What to Expect from California's New Motor Voter Law

Technical Appendices

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Appendix A: Estimating the Annual Eligible but Unregistered DMV Customer Base

To determine how quickly new registrants might be added to the registration rolls, we must first establish how many people use the DMV for one of the transactions covered by the law, and how many of those people are likely to be registered already. The easiest way to obtain this information would be to use a data set of individual DMV records, and match on demographics to the Current Population Survey (CPS) of the US Census to identify likely registration rates.

Unfortunately, such data are not available. In lieu of individual-level data, we work with publicly available records. These consist of state-level summaries for various demographic groups in various 12-month periods. The estimates we are able to generate with these sources are necessarily approximate, but they give a broad sense of magnitudes and are far more precise than any other previous estimates.

There are four steps to our process: (1) identify all available pieces of information about driver's licenses and ID cards; (2) where necessary, use this information to generate estimates of the volume of customer transactions in a given year, with as many demographic specifics as possible; (3) use the demographic information to identify the registration rates of similar individuals in the Current Population Survey of the US Census; (4) downweight each population of DMV customers by its registration rate, to reflect the number of people who are actually available to be registered. Once we complete this process for the state as a whole, we use the result to calculate county-level estimates of the same information.

Available Information on DMV Transactions

We have obtained the following information on DMV transactions:

- $NDL \equiv$ The statewide total number of new driver's licenses. For the period July 2014 through June 2015, this number was 1,232,050. Before using this number we subtract out the 396,859 AB 60 driver's licenses issued to undocumented immigrants, which gives us a remainder of 835,191.

- $NID \equiv$ The statewide total number of new IDs. For the period July 2014 through June 2015, this number was 626,250, consisting of 529,451 regular IDs and 96,799 senior IDs.

- $ADD \equiv$ The statewide total number of address updates to existing driver's licenses. For the period July 2014 through June 2015, this number was 2,232,723.

- $DL \equiv$ The statewide total number of driver's licenses. This number was 25,014,468 in January 2015 and 25,914,851 in January 2016.

- $ID \equiv$ The statewide total number of IDs (issued to those who do not already have a driver's license). This number was 2,894,741 in January 2015 and 2,925,964 in January 2016.

- $RENDL \equiv$ The statewide total number of driver's license renewals. For the period July 2014 through June 2015, this number was 5,282,752.

- $RENID \equiv$ The statewide total number of ID renewals. For the period July 2014 through June 2015, this number was 1,073,292, consisting of 935,933 regular renewals and 137,359 senior renewals.

- $DL_A \equiv$ The statewide total number of driver's licenses by age group for each January–December calendar period, 2007–2014. Age is clustered in five-year periods, i.e., 15–19, 20–24, 25–29, etc.

- $DL_C \equiv$ The total number of driver's licenses by county for each January–December calendar period, 2010–2014.

From these numbers, we can approximate:

- $\Delta DL \equiv$ The *change* in DL.
- $\Delta ID \equiv$ The *change* in ID.
- CDL $\equiv$ The statewide total number of *cancelled* or *unrenewed* driver's licenses each year.
- $\Delta DL_A \equiv$ The *change* in DL_A.
- $\Delta ID_A \equiv \Delta ID$ by age group; this number is comparable to ΔDL_A but calculated in a different way.

The first three of these are straightforward. ΔDL and ΔID are simply the difference between 2016 and 2015: $\Delta DL = DL_{2016} - DL_{2015}$ or $\Delta ID = ID_{2016} - ID_{2015}$. CDL is the residual from NDL and ΔDL: CDL = NDL - ΔDL. Calculating CDL is complicated somewhat by the fact that DL is recorded at the beginning of the calendar year and NDL covers July 2014 through July 2015. But ΔDL has been reasonably stable in recent years—it was 353,144 for 2014 and 371,036 for 2015, and a recent spike to 900,383 mostly reflects the 396,859 licenses under the new AB 60 program for undocumented immigrants. Thus, we presume that the numbers are comparable and adjust them at the margins where necessary.

For NID, we only want to include IDs that are held by those who do not also have a driver's license. At the start of 2015, the DMV reported 6,806,626 ID cards, out of which 2,894,741 were held by individuals who did not also have a driver's license. In the absence of more detailed information, we downweight NID by this ratio— 2,894,741 / 6,806,626 = 0.425.

It is somewhat more complicated to calculate ΔDL_A because the age data are grouped into five-year cohorts. That means from one year to the next, the group of people that is being described changes slightly as each cohort brings in new members and ages out the oldest. For example, between 2013 and 2014, the 15–19 age group gains a new class of 15-year-olds and loses the 19-year-olds as they turn 20. To make the changes comparable, we need to compare the groups across five-year time spans (e.g., 2007 to 2012, 2008 to 2013, etc.). Let us refer to these numbers as ΔDL_{A5yr}, and let us refer to the corresponding five-year change for the state as a whole as ΔDL_{5yr}.

To convert these five-year changes to the one-year changes we need for our calculations, we first compute each cohort's share of the total change across that five-year period, i.e., $\Delta DL_{A5yr} / \Delta DL_{5yr}$. With this number, we can then estimate the share of one-year change that also falls in the same category:

$$\Delta DL_A = \Delta DL * (\Delta DL_{A5yr} / \Delta DL_{5yr})$$

This approximation errs to the extent that changes in ΔDL are not uniform across age groups. For example, if one age group were to see a disproportionate spike in its share of driver's licenses in a given year, then this model would not accurately estimate ΔDL_A for that group in that year. To test the robustness of our model, we ran the same calculation on each year from 2007 through 2013. The results were quite consistent across years, with the one exception of 2013, where the gain among the young was even stronger than usual. The younger the estimated population, the more potential registrants there are, because young people are registered at lower rates. Thus, to the extent these calculations overstate the age of the NDLs, they understate the number of new registrants.

Unfortunately, we cannot follow the same process for ΔID_A because we have less information on the age distribution of ID holders. However, we do know that 12.8 percent of new IDs and 15.4 percent of ID renewals went to seniors in 2014–15. Both numbers are very close to the senior share of driver's license holders (14.9%). Thus, for the sake of our calculations, we presume that the age distribution of new ID holders matches the distribution of driver's license holders for the state as a whole.

Estimating Registration Rates

The next step in our process is to use the above information to estimate registration rates for NDLs, ADDs, and RENs. The goal for each will be to identify comparable groups in the Current Population Survey of the US Census which we can use to obtain estimated registration rates.

New Driver's Licenses and ID Cards

NDLs are likely to be quite young, which means their registration rate will be low compared to other groups. In fact, age is likely the most significant demographic identifier for this population. The share of the voting eligible population with a driver's license is so high that it seems the vast majority of the population eventually gets a driver's license, muting other demographic differences in the process. Thus, using age to estimate the existing registration rate for the NDL population offers a good approximation.

For this calculation we have ΔDL_A, the change in driver's licenses by age, and NDL and CDL, which are the total new and discontinued driver's licenses for all age groups. We wish to obtain NDL_A, the number of new driver's licenses by age. Each ΔDL_A is the sum of an NDL_A and a CDL_A, i.e., $\Delta DL_A = NDL_A - CDL_A$. Since New Motor Voter covers new driver's licenses but does not terminate voter registration for cancelled or discontinued ones, for our purposes each CDL_A is a nuisance parameter that must be estimated and then purged from the ΔDL_A.

We can express each ΔDL_A as a weighted sum of the aggregate NDL and CDL:

$$\mathbf{\Delta DL} = NDL*\mathbf{j} - CDL*\mathbf{k} \qquad\qquad [1]$$

where $\mathbf{\Delta DL}$ is an A x 1 vector of the previously calculated ΔDL_A values, and $\mathbf{j}$ and $\mathbf{k}$ are A x 1 vectors of proportions that indicate the fraction of total NDL and CDL that fall in each age group. Because they are proportions, all j_A's and all k_A's must sum to 1 and fall between 0 and 1.

$\mathbf{j}$ and $\mathbf{k}$ are unobserved, so we infer their values from the information we have. To do so, we treat Equation 1 as a constrained optimization problem, and solve it using the limSolve program for R. We first enter Equation 1 as a set of approximations such that:

$$\min(\mathbf{E'} * \mathbf{E}) \qquad\qquad [2]$$

where

$$\mathbf{E} = NDL*\mathbf{j} - CDL*\mathbf{k} - \mathbf{\Delta DL} \qquad\qquad [3]$$

subject to the constraints

$$\mathbf{o} <= \mathbf{j} <= \mathbf{\iota} \qquad\qquad [4]$$

$$\mathbf{o} <= \mathbf{k} <= \mathbf{\iota} \qquad\qquad [5]$$

$$\mathbf{\iota'} * \mathbf{j} = 1 \qquad\qquad [6]$$

$$\mathbf{\iota'} * \mathbf{k} = 1 \qquad\qquad [7]$$

where $\mathbf{\iota}$ is an A x 1 vector of 1's and $\mathbf{o}$ is an A x 1 vector of 0's. Equations 2 and 3 indicate we are seeking to minimize the sum of the squared residuals across all the individual equalities of Equation 1; Equations 4 through 7 simply formalize the constraint that the j_A's and k_A's are proportions as mentioned above. The R script with the specifications for this system of equations is available from the authors upon request.

When we run this set of equations, we obtain a vector $\mathbf{j}$ that suggests virtually all of the NDLs for recent years have been acquired by people under the age of 35: 34 percent are under 20 years old, 55 percent are between 20 and 24 years old, and the rest are between 25 to 34 years old. This is clearly an approximation, since there are

certainly some older people who obtain new driver's licenses when they move to California or simply decide to begin driving later in life. Nonetheless, the result does have some face validity. More people have been moving away from California than moving to it (Johnson 2014), meaning all of the state's net population growth is now coming from native-born residents. Moreover, the number of eligible residents who first begin to drive when they are older than 35 is probably very small. Thus, while these values of j_A are likely somewhat exaggerated due to the ambiguity of the data, they are also likely to be broadly correct.

With these estimates of **j**, we are able to identify the share of NDLs who are likely to be registered to vote by calculating the share of CPS respondents in each age group who are registered and applying those numbers to the estimated age distribution of NDLs. As discussed above, we also generate the same NDL estimates using the estimated ΔDL_A values for each year from 2007 through 2014 to ensure that we are not weighting the ΔDL_A from one pair of years too heavily. The results of this process suggested little variation in the estimates.

As noted above, we have no hard data on the age distribution of the new ID population, but the number of senior IDs is very consistent with a distribution that broadly matches the distribution of driver's licenses for the state as a whole. This assumption also produces a high estimate of potential new registrants (albeit not by much) and so gives administrators and advocates a sense of the high-end magnitude they are likely to see.

Address Changes

Estimating the registration rate of address changers is simplified by the fact that those who change their address have recently moved by definition. The CPS, in turn, asks respondents when they last moved. We assume that all ADDs have moved in the previous year, so estimating the registration rate means assigning the registration rate for last-year movers in the CPS to the population of ADDs. It is worth noting that this process assumes those who have recently moved accurately report their registration status. They may believe they are registered to vote at their new address and find they cannot vote when Election Day comes. AB 1461 would register these voters as well. In that sense, these estimates would understate the number of people who could be given a functional registration status.

Renewals

Renewals are perhaps the most straightforward category to estimate because the requirement to renew is imposed exogenously on all driver's license holders. This makes it reasonable to treat renewal customers as a random subset of the total population of driver's license holders. The one caveat to this approach is that eligible young people under 20 years old cannot have held a driver's license or ID long enough to need a renewal. Thus, we assign the population of renewals the average registration rate for Californians over the age of 20.

Adjusting for Eligibility

There remains one further challenge to producing credible estimates of the New Motor Voter customer base. While we can remove undocumented immigrants from the pool by subtracting out applicants under the AB 60 program (which provides driver's licenses to undocumented immigrants), the DMV also gives driver's licenses and IDs to *documented* immigrants who are not eligible to vote. These voting-ineligible driver's license holders are not identified anywhere in the DMV statistics, so we need to adjust down our numbers with a best estimate for the number who fit this description.

PPIC has estimated that noncitizen immigrants comprise 13 percent of California's population. Of that 13 percent, roughly half are documented and half undocumented (Cuellar Mejia and Johnson 2013). We assume these numbers apply to the population of DMV customers: namely, that all of them (after subtracting out AB 60

applicants) are legal residents, but the same share are naturalized or native-born citizens as we find in the population as a whole. That means roughly 92 percent of DMV customers will be eligible to vote, and we adjust our numbers down accordingly.

Estimating DMV Customers by County

To generate estimates by county, we use the best available county-level estimates of variables that characterize each type of DMV customer.

- NDL—we use the age distribution of residents in each county, as reported by the 2010–2014 five-year American Community Survey (ACS) of the US Census. Within each age category, we calculate the share of all Californians who reside in each county, and then apply that proportion to the raw total number of eligible but unregistered statewide NDLs in that age category, as calculated above.

- NID—we use the hypothetical age distribution described above to follow the NDL process for county-level estimates. Namely, we take the proportion of all Californians in each age category who reside in each county and multiply it by the estimated number of NIDs in that age category.

- ADD—we use data on mobility by county as reported by the 2009–2013 five-year ACS (the most recent estimates available). We calculate each county's share of all movers who moved in the last year, and then apply that proportion to the raw total number of eligible but unregistered statewide ADDs, as calculated above.

- REN—we use data on total driver's licenses by county from the DMV. Since any driver's license holder will eventually need to renew, counties with more outstanding driver's licenses should have a higher number of RENs. We calculate each county's share of all driver's licenses and then apply that proportion to the raw total number of eligible but unregistered statewide RENs, as calculated above.

Once we have these estimates for each type of transaction, we then sum them within each county to obtain the estimated total number of new registrants for that county. To obtain the percentage increase in registration, we divide this number by the total county registrants as reported in the Secretary of State's June 7, 2016 report of registration.

A Note about Pre-Registration

Pre-registration allows residents younger than 18 to place their names on the voter rolls in a provisional status, so and when they turn 18 their records will automatically become active. The goal is to allow young people to register whenever they find it convenient, and let election officials worry about the voter's eligibility in any given election.

California has passed two bills (AB 30 in 2009 and SB 113 in 2014) that extend pre-registration to 16- and 17-year-olds. Because this system will be up and running by the time New Motor Voter is implemented, we treat all 16- and 17-year-olds as potential new registrants in our analysis. This implicitly assumes that, absent the intervention of New Motor Voter, these young people would use pre-registration at the same rate as 18- and 19-year-olds use the traditional registration system today. This is a generous assumption; many 16- and 17-year-olds may choose to wait to register until they can vote in an election. If more take this wait-and-see approach, more will be available to be registered under New Motor Voter instead. That means our approach to these registrants likely understates the potential impact of the New Motor Voter program.

Appendix B: Comparing the New Motor Voter Electorate to All Adults

The main text of the report compares the gap between select demographic groups' share in either the current electorate or the New Motor Voter electorate and their corresponding share among all adults, including noncitizens. Table B1 shows the share of a wider range of demographic groups among all adults, and then shows how close the current (column 2) and estimated New Motor Voter (column 3) electorates come to all adults in each case.

TABLE B1
A successful New Motor Voter program would make the registered population more representative of all adults

Demographic group	Share of all adults	Difference: current—all adults	Difference: potential—all adults
Race/Ethnicity and nationality			
African American	6.4%	1.1%	0.9%
Asian/Pacific Islander	16.8%	-2.4%	-0.9%
Latino	34.5%	-10.7%	-6.7%
Naturalized citizen	17.0%	1.4%	3.1%
Two foreign-born parents	46.0%	-14.9%	-10.4%
Age and socioeconomic status			
Age 18–24	14.2%	-2.7%	0.8%
Family income < $20,000	15.0%	-4.1%	-1.4%
No college education	38.9%	-12.1%	-5.8%
Other demographic factors			
Resident of major metro county	80.2%	0.1%	-0.3%
With disability	10.4%	0.2%	0.5%

SOURCES: US Census Current Population Survey, November 2014 Supplement (registration rates); California Secretary of State (registration rates for counties); US Department of Agriculture (county metro classifications).

NOTES: Categories can and do overlap. The Current Population Survey did not ask noncitizens about mobility, so it is not possible to provide these estimates for those who moved in the last year. The "major metro" counties are those that contain at least part of one of the metro areas of 1 million people or more: Alameda, Contra Costa, El Dorado, Los Angeles, Marin, Orange, Placer, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Mateo, Santa Clara, and Yolo Counties. The "Asian/Pacific Islander" category includes all survey respondents who considered themselves part of either group alone or in combination with some other group (e.g., "white/Asian" or "Pacific Islander/African American").

Overall, New Motor Voter will improve representation for most of these groups, but underrepresentation will persist. The law would all but eliminate underrepresentation for young people (-2.7% to 0.8%) and the poor (-4.1% to -1.4%). On the other hand, underrepresentation would be significantly reduced but far from eliminated for those without a college education (-12.1% to -5.8%), children of foreign-born parents (-14.9% to -10.4%), and Latinos (-10.7% to -6.7%).

In one case—naturalized citizens—the New Motor Voter electorate would actually be slightly *less* representative than the current registered voter population. However, this is largely an artifact of the category. Virtually all ineligible adults in California are noncitizens (a small number are ineligible for other reasons, such as being felons in prison or on parole, or being mentally incapacitated). It follows that, absent a change in the law, we should not expect that adding more naturalized citizens to the rolls would make the electorate more representative of all adults on this dimension. The same is true to a lesser extent for the children of foreign-born parents, since virtually all ineligible adults fall in this category (that is, they are both the children of foreign-born parents and foreign-born themselves).

Appendix C: Motor Voter Document Fix and New Motor Voter Uptake

The DMV is currently fixing its registration process under the federal National Voter Registration Act—the original "Motor Voter" law—by consolidating some of the voter registration form with the form for obtaining a driver's license or changing or renewing an existing one. This process will be long done by the time the New Motor Voter law is implemented. If this policy change encourages a large number of eligible residents to register, it might limit the effect of New Motor voter by significantly shrinking the pool of registration targets. Here we offer some estimates of this potential impact by exploring different scenarios for the Motor Voter document fix.

In generating our estimates for the Motor Voter fix, we must be careful not to overstate the near-term effects. Most of those who would register at the DMV under the first year of the Motor Voter fix would not have reason to return to the DMV in the following year, when New Motor Voter is first implemented. For example, absent an address change, anyone obtaining a new driver's license in the first year would not need to return to the DMV for a qualified transaction until their license came up for renewal five years later. More generally, only those who moved in the first year and whose renewals came due in the second, or who used the DMV for any qualified transaction in the first year and then moved in the second, would end up using the DMV twice in two years. Because we are only interested in this first year of implementation, we develop estimates that only factor in the limited group that will use the DMV twice in two years.

The numbers in Table C1 project total new registrants for the state as a whole. The columns contain the different scenarios for the success of the Motor Voter fix: ones where its impact is large, modest, and small. The more people added by the Motor Voter fix, the less effect New Motor Voter is likely to have. The rows then present, for each of the document fix scenarios, different scenarios for the number of new people added to the rolls by New Motor Voter. In developing these scenarios, we assumed that New Motor Voter is likely to be more effective, such that the "high" adoption rate in Table C1 is higher than the "large impact" adoption rate for the Motor Voter fix. The column with the "small impact" scenarios is the one we present in Figure 3 of the main text.

TABLE C1
Scenarios for projected new registrants under the first year of New Motor Voter

Motor Voter fix has…	…large impact		…modest impact		…small impact	
	Total new registrants	% change	Total new registrants	% change	Total new registrants	% change
New Motor Voter adoption rate is…						
…low	262,051	+1.5%	259,517	+1.5%	262,051	+1.5%
…medium	1,269,496	+7.4%	1,290,617	+7.4%	1,303,290	+7.5%
…high	2,344,049	+13.6%	2,383,278	+13.8%	2,406,816	+13.9%

SOURCES: US Census Current Population Survey, November 2014 Supplement (estimates of current registration rates by demographic categories); California Department of Motor Vehicles (outstanding driver's licenses, number of renewals, address changes, and new driver's licenses); US Department of Transportation (estimates of outstanding driver's licenses by age).

NOTES: For the Motor Voter document fix, "large impact" means the new system registers 50 percent of unregistered voting-eligible individuals who use the DMV, "modest impact" means it registers 25 percent, and "small impact" means 10 percent. For the New Motor Voter adoption rates, "low" means 10 percent, "medium" means 50 percent, and "high" means 93 percent (the current adoption rate in Oregon). This reflects the general assumption that the impact of the earlier consolidation of forms is likely to have smaller effects than the New Motor Voter changes.

The results suggest that the effect of the Motor Voter fix on New Motor Voter registration is very small, and in all cases dwarfed by the effect of New Motor Voter adoption rates. For example, New Motor Voter only registers between 0.1 and 0.3 percentage points fewer people under the "large impact" scenario—where the Motor Voter fix takes a lot of potential registrants off the table—versus the "small impact" scenario where the Motor Voter fix leaves the pool of potential registrants largely untouched. By comparison, the gap between the low and high adoption rates for New Motor Voter suggests an almost 10-fold increase in new registrants. This does not mean that our Motor Voter fix scenarios are too conservative or that the Motor Voter fix has a small effect. Rather, the Motor Voter fix pulls from a different group of people than New Motor Voter in its first year. In the near term, both programs can be successful.

Appendix D: County-level Projections of New Registered Voters

Table D1 shows projections of new registered voters and percent change in registered voters by county under New Motor Voter. These projections use the high-adoption scenario (93% adoption) described in the main text of the report so that county registrars, voting rights advocates, and campaigns can prepare for the largest change they are likely to see in the first year.

TABLE D1
Optimistic estimates of projected new registrants under first year of New Motor Voter, by county

County	Total new registrants	% change		County (cont'd)	Total new registrants	% change
Alameda	98,587	12.6		Orange	198,921	13.9
Alpine	66	9.5		Placer	23,861	11.8
Amador	2,417	11.9		Plumas	1,307	11.4
Butte	17,107	14.3		Riverside	146,421	17.3
Calaveras	2,812	10.7		Sacramento	102,259	15.1
Colusa	1,402	18.7		San Benito	3,805	15.8
Contra Costa	68,381	13.0		San Bernardino	135,179	18.6
Del Norte	1,895	14.6		San Diego	205,512	14.5
El Dorado	12,239	11.7		San Francisco	50,313	11.2
Fresno	58,828	14.1		San Joaquin	46,280	15.8
Glenn	1,725	14.7		San Luis Obispo	21,257	14.5
Humboldt	9,619	12.7		San Mateo	43,727	12.5
Imperial	11,208	18.9		Santa Barbara	30,977	16.2
Inyo	1,128	12.1		Santa Clara	115,629	15.7
Kern	56,610	17.3		Santa Cruz	18,156	13.1
Kings	9,037	19.2		Shasta	12,467	13.5
Lake	4,477	13.8		Sierra	162	7.6
Lassen	2,636	20.5		Siskiyou	3,086	12.5
Los Angeles	589,771	12.2		Solano	28,264	13.7
Madera	8,266	15.4		Sonoma	31,537	13.2
Marin	16,233	11.2		Stanislaus	35,147	16.3
Mariposa	1,113	11.0		Sutter	6,431	15.6
Mendocino	5,662	12.1		Tehama	4,175	14.2
Merced	16,746	19.7		Trinity	825	11.5
Modoc	534	10.7		Tulare	25,914	19.4
Mono	1,065	18.4		Tuolumne	3,625	12.8
Monterey	24,555	14.6		Ventura	51,186	12.9
Napa	8,628	12.5		Yolo	15,931	16.8
Nevada	6,483	10.5		Yuba	5,230	18.2

NOTES: Estimates based on the most aggressive scenario in technical appendix Table C1: "small" impact from the Motor Voter fix and "high" uptake under New Motor Voter. County statistics on age were used to estimate new driver's licenses by county. County statistics on recent movers into the county were used to estimate address changers by county. County statistics on outstanding driver's licenses were used to estimate renewals by county. Additional details can be found in Technical Appendix A.