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DEPARTMENT OF TRANSPORTATION

Evaluation of the Use of Registration Stickers

FINAL REPORT

April 18, 2011

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16. Abstract

This research evaluated the potential costs and benefits of doing away with license plate registration stickers as part of the registration renewal process for Pennsylvania. The research consisted of a comprehensive literature review, a survey of U.S. and Canadian licensing agencies, a cost/benefit analysis of eliminating license plate stickers, and an assessment of related law enforcement issues and public information and education (PI&E) campaigns conducted by other agencies that have stopped using license plate registration stickers. The result is a set of options for Pennsylvania and an evaluation plan. The findings favored elimination of a sticker registration program for several reasons, including simplicity, cost savings, elimination of potential sticker theft, and positive reports from similarly adapted programs.

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Executive Summary

Overview

The goal of this research was to evaluate the potential costs and benefits of eliminating license plate registration stickers as part of Pennsylvania's registration renewal process. The research was divided into two main tasks: Task 1 consisted of a comprehensive literature review and a survey of U.S. and Canadian licensing agencies; and Task 2 involved a cost/benefit analysis of eliminating license plate stickers. The result is a set of options for Pennsylvania and an evaluation plan to assess the effectiveness of the selected option.

Who's not using license plate stickers?

Mainly for reasons of costs and sticker theft, several agencies no longer use license plate registration stickers. New York, Texas, and Washington, D.C. have replaced license plate stickers with windshield stickers for most vehicle classes and Quebec, New Jersey, and Connecticut do not require the use of any type of registration stickers on passenger cars.

State of the Practice Surveys

Surveys were filled out by 38 U.S. states plus Washington, D.C., and 7 Canadian agencies. Of the agencies that do not use license plate registration stickers, all four U.S. states (CT, NJ, TX, NY) and Washington D.C., and the one Canadian agency (Quebec) responded. None of these six agencies are considering going back to issuing license plate registration stickers.

Data Analysis and Cost-Benefit Calculation

Based on an examination of available data from all 50 states over several years, a comparison of outcomes revealed that there is no statistical evidence that the elimination of stickers has any statistically significant impact on the number of vehicle registrations, the ability of police to make drug arrests, or the number of motor vehicle thefts. This, combined with the potential cost savings due to sticker elimination, implies that the elimination of stickers passes the cost-benefit test for the Commonwealth of Pennsylvania.

Options

1. Eliminate vehicle registration stickers altogether,
2. Change to a windshield vehicle registration sticker program, or
3. Maintain the use of license plate vehicle registration stickers.

Discussion

Some of the benefits of eliminating vehicle registration stickers altogether include the following:

1. It is a much simpler option than Option 2.
2. The costs associated with fabricating registration stickers will be eliminated.
3. The costs associated with distributing registration stickers will be eliminated (e.g., special envelopes with plastic windows).
4. This also opens the door to the future opportunity of allowing customers to print their own registration cards, saving PennDOT the high costs of printing and distributing vehicle registration cards.
5. The possibility of sticker theft will be eliminated.
6. The surveys conducted for this research found that the three agencies that have eliminated registration stickers altogether reported no problems with law enforcement.
7. Of all the U.S. states surveyed for this research, only one state that maintains a license plate sticker program reported doing so because of "law enforcement reluctance" to eliminate them.
8. The cost/benefit analyses conducted for this research found that eliminating license plate registration stickers had no effect on motor vehicle theft, drug violations, and most importantly, the number of registrations.

Overview

The goal of this research was to evaluate the potential costs and benefits of doing away with license plate registration stickers as part of the registration renewal process for Pennsylvania. The research was divided into two main analytical tasks: Task 1 consisted of a comprehensive literature review and a survey of U.S. and Canadian licensing agencies; and Task 2 involved a cost/benefit analysis of eliminating license plate stickers. This was followed by an assessment of public information and education (PI&E) campaigns conducted by other agencies that have stopped using license plate registration stickers. The result is a set of options for Pennsylvania and an evaluation plan to go along with those options. This report documents the research findings and outlines the options and evaluation plan.

Task 1: State of the Practice Surveys and Literature Review

Overview

In Task 1, all identified currently used and anticipated solutions to the problems with license plate registration stickers were documented and are reported below. Although the literature review uncovered a good deal of useful information, to ensure that the most up-to-date procedures and practices were included in this report, and to elicit both positive and negative experiences that led to other agencies' current and planned vehicle registration programs, a state-of-the-practice survey of U.S. state DOTs, U.S. territory agencies, and Canadian motor vehicle licensing agencies was conducted.

The Pennsylvania Vehicle Registration Program

Like 46 other states, Pennsylvania uses vehicle license plate registration stickers. These stickers are not required on all vehicles. According to the 2010 Pennsylvania Motor Vehicle Code (PA, 2010), the following vehicles are exempt from registration and therefore plate stickers:

- Dealer vehicles
- Vehicles used exclusively for agricultural operations
- Golf carts
- Vehicles moved solely by human or animal power
- Mobile homes or modular housing units
- Trailers or semitrailers

- Military vehicles
- Oversized or overweight vehicles
- Motor vehicles being towed
- Tow dollies
- Electric personal assistive mobility devices
- Construction vehicles
- Permanently registered vehicles (such as fleet vehicles)
- Antique, collectible or classic motorcycles or motor vehicles that have a special license plate

New PA residents must register their vehicles within 20 days of establishing residency. This must be done in person at the Riverfront Office Center in Harrisburg or at one of PennDOT's authorized agents like one of the On-line Messenger Service Centers where additional fees will be applied (see Table 1 for PennDOT registration fees).

Table 1. Pennsylvania vehicle registration fees.

Passenger Vehicle Registration	$36.00
Motorcycle Registration	$18.00
Duplicate Registration (at time of original registration, transfer or renewal)	$1.50
Duplicate Registration (at any time other than identified above)	$4.50
Replacement of Registration Plate or Sticker	$7.50
Replacement Cab Card	$4.50
Additional Cab Cards	$1.50
Application for Retired Persons Vehicle Registration	$10.00
Vehicle Registration Change of Address	No Fee

According to the Pennsylvania Motor Vehicle Code, "at least 60 days prior to the expiration of each registration, the department shall send to the registrant an application for renewal of registration. Upon return of the application, accompanied by self-certification of financial responsibility and the applicable fee or fees, the department shall send to the registrant a renewed registration card." Registration can be renewed online, in person at an On-Line Messenger Service Center, or by mail. If mailed or renewed online, registration stickers are sent automatically through the mail when the registration process is complete. If done in person, they can be obtained immediately.

The physical plate stickers are 1.0 x 1.5 inches and are made of retroreflective vinyl. The information contained on the stickers is: the state name spelled out on top (Pennsylvania), the month and year in the middle (e.g., 5-11), and a seven-digit control number on the bottom.

Pennsylvania is one of 21 states that only require a single license plate (on the rear of the vehicle), so only one plate sticker is required. The color of the sticker varies from year to year for easy identification by law enforcement.

Although there is a fee for replacement of a stolen license plate (also called "registration plate"), the Pennsylvania Motor Vehicle Code states, "No owner or operator of a vehicle shall be subject to a fine for the reason that the registration plate is missing if they have in their possession an affidavit that the plate was lost or stolen and that application for new plate or plates was made within 48 hours as required in this section."

There are no late fees for renewing an expired vehicle registration in Pennsylvania. However, the Pennsylvania Motor Vehicle Code states that a person driving an unregistered vehicle "is guilty of a summary offense and shall, upon conviction, be sentenced to pay a fine of $75 or double the registration fee, whichever is greater, except when the vehicle was previously registered in this Commonwealth within 60 days of the commission of the offense [i.e., a recently expired registration] whereupon the fine shall be $25."

Literature Review

A traditional literature review using the Transportation Research Information Service (TRIS) and other online sources revealed no published reports specifically on the topic of license plate registration sticker programs. A few research articles were uncovered on the use of electronic vehicle identification (EVI) and radio frequency identification (RFID) tags that might be used in the future to replace license plate registration stickers (i.e., Samuel, 2005 and Persad et al., 2007). Because of the lack of published data, the literature review relied on other non-traditional sources, such as newspapers, surveys, and websites.

Who's not using license plate stickers?

New York, Texas, and Washington, D.C. have replaced license plate stickers with windshield stickers for most vehicle classes (The Unofficial DMV Guide, 2009). Quebec (since 1992), New Jersey (since 2004), and Connecticut (since 2010) do not require the use of registration stickers (license plate or window) on passenger cars (American Association of Motor Vehicle Administrators, 2009b).

Why Not? In 2008 (the most recent data published), the Federal Highway Administration reported that there were almost 250 million motor vehicles registered in the United States (FHWA, 2010). The majority of states use some kind of license plate sticker to indicate that a plate has current registration. The issuance of motor vehicle license plate registration stickers, however, is a costly and potentially flawed component of the vehicle registration renewal process.

The Commonwealth of Pennsylvania currently maintains an inventory of approximately 30 million such stickers (representing 11.2 million registered vehicles). Wisconsin, with about a third as many registered vehicles (4.4 million), has estimated that eliminating its own license plate sticker program would result in a cost savings of $532,000 over a 2-year period (*Milwaukee Journal Sentinel*, 2009).

In addition to cost issues, one of the principal reasons some states have moved away from plate stickers and others are considering it, is to counter the reported high incidence of registration sticker theft, theft of license plates, and plate clipping. In the latter two cases, either the entire plate is stolen or the corner of the plate containing the sticker is cut off, respectively (The Auto Channel, 2009). An article published in the mid- 1990s reported that "A stolen registration sticker carefully peeled off the plate's corner, goes for $25 or more." And "$100 can buy you a good registration sticker and a counterfeit inspection sticker" (*Philadelphia City Paper*, 1993). This is the reason PennDOT initiated "The Philadelphia Vehicle Registration Sticker Pilot Program," which ran from October 2000 until December 2003. This program was discontinued on December 15, 2003 because, although it reportedly reduced sticker theft, it was not found to be cost effective (The Auto Channel, 2009). Also, some citizens of Philadelphia reported that they were being targeted for traffic stops because of the absence of a sticker. The low quality of the sticker itself was cited by PennDOT officials as another reason for the failure of the pilot program. Furthermore, Pennsylvania's "License Plate Reissuance Program" moved the sticker to the upper left-hand corner and introduced thicker aluminum license plates, reportedly helping to reduce sticker theft and discourage plate clipping.

Sticker theft is a problem not only in Pennsylvania, but other states as well, including Missouri, where in 2008 alone over 1,500 stickers or plates were stolen in St. Louis (Examiner.com, 2009), and in Wisconsin, where Governor Jim Doyle proposed eliminating their license plate registration sticker program in part because in 2008 almost 5,000 sticker thefts occurred in Milwaukee (*Milwaukee Journal Sentinel*, 2009). The potential effects of that

proposal on enforcement are still being widely debated within Wisconsin's law enforcement community and the state's Department of Public Works (*Milwaukee Journal Sentinel*, 2009).

AAMVA Surveys

To identify potential sources of information regarding license plate registration sticker usage (e.g., who is using them, who is not, and why) the study team contacted the American Association of Motor Vehicle Administrators (AAMVA). Early in the literature review it was uncovered that, at the request of the International Association of Chiefs of Police (IACP), the AAMVA had recently formed a working group to review the status of license plate registration sticker programs in the United States and Canada (American Association of Motor Vehicle Administrators, 2008). Personal communication with a source at AAMVA revealed that while this started as a working group around 2007 or 2008, to look at the pros and cons of issuing plate registration stickers, the group never had funding and so it never really took off. The group, comprised of individuals from Vehicle Registration & Titling (VRT) and Law Enforcement (LE), held a few conference calls and then dissolved. Our source at AAMWA reported that there was a split between the LE and VRT members, with the VRTs favoring eliminating the decals as a way to save money and the LEs wanting to retain the decals as visible evidence of current registration. This debate led to a 2008 survey on the topic distributed by the AAMVA for Virginia (at the request of the IACP) (American Association of Motor Vehicle Administrators, 2008). The results of that survey, along with two other related surveys distributed by the AAMVA for Ontario in January 2010 and Arizona in September 2010, are reported below.

IACP/Virginia Survey. On April 28, 2008, the AAMVA distributed a survey titled: "Plate Registration Stickers" for Virginia at the request of the IACP. According to the AAMVA, the IACP requested that they "encourage DMVs to reverse the trend of eliminating the registration sticker on the back of the license plate. DMVs are looking for ways to save money. Law enforcement needs all the tools they can get and keep to help protect our citizens." A total of 30 agencies responded to the seven question survey (provided by the AAMVA). The following are the questions and a summary of the responses (in red):

1. Has your jurisdiction eliminated the plate registration sticker?

a. There were 28 “no” responses and 2 “yes” responses. Both of the yes responses were from NJ.
b. Montana responded no, but stated, “We have eliminated the front sticker [Montana vehicles carry two plates] 3 years ago.”

2. If your state eliminated the sticker, what was the main reason?
    a. New Jersey 1: “Cost Effective”
    b. New Jersey 2: Cost and “Customers did not properly affix the stickers and the small size made them difficult to read. The MVC saw no benefit to retaining the use of the stickers in passenger automobiles.”
    c. Montana: “We eliminated the front sticker due to cost.”
3. From a law enforcement perspective, has your effectiveness been decreased? Why?
    a. New Jersey 2: “Absolutely no negative feedback.”
4. From a DMV perspective, has the elimination of the sticker supported your reason to do so?
    a. Montana: “Yes”
    b. New Jersey 1: “Yes”
    c. New Jersey 2: “Yes”
5. If your state has not removed the sticker, have you considered doing so? Why?
    a. Alabama: “Alabama statute, Section 32-6-63, Code of Alabama 1975, provides "for the years during which the five-year license plates are not issued, in lieu thereof, tabs, stamps or other devices suitable for attaching to a motor vehicle license plate shall be issued".”
    b. California: “Primarily for Law Enforcement reasons and ability to identify that vehicle has current operating authority.”
    c. Nebraska: “We have not encountered a reason for doing so. Compliance with registration requirements is a big enough issue in Nebraska that we would not at this time consider making any changes that could potentially increase the noncompliance.”
    d. Saskatchewan: “Saskatchewan has had license plate stickers since 1976 when we moved to a new staggered registration renewal method. We consistently receive calls from customers, expressing concern about their plate stickers falling off their license plates and receiving a ticket even though their license plates are valid.

Also many customers that are on our monthly automatic bank withdrawal payment plan do not attend an issuer's office to obtain their new registration and expiry stickers. This gives enforcement a false impression that license plates are expired when they are in fact valid.

Saskatchewan and other jurisdictions with cold winters also struggle with the problem of stickers adhering to plates. Application of the stickers is not recommended when the temperature is below -23 degrees C or above +40 degrees C, or when there is a build-up of stickers on the plate. Although customers are encouraged to ensure the license plate is clean and dry before applying the expiry sticker, there seems to be increasing complaints of stickers not adhering and the tickets that can ensue.

In the past enforcement has stressed to us the necessity of having a visual indicator to help them in verifying valid vehicle registrations. They believe that the license plate and expiry sticker provide this. In a survey enforcement officials did concede that to ensure registration validity a check of the computer system would be necessary if a vehicle was pulled over. However, enforcement does not necessarily pull vehicles over specifically to check registration validity and that it would be part of other enforcement practices such as staged roadside safety checks for all vehicles."

e. South Carolina: "The month and year decals on license plates are important to law enforcement because it provides them with probable cause to stop a vehicle when decals are missing, expired, improperly displayed, appears to be altered, covered up, not visible, etc."

6. Did the DMV discuss the removal of the sticker from the plate with law enforcement prior to final action?
    a. New Jersey 2: "Law enforcement supports the removal of the stickers. They found the sticker hard to see and confusing"
7. If your state has no registration sticker, or the one you have is located elsewhere other than the plate, is the registration data available real-time to all law enforcement nationwide?
    a. Montana: "Yes"
    b. New Jersey 2: "Law enforcement has access to the Database."

Ontario Survey: On January 4, 2010, the AAMVA distributed a survey titled: "Elimination of Vehicle Validation Stickers" for Ontario. According to the survey results (obtained for this study from the AAMVA), Ontario was specifically "interested in hearing about rates of non-compliance of registration renewal from jurisdictions that have eliminated the validation sticker." There were a total of 21 responses to the survey, which consisted of four questions. These are the questions along with a summary of the responses (in red):

1. Does your jurisdiction issue vehicle license plate validation stickers?
    a. Twenty of 21 responded Yes, which terminated the survey for those participants.
    b. New Jersey responded No; the responses to the remaining questions are all from New Jersey.
2. If your jurisdiction no longer issues license plate validation stickers, when did you stop?
    a. "October 2004."
3. Did you measure compliance rates for vehicle registration renewal since eliminating the validation sticker? If so, did you experience an increase in non-compliance?
    a. "The data requested on compliance rates is not presently available."
4. What were your findings relative to cost savings versus non-compliance?
    a. "The annual direct cost for the passenger stickers was approximately $400,000.00."

Arizona Survey: On August 30, 2010, the AAMVA distributed a survey titled: "Registration Expiration Tabs" for Arizona. According to the survey results (provided by the AAMVA), Arizona wanted to know about vehicle registration compliance in the surveyed jurisdictions. A total of 21 agencies responded to the three question survey. The following are the questions and a summary of the responses (in red):

1. Does your jurisdiction issue renewal tabs, stickers or decals to indicate registration expiration (month/year)
    a. There were 20 "yes" responses and one "no" response. The no response was from New Jersey.
2. If no, how do you ensure compliance?

a. New Jersey: "A vehicle owner is issued an annual registration document that contains an expiration date. If stopped by law enforcement, the valid registration is submitted. If the registration is not valid, the owner /driver may be cited for improper documents."

3. What enforcement steps do you take to ensure compliance?
    a. Alabama: "Law enforcement accesses the registration database when they run a plate and can determine that the vehicle registration has expired. Additionally, they can visually see the expired decal."
    b. Florida: "Law enforcement has computers to check registrations (match with appropriate vehicle). As a courtesy, we send out registration renewal notices to remind motor vehicle owners of renewal dates."
    c. Illinois: "Compliance is enforced by law enforcement. Persons purchasing a renewal sticker 30 days or more after expiration incur a $20 late fee."
    d. Indiana 1: "Law enforcement manages compliance at this time."
    e. Indiana 2: "State Police ensures compliance. The registration document must be signed and kept in the car. If the vehicle is not registered or is expired the driver will be cited and possibly face impounding of the vehicle. Effective 2011, registrants will be required to maintain their vehicle record by making their renewal payment or indicating that they no longer own or operate the vehicle on public roads. If a registrant does not comply they may face suspension of their driving privileges."
    f. Minnesota: "No action by DVS; enforcement is done by law enforcement agencies."
    g. New Mexico: "Enforcement is up to law enforcement agencies, which we are not."
    h. Pennsylvania: "Enforcement of registration compliance is handled by law enforcement."
    i. Saskatchewan: "Enforcement officials advise us that they use the expiry stickers as another visual tool to enforce requirements for valid registration and insurance. They also advise that any vehicle suspected of having an expired registration and insurance are verified through our motor vehicle database before they are ticketed, impounded, etc."

j. South Carolina: "Currently, law enforcement does not have a mechanism in place other than enforcing the law by stopping a motorist who has an expired plate/decal."

k. Utah: **"**Drivers that are caught operating vehicles with registrations that have been expired for less than four months are issued citations by law enforcement. Drivers of vehicles with registrations that have been expired for four months or more are subject to a citation *and* vehicle impoundment, at the discretion of the officer."

l. Wyoming: "Visual enforcement by law enforcement. If the correct colored sticker is on the license plate, the officer assumes compliance. If an outdated colored sticker is on the license plate the officer may pull over the vehicle to determine compliance. (We use a different colored sticker for each year.)"

State of the Practice Survey (Wave 1)

Two survey instruments were developed for the present research project with close PennDOT involvement and input to identify aspects of other agencies' vehicle registration programs, and were delivered to PennDOT for review and final approval before beginning the survey process.

The survey was conducted in three phases. First, a list of 87 individuals working in the field of vehicle registration and titling was obtained from the AAMVA. These 87 individuals represented all 50 U.S. states, Washington, D.C., American Samoa, the U.S. Virgin Islands, Puerto Rico, and 15 respondents from 11 Canadian agencies. Through the literature review it was determined which of the agencies were using a license plate registration sticker program, and which were not. Separate surveys were developed and emailed to these two groups (Appendix A and B).

Within a week of the initial mailing, 24 surveys were completed and returned. After determining who had not responded and correcting the contact information on a few whose addresses or positions had changed, a second wave of surveys were emailed. This resulted in 18 more surveys completed and returned. The remaining respondents were called on the telephone, resulting in five more responses.

The final total of completed surveys was 47 out of 87 distributed, or a response rate of 54 percent. These represented thirty eight U.S. states plus Washington, D.C. (of 54 U.S. agencies), and seven (of eleven) Canadian agencies. Of the agencies that do not use license plate registration stickers, all four U.S. states (CT, NJ, TX, NY) and Washington D.C., and the one Canadian agency (Quebec) responded.

Survey Results

Table 2 shows which of the agencies who responded to the survey use a license plate registration sticker program and which do not. Only 11 U.S. states did not respond to the survey. The following is a summary of the survey responses broken down by whether or not the responding agencies currently use license plate registration stickers as part of their programs.

Table 2. Survey Respondents Use of License Plate Registration Stickers

Agency		Use License Plate Registration Sticker
U.S. Agencies		
1	Alabama	Yes
2	Arizona	Yes
3	Arkansas	Yes
4	California	Yes
5	Colorado	Yes
6	Delaware	Yes
7	Florida	Yes
8	Georgia	Yes
9	Hawaii	Yes
10	Idaho	Yes
11	Iowa	Yes
12	Kentucky	Yes
13	Louisiana	Yes
14	Maine	Yes
15	Maryland	Yes
16	Massachusetts	Yes
17	Michigan	Yes
18	Minnesota	Yes
19	Mississippi	Yes
20	Montana	Yes
21	Nebraska	Yes
22	Nevada	Yes
23	New Hampshire	Yes
24	North Carolina	Yes
25	Ohio	Yes
26	Oklahoma	Yes
27	Oregon	Yes
28	South Carolina	Yes
29	Utah	Yes
30	Vermont	Yes
31	Virginia	Yes
32	Washington	Yes
33	West Virginia	Yes
34	Wisconsin	Yes
35	Wyoming	Yes
36	Connecticut	No
37	New Jersey	No
	New York	No
38	Texas	No
39	Washington, D.C.	No
Canadian Agencies		
40	British Columbia	Yes
41	New Brunswick	Yes
42	Northwest Territories	Yes
43	Ontario	Yes
44	Prince Edward Island	Yes
45	Alberta	Yes
46	Yukon Territory	Yes
47	Quebec	No

U.S. agencies that use license plate stickers

When the 35 U.S. states that use plate stickers were asked if they require stickers on all of their vehicles, 20 of the 35 said "no," and 15 said "yes" or almost all. Of those that said that not all vehicles require a plate sticker, excluded vehicles were: vintage plates, historical plates, permanent trailer plates, mopeds, government or fleet vehicles, lifetime plates for disabled vets, and law enforcement vehicles.

When asked how drivers get the stickers, 15 said they could be obtained in-person, online, or through the mail, 7 said either in-person or via mail, and the remaining 13 said they get the stickers automatically through the mail when the registration process is complete.

The physical plate stickers range in size from 1.0 x 1.0 in to 2.0 x 1.75 in. Eighteen of the respondents said the stickers were 1.5 x 1.0 in (the same as Pennsylvania), three said 1.5 x 1.25, and two said 1.25 x 1.25. Three of the respondents said the sticker size varies depending on the vehicle, with Off Highway and Truck/Heavy Equipment receiving larger stickers. Four states said their stickers are made of vinyl, while 30 expanded on that by saying they were made of retroreflective vinyl. 3M is the main supplier, with 20 states using that company, seven using R.R. Donnelley, and the remainder using various other suppliers. Many of the respondents reported using two or more stickers placed side by side or stacked, and some respondents reported the requirement for stickers on both front and back license plates.

The type of information contained on the stickers varied widely among the respondents. Most had some combination of: state initials, month, year, and license plate or control number. Others also include: emissions requirement, registration number, birth month, and county.

When asked if they had ever considered using a different type of program, 17 said no, 16 said yes. Of those that said they had not considered changing from a license plate sticker program, nine said the reason is that they are satisfied with their program, three said that the stickers were required by state law, and one said it would be too expensive to change. Of the 16 that said they have considered changing from a plate sticker program, six said they did so to save costs, with the other responses varied, including: reducing fraud, assisting law enforcement, provide better customer service, and improving inventory control.

Of those who had considered alternate programs, most of the ones considered still used license plate stickers, just changing the procedures, for example switching from bulk production to print-on-demand, or from one to two stickers or from two to one sticker. Only three

respondents reported considering dropping the license plate sticker: Minnesota and Oklahoma are looking at window stickers, and Wisconsin is looking at getting rid of registration stickers altogether. The reasons the respondents gave for maintaining their current programs include: costs (eight respondents), technological issues (two), current system required by law (two), and law enforcement reluctance (one).

Canadian agencies that use license plate stickers

Six of the seven Canadian agencies that reported using license plate registration stickers require them on all vehicles. British Columbia does not require them on commercial trailers. In British Columbia the stickers are picked up in person from a licensed insurance agency; in the Northwest Territories they are picked up at the "local issuing office"; in Ontario, Prince Edward Island, and the Yukon Territory they can be obtained in-person, through the mail, or online.

The sticker sizes range from 2 7/16 x 1 1/16 inches in British Columbia to 1 ½ x 1 inches in Prince Edward Island. The stickers are all retroreflective vinyl with 3M specified for three of the agencies and two using CCL.

As in the United States, the information on the stickers varies among the Canadian agencies, with month, year, location name, bar code, and ID number, on the British Columbia and Prince Edward Island stickers; only month, location name, and ID number on the Northwest Territories' sticker; month, year, serial number on Ontario's stickers; and expiration year and registration number on the Yukon Territory stickers.

Of the respondents, only Ontario reported that it considered changing its program. Ontario is considering eliminating the license plate sticker program for cost savings and "Green Initiative" reasons. British Columbia reported that their stickers are associated with vehicle insurance and that they are very pleased with it, as the current system has resulted in a less than 2 percent uninsured motorist rate.

Agencies that do not use license plate stickers

All five of the U.S. agencies and the one Canadian agency that responded that they are not using license plate vehicle registration stickers reported having used license plate stickers in the past. Connecticut switched from license plate stickers to window stickers in 2006 and from window stickers to no stickers at all on August 1, 2010; New Jersey stopped using stickers on passenger vehicles in 2004 and commercial vehicles and motorcycles in 2010; Texas changed in

1994, the District of Columbia in 2002, New York in 1973, and Quebec in 1992. When asked why they changed, the District of Columbia, New York, and Texas reported sticker theft, Connecticut and Quebec changed for budgetary reasons, with Quebec adding that the new program reduced fraud, and New Jersey reported that "law enforcement no longer needed to rely on them."

When asked how law enforcement identifies vehicles as registered, Connecticut said that registration information is kept inside the vehicle and that law enforcement has electronic access to vehicle registrations. In Texas, motorcycles, mopeds, and trailers still require license plate stickers. In Texas, New York and the District of Columbia, law enforcement can see the registration status on the window sticker. In addition, Texas and Quebec law enforcement agencies have electronic access to their registration databases and New York said that many agencies have license plate readers. When asked what if any problems they have encountered by not using license plate stickers, Texas, the District of Columbia, Connecticut, New York, and Quebec did not report any problems; New Jersey reported that some of its residents were being cited for expired registration by other states' law enforcement (see also AAMVA, 2006).

Final Question

As a final question on the surveys, all participants were asked to attach documentation on their program such as: costs, number of vehicles, number of stickers, related laws and regulations, anything related to revenue or law enforcement, anything related to the actual or perceived success of the program, cost/effectiveness, etc. A great deal of information was submitted by the responders in the form of tables, websites, pdf documents, PowerPoint presentations, etc. The kind of information contained in the attached documents varied widely among agencies and included the reflective characteristics of the sticker vinyl and type of adhesive, legal documents, vehicle classifications, and breakdown of plate categories.

Some of the more relevant information received from a number of agencies related to the total program costs, individual sticker costs, the number of stickers printed each year, the number and cost of vehicle registrations per year or per month, and the number of vehicles by type. The information obtained on program costs was evaluated in Task 2.

State of the Practice Survey (Wave 2)

Two follow-up surveys (Appendices C and D) were developed to obtain additional data from the states/agencies that were not using license plate stickers (i.e., CT, NY, NJ, TX, D.C., and Quebec). These follow-up surveys were requested by PennDOT at the Task 2 presentation in Harrisburg. One survey was sent to agencies that used window registration stickers (i.e., NY, TX, and D.C.) and one to agencies that were not using any vehicle stickers at all (i.e., CT, NJ, and Quebec). Appendix E contains a complete record of the answers to all of the surveys.

Window Sticker

The three agencies that are currently using window vehicle registration stickers were asked three questions:

1. Did you ever consider eliminating vehicle registration stickers altogether? Why or why not?
2. Have you ever considered going back to issuing license plate registration stickers? Why or why not?
3. Do you currently mail vehicle registration cards to your customers, or have you gone to an on-line and print at home program?

The two agencies that responded (D.C. and TX) stated that they were not considering eliminating the window sticker because they were useful to law enforcement in quick identification of potentially non-registered vehicles. Both responding agencies stated that they would not consider going back to license plate stickers because the window stickers work and prevent the registration sticker theft that they experienced with plate stickers. With regard to question three, neither of the responding agencies use print on demand systems to issue their vehicle registration cards. Both do allow vehicle owners to register on-line, however both mail customers registration renewal notices as well as registration cards and stickers.

No Sticker

The three agencies that were at this time not using any vehicle registration stickers were also asked three questions:

1. Did you progress from license plate registration stickers, to window registration stickers, to no registration stickers, or did you go directly from license plate to no stickers? If it was a progression, why?
2. Have you ever considered going back to issuing vehicle registration stickers? Why or why not?
3. Do you currently mail vehicle registration cards to your customers, or have you gone to an on-line and print at home system?

In response to question one, New Jersey and Quebec reported going directly from license plate stickers to no stickers at all, without issuing window stickers in between. Connecticut went from license plate stickers, to window stickers, to no stickers. Connecticut originally went to window stickers because of plate sticker theft, then conducted a pilot License Plate Recognition study, the success of which allowed Connecticut to request a total elimination of registration stickers. None of the three are considering going back to issuing registration stickers. With regard to question three, as with the agencies that use window registration stickers, none of the three agencies that do not use stickers use print on demand systems to issue their vehicle registration cards. However, Connecticut stated that the absence of any sticker will allow it to initiate a more automated registration program in the future, which might include print on demand. All three allow vehicle owners to register on-line and mail customers registration renewal notices as well as the final registration cards.

Task 2: Data Analysis and Cost-Benefit Calculation

Overview

The elimination of registration stickers has the potential to reduce costs of administering Commonwealth vehicle registration programs, but carries with it several risks. From our investigations, these risks seem to arise from two sources. First, the lack of obvious signals of proper vehicle registration might provide incentives for motor vehicle owners to avoid registering their vehicles, thus causing a loss in registration revenue to the Commonwealth. Second, under current law, the lack of a registration sticker provides law enforcement officers the grounds to engage in vehicle stops (i.e., probable cause), which in turn creates an additional means to potentially search suspicious vehicles; thus the elimination of stickers shuts off a

potentially effective method of crime prevention and detection. These factors embody real costs to the Commonwealth, and the benefits of sticker elimination must be weighed against those costs. It is therefore necessary to estimate the effect of sticker elimination on various indicators.

Methods

The methodology used was to collect data on various state[1] characteristics for a number of years, and build a statistical model of the indicator on these characteristics. Importantly, one of those characteristics is whether or not the state has eliminated license plate stickers. As an example, we took vehicle registrations and built a model of registrations in the following form:

Registrations(state, year)=b0+b1*NoStickers(state, year)+b2*Other factors(state, year)

where the (state, year) designation simply means that we are modeling registrations in a particular state in a particular year as a baseline amount (b0) plus an additional factor we call "NoStickers," which equals one (1) if stickers were not required for that state in that year and zero (0) if stickers were required. Therefore, our statistical estimate of b1 is a measure of the reduction (if b1 indeed turns out to be negative) in registrations due to the absence of stickers. The estimates of b1 are then subjected to the usual standards of precision and statistical significance. Table 3 provides a list of states and years where "NoStickers" equals one[2]. Because of data limitations, we restricted the analyses to the 1995-2009 time period in this table.

Table 3. States where stickers have been eliminated*

State	Year
Connecticut	2006-2009
District of Columbia	2002-2009
New Jersey	2004-2009
New York	1995-2009
Texas	1995-2009

*Sticker elimination means license plate sticker elimination. This analysis does not distinguish between (for example) total elimination and the use of interior windshield stickers.

[1] The District of Columbia is part of our database, but for convenience we will use the term state to represent all of the political units in that database.
[2] The sources of this information are detailed in the Task 1 report.

However, common sense indicates that other factors are important in determining the number of vehicle registrations (and other indicators) in a state. These collectively comprise the "Other factors" term in the above equation. Each of these equations will have weights, which are collectively defined as b2. These other factors will include (see Appendix F for sources[3]):

- **Population:** Obviously, a larger population in a state will create a greater number of vehicles and vehicle registrations. The weight on this factor is expected to be positive and is expected to be one of the most important factors.
- **Density:** A state's working population must of necessity avail themselves of transportation. If cars are not used, then public transportation is an obvious alternative. We were not able to get consistent measures of public transportation over all states and time periods, so our proxy for this is the population density. This variable will be higher for states that have greater urban populations, where non-auto transportation is more likely. Thus we expect the weight to be negative (i.e., high density = low registration).
- **Median Income:** Vehicle demand is likely to be greater in places where income is higher. We expect a positive weight on this variable.
- **Population over 16:** While population is a primary driver of vehicle demand, that demand is intensified to the extent that the population is of driving age. We expect this to have a positive weight.
- **Population over 65:** At some point people give up driving, so the demand for vehicles becomes smaller as the population ages. We expect this variable to have a negative weight (i.e., older population = less vehicle registrations).

In addition, statistical best practice indicates that two other factors should be included in the models. The first is a time trend, because aside from any other factors it may be the case that demand for vehicles is rising (or falling) over time because of changing tastes or other trends that are otherwise unobservable. The second is an additional time-invariant factor for each state.[4] These factors have the effect of removing any effect of any of the strictly cross-sectional correlations between vehicle registration and any of its causal factors, including sticker policy.

[3] Please note in the table that for a number of the variables in the analysis we always have incomplete coverage; for some variables data were not available for some years. However, for the years where coverage exists, it does so for every state.
[4] These are referred to as "fixed effects" in the econometrics literature.

The point of the modeling procedures developed here is this: simple correlation of registrations (or any of the outcome measures, or indicators, discussed below) with sticker policy cannot be construed as causation, primarily because there may be other things that the group of states that have chosen sticker elimination have in common, which are also correlated with the outcome measure. To take an example, note that three of the states that have eliminated stickers (Connecticut, New York, and New Jersey) are part of the same region and share the broader New York City metropolitan area. Given the unique characteristics of New York City, in particular the reliance on public transportation, it would be no surprise if vehicle registrations were lower (on a per capita basis) in these states than elsewhere. Thus a simple correlation between vehicle registrations per capita and stickers might reveal a substantial loss of registrations in those states. In point of fact, the correlation is indeed negative and suggests a decline of 18.5 vehicles registered for every 100 persons in the state, a substantial loss indeed (see Output 1 in Appendix G, which contains all the statistical outputs). But such a conclusion would be misleading for precisely the reasons discussed. We can control for that in large measure by including the other factors (in this instance, density will be particularly important), but the possibility of unmeasured factors contaminating our analysis of the causality looms regardless, and therefore the use of the state-specific time-invariant factors has become the standard in this kind of policy analysis. The identification of the effect of a no-sticker policy therefore arises only by comparing what happens in states that *change* to a no-sticker policy (during the sample frame) compared to those that do not make such a change.

Results

1. Vehicle Registrations

In the absence of stickers, identifying a vehicle as unregistered is made more difficult. This may both hamper enforcement of registration regulations and cause a loss in registration revenue for the state. In Connecticut, which abandoned license plate stickers in favor of windshield stickers in 2006 (and is presently eliminating stickers altogether), police have complained about their elimination. For example, a lack of such indicators, especially in towns where the random running of license plate numbers is frowned upon, "will make it much easier for people to hide the fact that (a car) isn't registered" (Frampton, 2010). Therefore, it will be of interest to model

vehicle registrations in the manner described in the previous section. Output 2 in Appendix G displays the results.

The primary focus is on the factor abbreviated *nost,* which as noted above, equals one for state-year combinations. The weight on this indicates that in states and years with no license plate stickers, vehicle registrations increased by about 60,000 vehicles. This is of course contrary to the expectations expressed above, but there are two cautionary notes. The first is that 60,000 vehicles is a very small impact when the average number of registered vehicles across states is around 4.4 million. The second, more important caveat is that the test of significance is extremely low (i.e. the number we have is far more likely due to random chance than an actual causal effect of eliminating stickers). ***There is no evidence that sticker elimination has any impact on vehicle registration.***

As an aside, it is worth noting that the model performs well on other dimensions: populations greater than 16 and less than 65 years of age both cause increases in vehicle registrations. Higher incomes cause more cars to be registered; an additional $1,000 worth of income increases the number of registrations by about 348. Density turns out not to be important, and the trend in registrations is decidedly negative, although small (about 27,000 cars per year, holding other trends constant).

2. Drug Violations

It is possible that registration stickers, or rather, their absence, on license plates, may be an indicator of other wrongdoing on the part of the vehicle owner or driver. The lack of a sticker can, in any event, serve as a legitimate cause for stopping vehicles under suspicion for more serious offenses. Frampton observes that "police say that criminals often drive unregistered cars. Motor vehicle stops can lead to more serious charges, such as weapon or drug possession." We therefore modeled drug violation arrests in a manner similar to that used for registrations above. The results are contained in Output 3 in Appendix G.

As can be observed, in those states and years where stickers have been eliminated the number of drug arrests did fall, by about 1,600 per year. This is about a 5 percent drop, compared to the average of approximately 30,000 arrests made per year per state. It is *critical* to note, however, that (similar to what was found for registrations) the statistical tests indicate that this is not a causal effect and very likely just due to random fluctuations in arrests over time and across states. ***There is no causal link between sticker policy and drug arrests.***

3. Motor Vehicle Theft

The license plate sticker may facilitate the detection of stolen vehicles. Frampton (2010) quotes Connecticut State Rep. Christopher Caruso: "The officer has to be able to...determine in the quickest manner whether or not the vehicle is registered and whether it's registered to the right person" with the evident implication that stickers are an aid to this process. Therefore it was of interest to investigate whether the absence of stickers engenders a rise in motor vehicle theft. The model was estimated and is presented in Output 4, Appendix G. The surprising result is that the absence of license plate stickers is actually associated with a decline in such theft by about 3,200 cars per year, and unlike the previous two analyses, this result passes the test of statistical significance. (Note that this is number of crimes, not number of arrests, therefore the decline is a positive development.) We are not ready, despite this strong evidence, to ascribe a causal relation between sticker policy and lower theft rates. ***It does seem clear that fears of increased theft due to eliminating license plate stickers are not well-founded, based on existing evidence.***

4. Cost Savings

Ideally we would like to be able to assess the cost savings from the elimination of stickers by applying a similar methodology to the yearly expenditures of states on the administration of vehicle registrations, comparing sticker and no-sticker regimes. Consistent data on this does not appear to be available. For example, the United States Census of Governments (the most likely place for such data-gathering to occur) does not break this data out separately. (The closest match is for entire state departments of transportation, which is not nearly specific enough for our purposes.) However, conversations with PennDOT officials revealed that some savings would accrue to sticker elimination, particularly the physical cost of sticker manufacturing and distribution. This cost was estimated to be about $1.3 million.

Conclusions

Based on an examination of available data from all 50 states over several years, a comparison of outcomes reveals that there is no statistical evidence that the elimination of stickers has any statistically significant impact on the number of vehicle registrations, the ability of police to make drug arrests, or on the number of motor vehicle thefts. This, combined with

the reported cost savings due to sticker elimination, implies that the elimination of stickers passes the cost-benefit test for the Commonwealth of Pennsylvania.

Public Information and Education Campaigns

When an agency that deals directly and heavily with the public changes its procedures, it is important for it to alert and educate its customers. In the summer of 2010, when Connecticut switched from window stickers to no stickers, the state developed a comprehensive PI&E campaign. This campaign included a one-minute video, a podcast (i.e., an audio file available on the Internet that can be played on a computer or mobile device, like an mp3 player or iPod), and an addition to the state website's FAQ (www.ct.gov/dmv/regstickers). The FAQ lists the following as further elements of CT's PI&E campaign:

> "press releases, an insert in renewals to explain the change, information in law enforcement bulletins,…a newly designed general purpose envelope that highlights the change, the change will be advertised on an electronic bulletin board in DMV offices..."

When NJ decided to move from motor vehicle license plate registration stickers directly to no vehicle registration stickers at all in 2004, they took a different, less wide-ranging approach. In fact, an interview with a representative of the NJDOT stated that they did not have any campaign or special public education program to let people know about the program change. He said that their customers were informed through newspaper and media and that, "it was not a big issue for us." However, they did insert a special addition to the "registration renewal" section of their driver manual, which reads: "Note: The MVC no longer issues license plate registration decals to passenger vehicles or non-commercial light-truck owners." When, in 2010, they expanded this change to cover motorcycles, commercial vehicles, and trailers, they issued a press release (http://www.state.nj.us/mvc/pdf/About/advisories/advisory-2010-004.pdf) and added the following language under "License Plates" "Standard Issue" on their website: "MVC no longer issues registration decals that adhere to the upper right-hand corner of license

plates on passenger vehicles, motorcycles or commercial vehicles. Customers may remove the decals from their license plates, as long as the license plate is not damaged." (http://www.state.nj.us/mvc/Vehicle/StandardIssue.htm).

Options

At this point in time Pennsylvania has three options: (1) eliminate vehicle registration stickers altogether, (2) change to a windshield vehicle registration sticker program, or (3) stay the course. If Option 1 is selected, the fabrication and distribution of registration stickers will discontinue. This would require an evaluation of the effects of eliminating the sticker program and a PI&E campaign explaining the change to PennDOT's customers. If Option 2 is selected, a plan for eliminating plate stickers and replacing them with window stickers would need to be developed. As with Option 1, this would require an evaluation and a PI&E campaign to alert and educate PennDOT's driving population. With Option 2, PennDOT could consider either a stand-alone window registration sticker, or combining registration information with the current annual safety inspection sticker. Currently, New York, Texas, and D.C. are using window registration stickers and all of them are stand alone, although TX has "conducted studies" into the possibility of combining its registration and inspection stickers. If PennDOT selects Option 2, the research that TX has already completed should be evaluated for application to Pennsylvania. If PennDOT chooses Option 3, nothing will change; i.e., it will incur no cost savings and sticker theft will likely continue at something like the current rate.

Summary

Some of the benefits of eliminating vehicle registration stickers altogether include the following:

1. It is a much simpler option than Option 2.
2. The costs associated with fabricating registration stickers will be eliminated.
3. The costs associated with distributing registration stickers will be eliminated (e.g., special envelopes with plastic windows).
4. This also opens the door to the future option of allowing customers to print their own registration cards, saving PennDOT the high costs of printing and distributing vehicle registration cards.

5. The possibility of sticker theft will be eliminated.
6. The surveys conducted for this research found that the three agencies that have eliminated registration stickers altogether reported no problems with law enforcement.
7. Of all the U.S. states surveyed for this research, only one state that maintains a license plate sticker program reported doing so because of "law enforcement reluctance" to eliminate them.
8. The cost/benefit analyses conducted for this research found that eliminating license plate registration stickers had no effect on motor vehicle theft, drug violations, and most importantly, the number of registrations.

Evaluation

The ex post evaluation of the removal of license plate stickers would use the same analytical framework as the empirical models described earlier in Task 2. First, note that for the three outcomes discussed above (i.e., vehicle registrations, drug violations, and motor vehicle theft), the bottom line is that there is no empirical evidence that sticker removal or modification had a statistically discernible effect on that variable.

Therefore, these outcomes should be monitored for the Commonwealth in the aftermath of sticker removal. If there is no discernible deviation from that variable's trend (as predicted by our empirical evidence), this can be the end of the evaluation process – the sticker removal is a non-event. If there was a discernible change in the outcome (and even if there is not), the question would arise as to whether this change would be predicted by the model. This would involve finding updated values for the variables in the model (including the updated version of the stickers indicator), plugging them into the regression equations presented in Task 2, and asking what the model forecast is for that variable, along with the statistical confidence interval. If the new outcome level is inside that standard confidence interval, then (again) the empirical model is vindicated to that extent.

However, it is possible that the outcome may be outside that predicted interval because of factors that may have changed between the time the model was developed and the time the program is implemented. In that case, the empirical model utilized in this report may need greater precision to accurately predict the effect of sticker removal. In this case, two parallel investigations can take place. The first is to ask whether the model changed. That is, did the

relationship between the input variables (including sticker policy) and the outcome variable change over the years subsequent to the years encompassed by the original database used in Task 2. The database could be augmented with updated variables and the parameters re-estimated. This would provide a new prediction and confidence interval for the impact of sticker removal in Pennsylvania, which in all likelihood would encompass the actual outcome. But more importantly, this procedure would simultaneously allow the question of whether the "anomalous" result was due to sticker removal or any of the other confounding factors in the model to be answered.

But there is another possibility, which is that change in the outcome variable is large and anomalous enough so as not to be explainable by either the model in this report or any possible updates of that model. This possibility would arise from forces that are unique to Pennsylvania and not coincident with trends in any other state that modified its sticker program. This would suggest that Pennsylvania is an outlier in some way not accounted for by our empirical investigations. Since nothing in those investigations suggested anything relevant in that way, the ex post investigation would have to search anew for such factors.

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APPENDIX A:
WAVE 1 SURVEY: AGENCIES THAT USE LICENSE PLATE REGISTRATION STICKERS

Dear Name,

I'm a researcher at Penn State doing a survey on the use of License Plate Registration Stickers for the Pennsylvania Department of Transportation. I understand that you may have responded to similar surveys in the past couple of years, but I hope you wouldn't mind answering a couple more quick questions. If you agree to help, please hit "reply," fill out the responses in a different color if you can, attach any applicable documents, and when you are done hit "send."

Our research shows that you use license plate stickers as part of your vehicle registration.

1. Are they used on all vehicles?
   a. If not, what vehicles are excluded/included?
2. How do drivers get the sticker?
3. How big is the sticker?
4. What information is on the sticker?
5. What is it made of?
6. Who is the sticker vendor?
7. Have you ever considered using a different type of program?

If no:

8. Why not? [Skip to * after you type your response]

If yes:

8. Why?
9. What alternate programs have you considered?
10. Why did you decide to maintain your current program?

*Could you attach documentation on your program such as: costs, number of vehicles, number of stickers, related laws and regulations, anything related to revenue or law enforcement, anything related to the actual or perceived success of the program, cost/effectiveness, etc?

Thank you for your help.

Sincerely,

APPENDIX B:
WAVE 1 SURVEY: AGENCIES THAT DO NOT USE LICENSE PLATE REGISTRATION STICKERS

Dear Name,

I'm a researcher at Penn State doing a survey on the use of License Plate Registration Stickers for the Pennsylvania Department of Transportation. I understand that you may have responded to similar surveys in the past couple of years, but I hope you wouldn't mind answering a couple more quick questions. If you agree to help, please hit "reply," fill out the responses in a different color if you can, attach any applicable documents, and when you are done hit "send."

Our research shows that you do not use license plate stickers as part of your vehicle registration.

1. How does Law Enforcement identify vehicles as registered?

2. Did you ever use license plate registration stickers?

If yes:

3. Why did you change?

4. When did you change?

5. What problems (with enforcement or otherwise) have you encountered since you switched?

Finally:

Could you attach documentation on your program such as: costs, number of vehicles registered, number of stickers, related laws and regulations, anything related to revenue or law enforcement, anything related to the actual or perceived success of the program, cost/effectiveness, etc?

Thank you for your help.

Sincerely,

APPENDIX C:
WAVE 2 SURVEY: AGENCIES THAT USE WINDOW REGISTRATION STICKERS

Dear Name,

I'm doing a follow-up survey on the use of License Plate Registration Stickers for PennDOT that you completed recently. I hope you wouldn't mind answering a couple more quick questions. Please hit "reply," fill out the responses in a different color, and when you're done hit "send."

Our research shows that you issue window vehicle registration stickers.

1. Did you ever consider eliminating vehicle registration stickers altogether? Why or why not?

2. Have you ever considered going back to issuing license plate registration stickers? Why or why not?

3. Do you currently mail vehicle registration cards to your customers, or have you gone to an on-line and print at home system? [If your customers now register on line and print their cards at home, please elaborate on the success of that program.]

Thank you for your help.

Sincerely,

APPENDIX D:
WAVE 2 SURVEY: AGENCIES THAT DO NOT USE ANY VEHICLE REGISTRATION STICKERS

Dear Name,

I'm doing a follow-up survey on the use of License Plate Registration Stickers for PennDOT that you recently completed. I hope you wouldn't mind answering a couple more quick questions. Please hit "reply," fill out the responses in a different color, and when you're done hit "send."

Our research shows that you do not issue vehicle registration stickers at all for normal passenger vehicles.

1. Did you progress from license plate registration stickers, to window registration stickers, to no registration stickers, or did you go directly from license plate to no stickers? If it was a progression, why?

2. Have you ever considered going back to issuing vehicle registration stickers? Why or why not?

3. Do you currently mail vehicle registration cards to your customers, or have you gone to an on-line and print at home system? [If your customers now register on line and print their cards at home, please elaborate on the success of that program.]

Thank you for your help.

Sincerely,

APPENDIX E: DETAILED STATE OF THE PRACTICE SURVEY RESULTS (See electronic spreadsheet)

APPENDIX F: DATA SOURCES FOR COST/BENEFIT ANALYSIS

Total Number of registered vehicle (data for 1995,1996 and 1998 to 2008)
Federal Highway Administration
http://www.fhwa.dot.gov/policy/ohim/hs03/htm/mv1.htm

- Number of private and commercial vehicle (data for 1995,1996 and 1998 to 2008)
(Federal Highway Administration)
http://www.fhwa.dot.gov/policy/ohim/hs03/htm/mv1.htm

- Population Density (2000,2008,2009)
US Census Bureau http://www.census.gov/

- Under 18 and over 65 (2000 and 2010)
US Census Bureau
http://www.census.gov/population/www/projections/projectionsagesex.html

- Median income (2005,2006,2007,2008 and 2009)
US Census Bureau http://factfinder.census.gov/servlet/GRTTable?_bm=y&-_box_head_nbr=R1901&-_req_type=S&-ds_name=ACS_2008_1YR_G00_&-format=US-30

- Personal income (from 1995 to 2010)
Bureau of Economic Analysis http://www.bea.gov/regional/

- Population by selected age group (1995-1999 and 2002-2008)
US Census Bureau http://www.census.gov/popest/states/

- Crime data +Population (10 columns) (data from 1995 to 2008)
Bureau of Justice Statistics
http://bjsdata.ojp.usdoj.gov/dataonline/Search/Crime/State/StatebyState.cfm?NoVariables=Y&CFID=12604046&CFTOKEN=35234424

APPENDIX G: COST/BENEFIT DATA ANALYSES RESULTS

Output 1

```
. reg vehpercap nost

      Source |       SS       df       MS              Number of obs =     612
-------------+------------------------------           F(  1,   610) =   41.87
       Model |  1.24304342     1  1.24304342           Prob > F      =  0.0000
    Residual |  18.1076727   610  .029684709           R-squared     =  0.0642
-------------+------------------------------           Adj R-squared =  0.0627
       Total |  19.3507161   611  .031670566           Root MSE      =  .17229

------------------------------------------------------------------------------
   vehpercap |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        nost |  -.1845055   .0285123    -6.47   0.000    -.2404997   -.1285113
       _cons |   .8333923   .0071976   115.79   0.000     .8192572    .8475274
```

Output 2

```
Fixed-effects (within) regression               Number of obs      =       510
Group variable: stateno                         Number of groups   =        51

R-sq:  within  = 0.7721                         Obs per group: min =        10
       between = 0.9646                                        avg =      10.0
       overall = 0.9604                                        max =        10

                                                F(7,452)           =    218.76
corr(u_i, Xb)  = -0.5518                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         veh |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        nost |    60060.4   169839.8     0.35   0.724    -273713.2      393834
     density |   34.57321   377.2353     0.09   0.927    -706.7795    775.9259
      income |   3.482159   .9843868     3.54   0.000     1.547616    5.416701
  population |  -.6165669   .4227344    -1.46   0.145    -1.447336    .2142019
      over16 |   2.051065   .5827935     3.52   0.000     .9057436    3.196386
      over65 |  -1.609604   1.022975    -1.57   0.116    -3.619982    .4007726
        year |  -27281.66    5072.92    -5.38   0.000    -37251.09   -17312.22
       _cons |   5.41e+07   1.01e+07     5.37   0.000     3.43e+07    7.39e+07
-------------+----------------------------------------------------------------
     sigma_u |  1150748.9
     sigma_e |  373784.43
         rho |  .90456233   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(50, 452) =    38.99             Prob > F = 0.0000
```

Output 3

```
. xtreg drug nost density income pop andover over65 year, fe

Fixed-effects (within) regression               Number of obs      =       203
Group variable: stateno                         Number of groups   =        51

R-sq:  within  = 0.4319                         Obs per group: min =         3
       between = 0.5168                                        avg =       4.0
       overall = 0.5157                                        max =         4

                                                F(7,145)           =     15.75
corr(u_i, Xb)  = -0.3293                        Prob > F           =    0.0000

------------------------------------------------------------------------------
drugviolat~n |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        nost |  -1639.792   3501.332    -0.47   0.640    -8560.033    5280.449
     density |   6.959155   21.48944     0.32   0.747    -35.51386    49.43217
      income |    .092207   .0260859     3.53   0.001     .0406494    .1437647
  population |   .0512745   .0070006     7.32   0.000     .0374381    .0651109
     andover |  -.0439484     .01252    -3.51   0.001    -.0686936   -.0192032
      over65 |  -.1308186   .0245622    -5.33   0.000    -.1793648   -.0822724
        year |  -236.8721   296.1125    -0.80   0.425    -822.1264    348.3823
       _cons |   479402.5   593415.1     0.81   0.420    -693458.5     1652263
-------------+----------------------------------------------------------------
     sigma_u |  35379.992
     sigma_e |  2990.9218
         rho |  .99290419   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(50, 145) =    66.81             Prob > F = 0.0000
```

Output 4

```
. xtreg mvtheft nost density income pop andover over65 year, fe

Fixed-effects (within) regression               Number of obs      =       612
Group variable: stateno                         Number of groups   =        51

R-sq:  within  = 0.3459                         Obs per group: min =        12
       between = 0.8137                                        avg =      12.0
       overall = 0.7948                                        max =        12
                                                F(7,554)           =     41.86
corr(u_i, Xb)  = 0.5099                         Prob > F           =    0.0000
------------------------------------------------------------------------------
     mvtheft |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        nost |  -3329.175   2551.204    -1.30   0.192    -8340.391    1682.041
     density |   1.046723   5.056877     0.21   0.836    -8.886274    10.97972
      income |  -.0462627   .0144218    -3.21   0.001    -.0745908   -.0179346
  population |   .0435291   .0062571     6.96   0.000     .0312385    .0558196
     andover |  -.0458294   .0086041    -5.33   0.000    -.0627299   -.0289288
      over65 |  -.0294676   .0149948    -1.97   0.050    -.0589211    -.000014
        year |  -7.193484   71.72558    -0.10   0.920    -148.0808    133.6939
       _cons |   22949.82   142409.1     0.16   0.872    -256778.1    302677.7
-------------+----------------------------------------------------------------
     sigma_u |  18140.377
     sigma_e |  5851.7416
         rho |  .90574908   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(50, 554) =    24.14             Prob > F = 0.0000
```