

Policy Brief

An analysis of the driving restriction implemented in San José, Costa Rica

REBECCA OSAKWE. JUNE 2010

Driving restrictions such as the one implemented in the San José Metropolitan Area, in Costa Rica, have gained popularity among policymakers in developing countries. However, the effects of restrictions on common transport externalities such as air pollution and traffic congestion remain unclear. This analysis evaluates the effect of San José's driving restriction on national transport fuel sales.

In August 2005, Costa Rican policymakers implemented a driving restriction (DR) that bans most drivers from circulating their vehicle within a restricted zone of the San José Metropolitan Area (SJMA). A restriction to drive one weekday per week on a specific zone of the SJMA is imposed on any privately owned vehicle; this is determined by the last digit of the vehicle's license plate which corresponds to a day of the week. For example, vehicles whose license plate number ends in 1 or 2 are prohibited from circulating within the restricted zone on Mondays between 6 AM and 7 PM.

Driving restrictions such as the one implemented in San José have been implemented in other Latin American cities, including Mexico City, Bogotá, Santiago and Sao Paulo. Despite their popularity among policymakers, the effects of such restrictions on common transport externalities such as air pollution and traffic congestion remain unclear. Proponents of San José's restriction argue that the policy is a reasonable way to reduce congestion and air pollution within the SJMA. Opponents argue that it is inefficient, in the sense that it fails to reduce transport fuel sales, and it is likely that reductions in traffic congestion and air pollution within the SJMA have aggravated these problems in the areas surrounding the restricted zone.

The DR was originally implemented for fiscal reasons: it was initially justified on grounds that it would help to reduce consumption of gasoline and thereby reduce national expenditures on fuel. When international fuel prices began to fall in late 2008, opponents argued that the restriction was no longer necessary. When DR was discontinued on June 12, 2009, and among the more notable consequences of this decision was a sharp rise in traffic congestion within the SJMA. Proponents pressed policymakers to re-establish the restriction, arguing that it was now needed to reduce traffic congestion. On July 21, the program was re-initiated on grounds that it would help to reduce traffic congestion and air pollution within the SJMA.

Key Points

- San José's DR reduced national gasoline sales by between 6.23% and 9.23% during the period of July 2008—April 2009.
- However, differences in the restriction's effects on sales of regular versus premium gas suggest the measure has distributional effects; there is a larger effect on convenience and budgets of poor drivers.
- Policymakers are advised to improve mass transit, and to incentivize further research relevant to the transport sector.

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This analysis contributes to a more accurate evaluation of the effects of the DR on transport fuel sales in Costa Rica by accounting for changes in fuel prices over time, as well as changes in the vehicle fleet.

Methodology and Data

In order to measure the effect of the DR on national fuel sales, it is necessary to model national demand for transport fuel. The models used in this analysis are based on two transport fuel demand models developed by Sterner and Dahl (1992).

The literature on measuring the effects of DRs includes theoretical attempts (Levinson and Shetty 1992; Goddard 1997; Molina and Molina 2002) and empirical attempts (Eskeland and Feyzioglu 1997; Davis 2008). The theoretical studies suggest that DRs are a costly way to reduce traffic and pollution, and the empirical studies indicate that, at least in Mexico City, such restrictions are also counterproductive.

In this regression analysis, two models of transport fuel demand (one static, one dynamic) are used to measure the effect of San José's DR on national sales of four types of transport fuels. Both models include a measure of the change in the vehicle fleet, indicator variables for month of year (to adjust for seasonal variation in fuel sales) and for year (to adjust for the increasing trend in fuel sales over time).

Data on national monthly fuel sales and prices for the period January 2002 to April 2009 were obtained from the Costa Rican Petroleum Refinery. GDP data were obtained from the Central Bank of Costa Rica and were deflated by the CPI, as defined by the Costa Rican National Statistics and Census Bureau. Vehicle stock data were obtained from the Costa Rican National Registry.

Main Results

This analysis indicates that during the period July 2008–April 2009, San José's DR was successful in reducing national gasoline sales. The results for this period can be summarized as follows:

Effect of the San José's driving restriction on national fuel sales

Period	% change in fuel sales			
	Diesel	Gasolines	Regular gas	Premium gas
<i>July 2008– April 2009</i>	none	-6.23 to 9.23	none	- 12.84 to 15.56

Between July 2008 and April 2009, the restriction was consistently enforced. The effect of the restriction on gasoline sales (regular and premium combined) is of particular interest, since the program was originally implemented to reduce the sale of these fuels. The results indicate that during this period, this objective was indeed fulfilled, at least during the period July 2008–April 2009. The DR reduced gasoline sales by between 6.23% and 9.23%; however it had no significant effect on diesel sales. The fact that diesel sales did not increase suggests that the substitution of private transportation for public transportation was not a popular response to the restriction—a hypothesis that could be verified by an analysis of data on bus and taxi ridership.

When gasoline sales are divided into regular and premium, the results are different for each type of gasoline. While the restriction had no significant effect on regular gas sales, it reduced premium gas sales by between 12.84% and 15.56%. Differences in the number of vehicles owned by consumers of regular gas as compared to consumers of premium gas might account for these

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results. Presumably, it is easier for high-income car owners to accommodate to the restriction by carpooling with members of their own household, because high-income households are more likely to own more than one car. Low-income car owners, however, cannot carpool as easily, because they are more likely to belong to households with only one car. If they wish to heed the restriction, they must either take the bus (which currently does not meet their transport needs) or a taxi (which is more expensive than driving)—but the lack of a change in diesel sales suggests that neither of these options has been popular among drivers. Alternatively, they could violate the restriction and assume the cost of fines, which can reach 20,400 colones (\$40.80) in a single day, if they are fined twice. Whether drivers choose to heed or violate the restriction, the program seems to affect more low-income drivers than high-income drivers, both in terms of finances and convenience.

Policy implications and recommendations

These results generate a few lessons for Costa Rican policymakers.

1. If policymakers wish to decrease gasoline sales in a way that does not disproportionately affect low-income drivers, they must find a way to create incentives for consumers of both regular and premium gasoline to substitute private transport for mass public transport.
2. Given that national gasoline sales decreased as a result of the DR, it is likely that vehicular emissions and traffic congestion have also decreased. It is important to determine whether changes in emissions and traffic congestion within the restricted zone differ markedly from such changes in the area surrounding this zone. Policymakers should create incentives for research institutions to expand and improve the analysis of the effects of San José's DR.
3. This analysis could be improved by the use of data on bus and taxi ridership, air quality and traffic congestion. Policymakers are advised to incentivize the collection and sharing of data related to the transport sector in order to facilitate and promote research that might lead to improvements in transportation policies.

In sum, although San José's DR was successful in reducing gasoline sales between July 2008 and April 2009, the program is unfair in that high-income drivers can accommodate to the restriction with greater ease and less cost than low-income drivers. Policymakers should keep this in mind when evaluating the effects of the policy and in deciding what other transport policies to implement simultaneously. If the restriction were complemented by an improvement in mass public transport, its presumed inequitable effects would likely disappear, and its effects on gasoline consumption might be more pronounced.

ABOUT THIS BRIEF

This brief is based on results from: Osakwe, Rebecca. 2010. "The Political Economy of Private Transport Regulation in Costa Rica." M.S. Thesis. Tropical Agricultural Research and Higher Education Center (CATIE): Turrialba, Costa Rica.

REFERENCES

- Davis, L. 2008. The Effect of Driving Restrictions on Air Quality in Mexico City. *Journal of Political Economy*, 2008, v. 116, no. 1.
- Eskeland, GS; Feyzioglu, T. 1997. Rationing Can Backfire: The 'Day without a Car' in Mexico City. *World Bank Econ. Rev.* 11 (3): 383–408 p.
- Goddard, HC. 1997. Using Tradeable Permits to Achieve Sustainability in the World's Large Cities: Policy Design Issues and Efficiency Conditions for Controlling Vehicle Emissions, Congestion and Urban Decentralization with an Application to Mexico City. *Environmental and Resource Econ.* 10 (1): 63–99 p.
- Levinson, A; Shetty, S. 1992. Efficient Environmental Regulation: Case Studies in Urban Air Pollution in Los Angeles, Mexico City, Cubatao and Ankara. Banco Mundial, Washington, DC. US. Policy Research Working Paper no. 942.
- Molina, LT; Molina MJ. eds. 2002. Air Quality in the Mexico Megacity: An Integrated Assessment. Londres, UK. Dordrecht. Kluwer. 384 p.
- Sterner, T; Dahl CA. 1992. Modelling Transport Fuel Demand. International Energy Modeling. Londres, UK. Chapman and Hall. Sterner, T ed.

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CONTACT INFORMATION

MSc. Rebecca Osakwe, rebecca.osakwe@gmail.com. Tel. + (506) 2558-2524



EfD Center in Central America. www.efdinitiative.org/centers/central-america
efd@catie.ac.cr. Phone.+ (506) 2558-2624. Fax.+ (506) 2558-2625
Research Group on Socioeconomics of Environmental Goods and Services (SEBSA)
CATIE Headquarters 7170, Cartago, Turrialba 30501, Costa Rica



Environment for Development (EfD) initiative. www.environmentfordevelopment.org
EfD Secretariat: info@efdinitiative.org. Phone: + 46.31.786.2595. Fax + 46.31.786.1043
www.efdinitiative.org/efd-initiative/organisation/secretariat. Department of Economics
University of Gothenburg , PO Box 640, SE 405 30 Gothenburg, Sweden