



Providing driver's licenses to unauthorized immigrants in California improves traffic safety

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The integration of immigrants presents a major challenge for policymakers in the United States. In an effort to improve integration, several US states recently have implemented laws that provide driver's licenses to unauthorized immigrants. These new laws have sparked widespread debate, but we lack evidence on the traffic safety impact of these policies. We examine the short-term effects of the largest-scale policy shift, California's Assembly Bill 60 (AB60), under which more than 600,000 licenses were issued in the first year of implementation in 2015 alone. We find that, contrary to concerns voiced by opponents of the law, AB60 has had no discernible short-term effect on the number of accidents. The law primarily allowed existing unlicensed drivers to legalize their driving. We also find that, although AB60 had no effect on the rate of fatal accidents, it did decrease the rate of hit and run accidents, suggesting that the policy reduced fears of deportation and vehicle impoundment. Hit and run behaviors often delay emergency assistance, increase insurance premiums, and leave victims with significant out of pocket expenses. Overall, the results suggest that AB60 provides an example of how states can facilitate the integration of immigrants while creating positive externalities for the communities in which they live.

driver's licenses | immigration | traffic safety | unauthorized immigrants | integration

Unauthorized immigration is one of the most divisive political issues in the United States. An estimated 11 million immigrants currently live in the United States without legal documentation (1, 2), and about 8% of newborn US citizens have parents who are unauthorized immigrants (3). The current debate centers on sharply contrasting proposals for how to deal with unauthorized immigrants. Some argue that they should be forcibly deported, and others contend that they should be granted amnesty and given a path to American citizenship (4).

Because immigration policy reform has become increasingly gridlocked at the federal level, many state and local governments have begun to implement a variety of policies directed at unauthorized immigrants (ref. 5, pp. 233–237). Some states, such as California and Illinois, have opted for an inclusive and welcoming approach, whereas other states, such as Arizona, Alabama, and Georgia, have taken a more restrictive and exclusionary approach (4, 6). Of these policy reforms, one of the most significant involves giving unauthorized immigrants access to driver's licenses. Because most states require a valid social security number and proof of lawful immigration status, unauthorized immigrants typically cannot legally obtain a driver's license. However, as is shown in Fig. 1, 12 states and the District of Columbia have adopted laws that allow unauthorized immigrants to obtain driver's licenses if the applicant provides certain documentation, such as foreign birth certification or a passport and evidence of state residency. Several other states, such as New Jersey, New York, and Rhode Island, have recently debated similar initiatives.

The new driver's license laws have sparked widespread debate. Opponents have raised concerns that the laws will increase identity theft (7) and attract more unauthorized immigrants (8). Sup-

porters have argued that access to driver's licenses would enable unauthorized immigrants to contribute more to the local economy and improve their access to health care or education (8–10).

Most prominently, there is considerable disagreement about the potential effects of driver's license policies on traffic safety. Opponents argue that providing unauthorized immigrants with access to driver's licenses will increase the number of accidents, because unauthorized immigrants drive older, more accident-prone cars and “often are not able to read road alerts in English” (11). Furthermore, they argue that unauthorized immigrant drivers are less likely to purchase auto insurance and come from countries where “it is not uncommon for motorists involved in accidents to flee the scene,” and therefore, these policies could lead to an increase in hit and run accidents (11). In contrast, proponents have argued that access to driver's licenses can improve road safety by ensuring that drivers are trained, tested, licensed, and insured (12). In their view, the reform may decrease hit and run accidents, because driving with a valid driver's license should encourage unauthorized immigrants to purchase auto insurance and reduce fear of legal persecution or even deportation, thus creating incentives to stay after an accident.

Reducing the number of hit and run accidents would create significant positive externalities. These accidents distort insurance markets and increase average insurance premiums, because drivers who leave the scene of an accident often cannot be identified and held accountable for compensation (9, 10, 13, 14). Moreover, serious injuries and fatalities become more likely when a

Significance

Several states have experimented with more inclusive policies toward immigrants. There is little empirical evidence related to their impact. Our study examines the short-term traffic safety effects of one of the largest-scale state policies focused on the integration of unauthorized immigrants: California's extension of driving privileges to unauthorized immigrants. We find that this policy did not increase the total number of accidents or the occurrence of fatal accidents, but it did reduce the likelihood of hit and run accidents, thereby improving traffic safety and reducing costs for California drivers. Our findings have important implications for policymakers: providing unauthorized immigrants with access to driver's licenses can create positive externalities for the communities in which they live.

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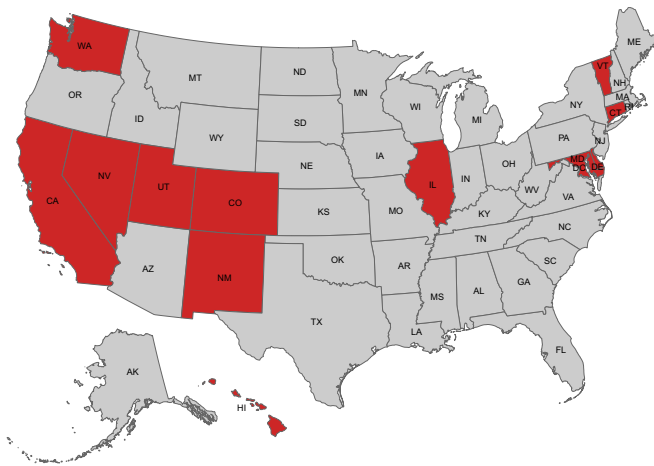


Fig. 1. States granting unauthorized immigrants access to driver's licenses. Twelve states and the District of Columbia have passed laws that allow unauthorized immigrants to obtain driver's licenses.

driver leaves the scene of an accident without helping victims or reporting the incident to the authorities. When emergency assistance is delayed and police do not arrive swiftly to secure the scene, victims may be struck again, or additional accidents can occur (15–17). This delay increases fatality risk in particular, because most deaths in traffic collisions occur within the first 60 minutes after the accident (18, 19).

However, despite the importance of the issue, we know very little about how these policies affect traffic safety or social and economic outcomes. Although studies have found that unlicensed drivers in general are more likely to be involved in accidents (20–22) and hit and run accidents (14, 23, 24), these studies do not examine the impact of policies that extend driver's license access to unauthorized immigrants. Unauthorized immigrants differ from other drivers without a valid license in that they face a risk of deportation and, therefore, might be more likely to leave the scene of an accident to avoid contact with the police. One study has examined how restrictions to obtain driving documents (such as documented presence laws or social security number requirements) affected auto insurance premiums (13), but this study does not consider effects on traffic safety, and their data predate the recent wave of new laws that explicitly grant unauthorized immigrants legal access to driver's licenses. In fact, although these policies are one of the most debated issues in state immigration legislation in recent years, we are not aware of any study that quantifies their impact on traffic safety.

In this research, we take a step toward filling this void by providing a first look at the short-term traffic safety impacts of California's 2013 Assembly Bill 60 (AB60), which California's Department of Motor Vehicles (DMV) estimated would result in 1.4 million license applications in the first 3 years after its implementation in 2015 (25). AB60 enables unauthorized immigrants who cannot prove legal presence in the United States to apply for a special driver's license if they can prove California residency. AB60 licenses allow license holders to drive legally in California, but they cannot be used for federal identification. In addition, AB60 prohibits discrimination against anyone on the basis of holding or presenting the new license. It also explicitly prohibits using the new license to consider an individual's immigration status as a basis for a criminal investigation, arrest, or detention (AB60, Chapter 524).

AB60 provides a crucial case study to learn about the impact of the new driver's license state laws for at least three reasons. First, California is the state with the largest number of unauthorized immigrants, and therefore, the reform is unprecedented

in its scale [estimates of the unauthorized immigrant population in California vary between 2.6 (2) and 2.7 million (26)]. More than 600,000 AB60 licenses were issued in 2015 alone (27). Second, the California case has high external validity, because AB60 is otherwise similar to recent reforms in other states that have extended access to driver's licenses for unauthorized immigrants (28). Third, there is cross-county variation in exposure to the policy in California. This variation allows us to identify the effect of AB60 in a difference in differences design by comparing changes in traffic safety between counties with different levels of exposure.

In theory, AB60 can affect traffic safety through multiple mechanisms. One possibility is that AB60 encourages unauthorized immigrants to begin driving, increasing the number of active drivers. The traffic safety impacts then depend on whether the new drivers are more or less likely to cause accidents compared with existing drivers (risk group effect) and how the addition of new drivers affects the propensity of existing drivers to cause accidents (crowding effect).

Another possibility is that many unauthorized immigrants were already driving without licenses before AB60 was implemented. Because there is limited access to public transportation in many areas, going to work, buying groceries, or taking children to school would all necessitate driving. If we assume that many unauthorized immigrants were driving unlicensed before the reform (we provide empirical evidence of this below), then AB60 allows unlicensed drivers to legalize their driving by obtaining a valid AB60 license. This legalization can affect traffic safety in various ways.

If, for instance, unlicensed immigrant drivers are generally defensive in their driving habits, because they lack a license and authorized status, we might expect accidents to actually increase, because providing licenses would reduce the fear of being stopped by the police for traffic violations (moral hazard effect). Alternatively, if driving tests help educate drivers and promote defensive driving, we would expect accidents to decline as more and more unauthorized immigrants legalize their driving by obtaining an AB60 license (training effect). This effect might be muted for newly licensed drivers who already have significant driving experience.

We also might expect the policy to impact driver behavior after an accident occurs. Before AB60, unauthorized immigrants who caused an accident and lacked a license could have feared being arrested and deported or having their vehicle impounded. Therefore, they had incentives to engage in hit and run behavior and flee the scene of an accident without helping the victim or reporting it to the relevant authorities. However, with a valid license and the safeguard that law enforcement cannot use it to consider immigration status as a basis for criminal investigation, fear of deportation or other consequences, such as vehicle impoundment, may be markedly reduced. Therefore, we may expect that hit and run accidents decline as a result of AB60 (reduced fear effect). Below, we test these hypotheses and provide evidence on the short-term traffic safety impact of providing unauthorized immigrants with driver's licenses in California.

Materials and Methods

Data. We combine data from two sources to estimate the short-term effects of AB60 on traffic safety. To measure traffic safety, we use monthly data on accidents reported by the *Statewide Integrated Traffic Records System (SWITRS)* from the California Highway Patrol (29). Accident data are available for each county and month between January 2006 and December 2015; these dates define our sample period. To measure exposure to the AB60 law, we rely on data from the California DMV on all outstanding licenses before and after implementation of the law to estimate the share of each county's AB60 licenses on all outstanding in 2015 (*SI Appendix* has details on this estimation and all variables used in our analysis).

Empirical Strategy. Our empirical strategy exploits the fact that the target population of AB60 (i.e., unauthorized immigrants) is unequally distributed

across the state of California, such that, in some counties, many driver's licenses were issued under AB60, whereas in other counties, barely any AB60 licenses were issued. We should witness noticeable effects of the law change on traffic safety only in those counties where a substantial number of AB60 licenses were issued. This variation in exposure to AB60 suggests the following difference in differences strategy based on a standard fixed effects regression model of the form

$$y_{itm} = \beta_0 + \beta_1 \text{law}_{itm} + \beta_2 (\text{law}_{itm} \times \text{exposure}_i) + \mu_i + \delta_t + \alpha_m + \epsilon_{itm},$$

where y_{itm} is the accident outcome of interest measured for county i in year t and month m ; law_{itm} is an indicator variable that marks the post-AB60 treatment period starting in January 2015, when the DMV began to issue the first AB60 licenses; exposure_i is a time-invariant measure of each county's share of AB60 licenses on all outstanding licenses in 2015 to capture the extent to which county i should be affected by the AB60 reform in the posttreatment period; μ_i indicates county fixed effects that control for all time-invariant county-level characteristics that might affect traffic safety (e.g., geography); δ_t and α_m are year and month fixed effects, respectively, that control for all common temporal and seasonal shocks that might affect traffic safety (such as weather patterns, changes in general statewide economic conditions, etc.); and ϵ_{itm} is the error term, capturing all idiosyncratic variation in the outcome variable that is not picked up by any of the aforementioned predictors. The key quantity of interest in this regression is the coefficient on the interaction term β_2 , which identifies the effect of AB60 by comparing the changes in the outcome before and after the law within counties with low and high numbers of AB60 licenses. Our primary outcome of interest is the number of accidents per 1,000 capita, and as secondary outcomes, we consider the share of fatal accidents and the share of hit and run accidents on all accidents. Normalizing the secondary measures by the total number of accidents is preferred, because it ensures that the results are not contaminated by the potential increase in the number of accidents of any type that could simply result from an increase in the number of drivers (details are in *SI Appendix*).

Results

Fig. 2 plots the county-level changes in accidents per 1,000 capita, the share of fatal accidents, and the share of hit and run accidents between the pre- and post-AB60 period (before and after January 2015) against the share of AB60 licenses on all outstanding licenses in 2015. In Fig. 2A, we find that accidents per capita generally declined from the pre- to post-AB60 period. However, the reduction in accidents is not systematically related to the share of AB60 licenses that captures the exposure of each county to the reform. The flat line in Fig. 2A indicates that AB60 had no discernible effect on accidents per capita. Similarly, in Fig. 2B, we find that the changes in the rate of fatal accidents are unrelated to the share of AB60 licenses, indicating that the reform had no discernible effect on this other important metric of traffic safety. In Fig. 2C, we see that changes in the rate of hit and run accidents decline with the share of AB60 licenses, indicating that the reform reduced the rate of hit and run accidents.

Table 1 reports the formal estimates of the impact of AB60 from our fixed effects regression models. For all three outcomes, we estimated two models. One model uses a continuous measure of exposure to the law, which captures the counties' shares of AB60 licenses. The other model relaxes the linearity assumption and uses a categorical measure of exposure to the law, which differentiates counties in the low, medium, and high terciles of the distribution of the shares of AB60 licenses.

We find that the effect of AB60 on accidents per capita (Table 1, models 1 and 2) is statistically indistinguishable from zero at conventional levels with point estimates that are also close to zero. This null effect suggests that allowing unauthorized immigrants to obtain licenses had no discernible effect on the number of accidents per capita in California. Similarly, we find that AB60 had no discernible effect on the rate of fatal accidents (Table 1, models 3 and 4). The point estimates are negative, indicating that, if anything, the rate of fatal accidents decreased, but the estimates are statistically indistinguishable from zero at conventional levels.

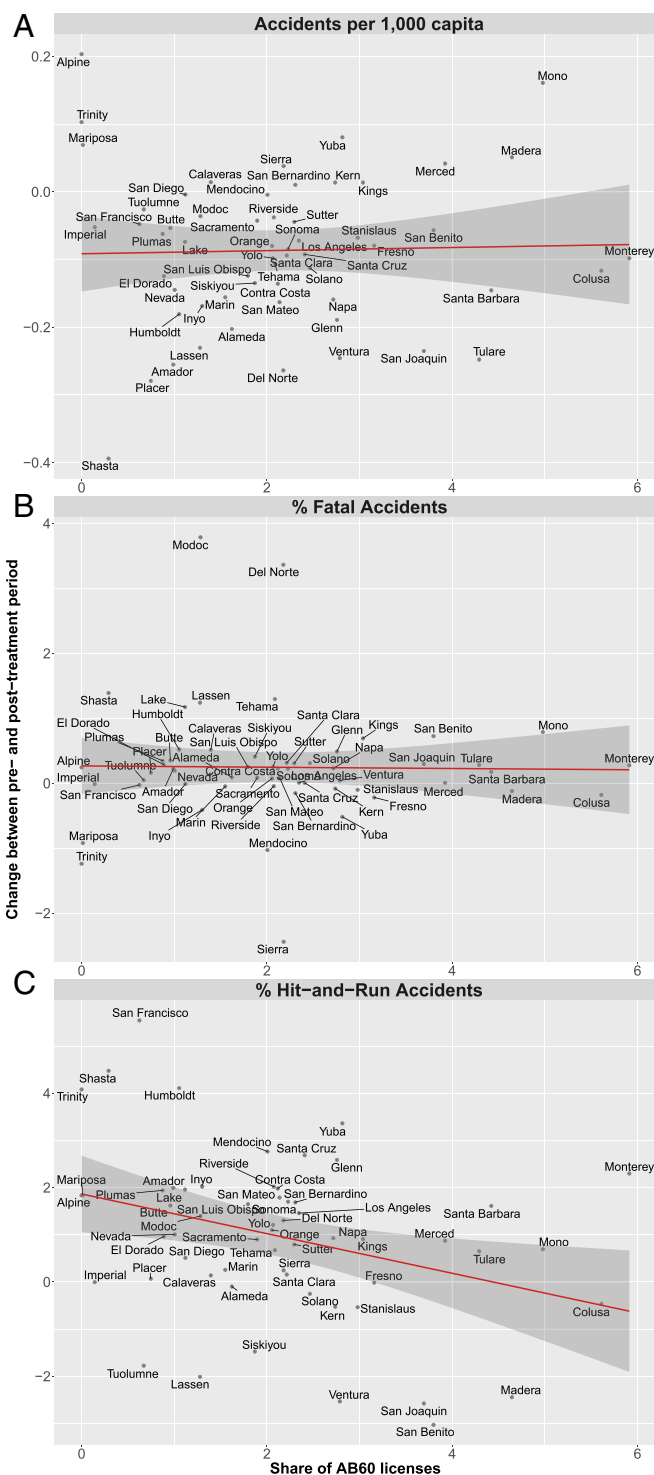


Fig. 2. Effects of AB60 on accidents per capita, the share of fatal accidents, and the share of hit and run accidents. (A) Average accidents per capita generally declined from the pre- to post-AB60 period. However, this reduction in accidents is unrelated to the share of AB60 licenses issued in a county. (B) Similarly, there is no relationship between the share of AB60 licenses issued and changes in fatal accidents. (C) The rate of hit and run accidents increased from the pre- to post-AB60 period in counties that issued few AB60 licenses. However, these increases are markedly reduced in counties where many AB60 licenses were issued.

The results also suggest that AB60 had a significant effect in reducing the rate of hit and run accidents (Table 1, models 5

Table 1. The effect of AB60 on traffic safety in California

	Accidents per 1,000 capita (mean = 1.1, SD = 0.7)		Fatal accidents, % (mean = 1.3, SD = 2.5)		Hit and run accidents, % (mean = 13.6, SD = 6.8)	
	1	2	3	4	5	6
Law	-0.330*	-0.329*	0.271	0.151	0.887	1.090*
	(0.044)	(0.048)	(0.241)	(0.217)	(0.492)	(0.489)
Law × AB60 licenses (second tercile)	0.003		-0.188		-0.672	
	(0.037)		(0.337)		(0.494)	
Law × AB60 licenses (third tercile)	0.015		-0.231		-1.377*	
	(0.041)		(0.248)		(0.604)	
Law × AB60 licenses (continuous)		0.002		-0.010		-0.420*
		(0.014)		(0.061)		(0.190)
Observations	6,960	6,960	6,959	6,959	6,959	6,959
Implied change in outcome compared with 2014, %	1.6 (4.3)	0.5 (3.1)	-19.8 (21.3)	-1.8 (11.2)	-10.4 (4.5)	-6.8 (3.1)

AB60 had no discernible effect on accidents per capita or the share of accidents that were fatal, whereas it reduced the share of hit and run accidents by between 6.8% and 10.4%. Robust SEs, clustered by county, are in parentheses. All models include fixed effects for month, year, and county.

* $P < 0.05$.

and 6). In both models, the interaction term is consistently negative and statistically significant (with both two-tailed P values lower than $P < 0.05$). The estimates suggest that AB60 led to an average decrease in the rate of hit and run accidents between 7 and 10% (Table 1, models 5 and 6) over the average level of this outcome in 2014. [One observation (Sierra County in March 2013) did not experience any accidents. As a consequence, the share of fatal and hit and run accidents is undefined. For this reason, models 3–6 in Table 1 include one fewer observation than models 1–2.] This effect roughly translates into 4,000 fewer hit and run accidents occurring in California during the 2015 period because of AB60 (according to Table 1, model 6 and details are in *SI Appendix*).

In *SI Appendix*, we show that these results are robust to various alternative model specifications, including weighting each county by its (log) population, using alternative thresholds (means and medians) to classify counties by low and high exposure, adding controls for each county’s median income and unemployment rates, and restricting the sample to the shortest possible period (given the drop in sample size in the latter models, the coefficients are less precisely estimated, such that the interaction terms for the share of hit and run accidents are no longer statistically significant at conventional levels). Moreover, we show that AB60 had no discernible effect on other traffic safety outcomes, including the number of fatal accidents per capita, the number of persons killed in fatal accidents per capita, and the number of accidents net of hit and run accidents per capita. We also find that the results are similar when using hit and run accidents per capita rather than the more appropriate share of hit and run accidents. Using two placebo tests detailed in *SI Appendix*, we also determined that two other reforms that preceded AB60 and may have impacted the incentives of unauthorized immigrant drivers in California, the so-called Anti-Impound Law (AB353) and the TRUST Act (AB4), did not affect accidents or hit and run accidents (details are in *SI Appendix*). Note that this does not rule out the possibility that the TRUST Act might have reinforced the effect of AB60 in the sense that it gives an additional assurance against deportation.

Discussion

Overall, the findings suggest that providing driver’s licenses to unauthorized immigrants led to improved traffic safety: contrary to concerns voiced by opponents to this reform, we find that AB60 had no discernible effect on traffic accidents and fatalities. This null finding suggests that there is no empirical sup-

port for the claim that unauthorized immigrants are less cautious drivers or generally more likely to cause accidents; AB60 did not increase the number of accidents in California. Furthermore, we find that concerns about a potential increase in hit and run accidents because of AB60 are unsubstantiated. Rather, our results suggest that, if anything, providing unauthorized immigrants access to driver’s licenses reduced their incentives to flee the scene of an accident.

What mechanisms might explain these findings? As explained above, the effects of the policy depend on whether the more than 600,000 AB60 licenses were primarily issued to unlicensed drivers who sought to legalize their driving or new drivers who did not drive before the law change.

Fig. 3 reveals an answer to this question. It depicts the relationship between the annual percentage increases in outstanding driver’s licenses and auto registrations in each county separately for counties that issued few (Fig. 3, *Left*) and many AB60 licenses

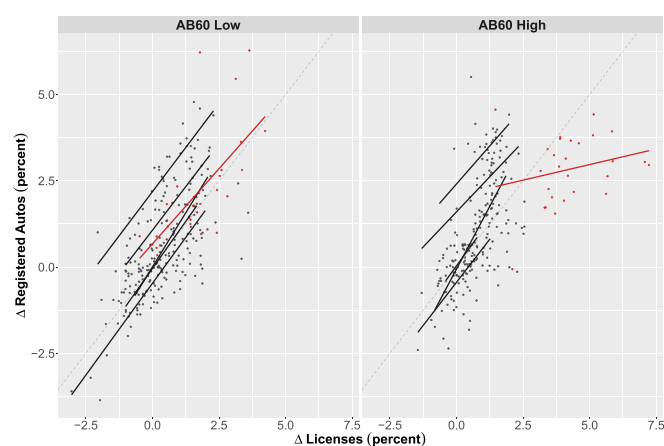


Fig. 3. Correlation between changes in outstanding driver’s licenses and auto registrations. The best-fitting lines summarize for each year the relationship between the annual percentage changes in all outstanding driver’s licenses and auto registrations separately for counties with few (*Left*) and many (*Right*) AB60 licenses issued in 2015. The correlation is close to one for all years except 2015 (red), when the correlation drops considerably and is no longer statistically significant for the counties that issued many AB60 licenses. This decline in the correlation indicates that unauthorized immigrants who obtained AB60 licenses were much less likely to also register a car.

(Fig. 3, *Right*). The elasticity is almost one in every year before 2015, suggesting that a 1% increase in new licenses is associated with about a 1% increase in auto registrations (details are in *SI Appendix*). However, the elasticity dropped dramatically in 2015 when AB60 went into effect (red in Fig. 3): among high-exposure counties, where many AB60 licenses were issued, a 1% increase in new licenses is only associated with a statistically insignificant 0.18% increase in auto registrations. At the same time, the correlation remained close to one among low-exposure counties, where few AB60 licenses were issued. This pattern indicates that unauthorized immigrants who obtained a driver's license under AB60 were much less likely to also register a car, suggesting that they had been driving registered vehicles before the implementation of AB60. This finding is consistent with the idea that, in California, driving is often necessary to go to work, school, the doctor, the grocery store, and other routine destinations.

The fact that most AB60 license holders were driving unlicensed before the policy change points to a potential explanation for why accidents per capita and the share of fatal accidents were unaffected by this law: the majority of new license holders had sufficient driving experience, and obtaining a driver's license did not change their routine driving behavior. Moreover, the total number of actual drivers who could potentially cause accidents increased by far less than the 600,000 new license holders. As to the effect of AB60 on hit and run accidents, it is important to recognize that AB60 explicitly prohibits law enforcement officers from reporting license holders to Immigration and Customs Enforcement. Consequently, unauthorized immigrants with a valid form of in-state driving authorization have weaker incentives to flee the scene after an accident, because they are less likely to fear deportation.

Alternatively, unauthorized immigrants involved in an accident before the reform also may have been concerned about having their car impounded as a result of driving without a license. Fees to recover a vehicle after impoundment can easily exceed \$1,000. Like most Californians, many unauthorized immigrants depend on their car to go to work, often driving long distances to get there. Losing the car to impoundment can jeopardize their income and employment, which presents another incentive to flee the scene after an accident. With AB60 in place, however, unauthorized immigrants who obtain a license may no longer fear impoundment of their vehicles and are, thus, more likely to stay after involved in an accident. Under either of the above scenarios, the number and share of hit and run accidents would decrease as a result.

Conclusion

Our results have important implications for policymakers, who face increasing pressure to respond to a large population of unauthorized immigrants who live in the United States long term but lack authorization to work and have no access to many government services and programs. Our findings show that providing unauthorized immigrants with access to driver's licenses can create significant positive externalities for the communities in which they live.

The California reform enabled more than 600,000 unauthorized immigrants to drive legally in the state in 2015 alone. However, contrary to what opponents to the reform feared, we find that AB60 had no discernible effect on the number of accidents

or fatalities in California. Moreover, our results show that, if anything, the reform reduced the occurrence of hit and run accidents.

Hit and run behavior results in serious injuries and fatalities because of delayed medical reporting (15–19), and therefore, the policy has been a benefit for public safety. Moreover, reducing hit and run accidents also has had significant positive economic effects by correcting distortions in the auto insurance market. Our calculations point to a decrease in market inefficiencies by roughly \$17 million per year (details are in *SI Appendix*): because at-fault drivers involved in accidents are less likely to flee, costs equaling that amount can be charged to the responsible party and do not have to be absorbed by hit and run victims and their own insurance providers. Given our findings that AB60 did not increase accidents on average but reduced the number of hit and run accidents, a greater share of accident-related costs is likely to be borne by the at-fault driver's insurance. Assuming an efficient insurance market, this transfer of accident-related costs to the at-fault driver's insurance could lead to a decrease in average insurance premiums. This effect should be stronger in counties with a larger number of unauthorized immigrants who obtained a driver's license under AB60. To our knowledge, comprehensive county-level data on auto insurance premiums over time are not publicly available. Therefore, we were unable to provide an estimate of the total amount saved in insurance premiums because of AB60. Studying the effects of AB60 on the insurance market could be an important avenue for future research.

Also, individual drivers benefit significantly from reduced hit and run accidents. Ignoring the costs associated with stress, lost work, medical care, or loss of use, we estimate that, because AB60 led to an annual decline in hit and run accidents by about 4,000, not-at-fault drivers avoided out of pocket expenses for car repairs (physical damage) of about \$3.5 million.

One important limitation of our study is that we can only consider the short-term effect of AB60 in the first year after implementation. More follow-up data are needed to determine the longer-term effects and examine if they are sustained over time.

Given the extensive and rapid uptake of AB60 licenses, it also stands to reason that the new licenses provide benefits for unauthorized immigrants themselves. Multiple authors argue that driver's licenses enable unauthorized immigrants to contribute to the local economy, with positive externalities for the community as a whole (9, 30). For instance, workers with a car are found to have higher earnings (10), and driver's licenses give unauthorized immigrants access to a larger number of services, such as financial (8), health (31), or education services (32). Similarly, one study has found correlational evidence that immigrants without any form of identification have considerably less political knowledge than naturalized citizens or immigrants with a driver's license, other government picture identification, or green card (33). However, to our knowledge, none of these arguments about the potential effects of driver's license reforms on the integration of unauthorized immigrants have been thoroughly tested, and therefore, we lack causal evidence on these hypotheses.

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