organizations designated by filing organizations, with the California government receiving less than 15 percent of settlement costs in recent years.

CONCLUSION

This article has examined whether cancer rates in California have fallen significantly since the introduction of Proposition 65. The empirical strategy examined whether the state's cancer rates changed when compared to other locations that did not adopt similar "right-to-know" laws. Little to no statistical support was found that Proposition 65 significantly influenced cancer incidence in California. Lack of available data did not allow for a similar examination of the law's effect on reproductive health. Future availability of a suitable data set to test this effect would be a useful endeavor.

Proposition 65 imposes costs on many citizens. Obvious but unknown costs are those associated with lawsuit settlements prior to the 1999 amendments when plaintiffs were required to file copies of their settlements with the California attorney general. No estimates are available for years prior to 2000, but they were likely much higher during the era in which defendants could simply "pay off" litigants without public trial, public knowledge, or civil penalties. Settlement costs of nearly $180 million over 2000–2011 underestimate total costs over this period since they do not include legal costs of plaintiffs or court costs.

Consumers, workers, and taxpayers bear "hidden" costs for Proposition 65 that are difficult to quantify because there is no "one-size-fits-all" strategy for businesses dealing with the law. Business owners must determine whether to post warning labels, stop production, reformulate, and/or ignore Proposition 65. Appropriate courses of action involve many complex questions that involve research, legal costs, and consumer reactions as they consider the legal criteria of mandatory labeling. Meanwhile, costs are imposed on many parties that include business owners, consumers, workers, and taxpayers. Taxpayers pick up administrative costs and uncompensated court costs. Businesses bear testing and labeling costs, lost sales from consumers unhappy with warning signs, reformulated products, withdrawn products, and bad publicity stemming from lawsuits. Consumer surplus falls when prices rise. Workers may suffer lower income or job insecurity as a result of costs imposed on businesses. Governments receive less tax revenue because of lost sales and reduced employment.

Reform / The California State Legislature does not exercise free rein to amend Proposition 65 because it was enacted on an initiative measure. Proposition 65 does permit legislative amendment, but imposes significant restrictions on the power of the Legislature to change the law. Any amendment must "further the purpose" of the initiative and must be approved by a two-thirds supermajority vote.

Despite those limitations, two reform measures have been offered. One is to change the burden of proof so that plaintiffs have to incur costs of proving exposures above the "no significant risk" and "no observable effect" levels. This change would likely decrease the number of low-merit and outright frivolous lawsuits brought by plaintiffs counting on high litigation costs (borne by defendants) to push defendants to settle cases. The other change would be to update the risk assessment methodology so that the criterion for posting warnings no longer contains low-probability risks. A focus on large probability risks would improve risk communication if it steered consumers toward making better decisions.

In sum, public health has not demonstrably improved because of Proposition 65, as evidenced by this study's empirical examination. But the law has imposed many costs on business owners, workers, customers, and taxpayers. Public health also suffers if Proposition 65 lessens efforts of increasing public awareness of how to reduce exposures to established risk factors for cancer and reproductive harm. R

READINGS

■ "An Exaggerated And Ill-Conceived Sense Of Risk: The Ephemeral Nature of California's Proposition 65," by Thomas H. Clarke Jr. Washington Legal Foundation Working Paper No. 136, January 2006.

■ "Bounty Hunters and the Public Interest: A Study of California Proposition 65," by Anthony T. Caso. *Engage*, Vol. 13, No. 1 (March 2012).

■ "California Proposition 65 in the Hospitality Context," by Suzanne Henderson. Hospitality Law Conference (Houston, Texas), Jan. 22–23, 2004.

■ "California's Attorney General Acknowledges Prop 65 Abuse," by Lisa L. Halko. Washington Legal Foundation *Legal Backgrounder*, Vol. 22, No. 29 (July 27, 2007).

■ "California's Proposition 65 and the Limits of Information Economics," by Michael Barsa. *Stanford Law Review*, Vol. 49, No. 5 (May 1997).

■ *Product Risk-Labeling: A Federal Responsibility*, by W. Kip Viscusi. AEI Press, 1993.

■ "The 'California Effect' and the Future of American Food: How California's Growing Crackdown on Food and Agriculture Harms the State and the Nation," by Baylen J. Linnekin. *Chapman Law Review*, Vol. 13 (2010).

■ "The Ethics and Cultural Politics of Reproductive Risk Warnings: A Case Study of California's Proposition 65," by Rebecca Kukla. *Health, Risk, and Society*, Vol. 12, No. 4 (August 2010).

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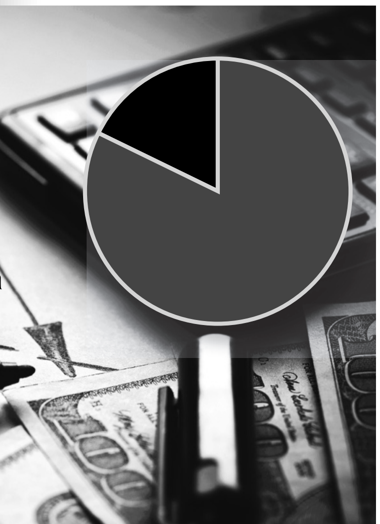

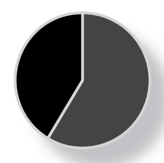

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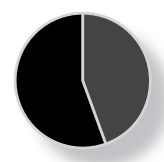

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