# Reducing binge drinking? The effect of a ban on late-night off-premise alcohol sales on alcohol-related hospital stays in Germany

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## ABSTRACT

Excessive alcohol consumption among young people is a major public health concern. On March 1, 2010, the German state of Baden-Württemberg banned the sale of alcoholic beverages between 10 pm and 5 am at off-premise outlets (e.g., gas stations, kiosks, supermarkets). We use rich monthly administrative data from a 70% random sample of all hospitalizations during the years 2007–2011 in Germany in order to evaluate the short-term impact of this policy on alcohol-related hospitalizations. Applying difference-in-differences methods, we find that the policy change reduces alcohol-related hospitalizations among adolescents and young adults by about 7%. There is also evidence of a decrease in the number of hospitalizations due to violent assault as a result of the ban.

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## 1. Introduction

According to the World Health Organization (2014), excessive alcohol consumption is responsible for around 3.3 million preventable deaths worldwide in 2012, and the harmful use of alcohol accounts for 5.1% of the global burden of disease and injury. In particular, excessive consumption of alcohol by young people is a major public health concern. The Centers for Disease Control and Prevention reports that in 2010, among U.S. adults aged 18 years and older, binge drinking prevalence and intensity was highest among those aged 18–24 years (Kanny et al., 2012). Since drinking is habit-forming (see e.g., Enoch, 2006), early drinking onset might have long-lasting adverse consequences. Indeed, a large body of literature documents a significant relationship between (extensive) alcohol consumption in young people and various negative outcomes, such as crime (Carpenter, 2005a), risky sexual behavior and teenage pregnancy (Sen, 2003; Carpenter, 2005b), suicide (Birckmayer and Hemenway, 1999; O'Connell and Lawlor, 2005), lower academic performance (Carrell et al., 2011), lower employment and higher risk of unemployment (Mullahy and Sindelar, 1996), adverse

health effects such as mortality and hospitalization (Chaloupka and Xin, 2011; Kim et al., 2012), and motor vehicle fatalities (Ruhm, 1996; Dee, 1999).

High-risk drinking has been increasing in the last years among young people in the United States (White et al., 2011) and across much of Europe, including Germany (DHS, 2008). Fig. 1 reports trends in alcohol-related hospitalization rates among adolescents and young adults in Germany, a country where young people can legally buy beer and wine starting at the age of 16. Panel a) displays trends in the annual number of alcohol-related hospitalizations per 100,000 inhabitants of the same age between 2002 and 2011. Panel b) displays the corresponding growth rates. The figure shows that the alcohol-related hospitalization rates doubled in the age groups 15–19, 20–24, and 25–29. The German Federal Statistical Office reports that in 2011, 41,959 individuals between 15 and 29 received hospital treatment due to excessive alcohol consumption, compared to 18,391 in 2002.[1]

In March 2010, the German state of Baden-Württemberg[2] banned the sale of alcoholic beverages between 10 pm and 5 am at off-

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[1] https://www.destatis.de/EN/FactsFigures/SocietyState/Health/Hospitals/Tables/DiagnosisAlcoholAgYears.html. Note that the numbers of alcohol-related hospitalizations in Fig. 1 are taken from the same source. Accessed on July 16, 2014.
[2] Baden-Württemberg is located in southwestern Germany and is the third-largest German state by population (10.5 million in 2011).

(a)

(b)
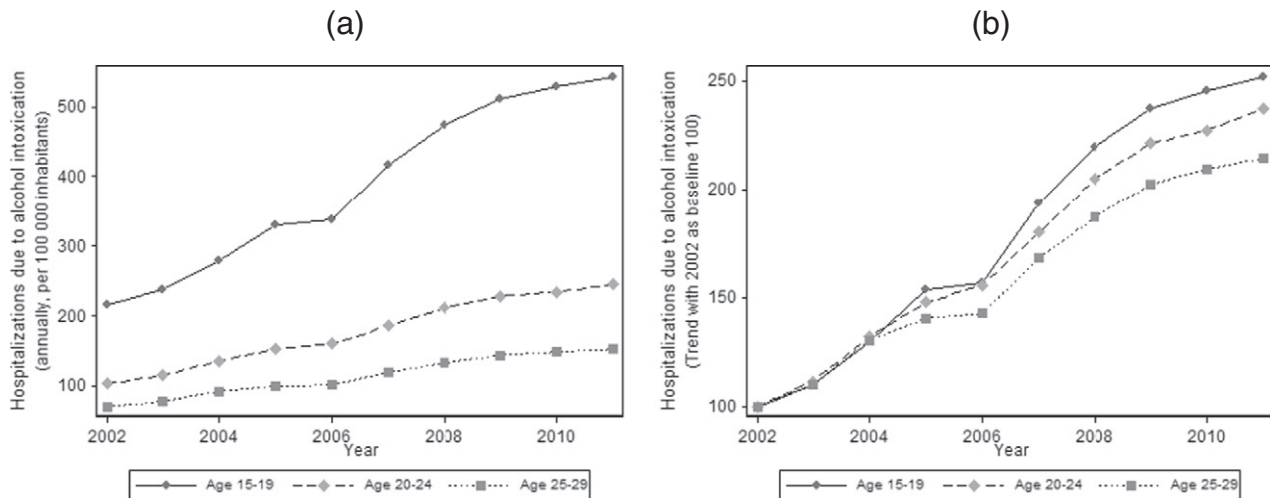


Note: The figure displays trends in alcohol-related hospitalization rates in various age groups of young people (15-19, 20-24, 25-29) between 2002 and 2011. Panel (a) provides the annual number of alcohol-related hospitalizations per 100,000 inhabitants of the same age. Panel (b) shows growth rates of these alcohol-related hospitalizations compared to the base year 2002.
Source: German Federal Statistical Office 2014.

**Fig. 1.** Trends in alcohol-related hospitalizations.

premise outlets (e.g., gas stations, supermarkets, kiosks). One of the law's main objectives was to reduce binge drinking among young people. This study presents first evidence on the short-term effects of this late-night alcohol sales ban on alcohol-related hospitalizations. We exploit rich monthly data from a 70% random sample of the German hospital diagnosis statistics for the 2007–2011 period. This nationwide hospitalization data set contains information about all inpatients at all German hospitals. We study the short-term effect of the reform on alcohol-related hospitalizations in general and specifically for young people, as there are various reasons to assume that the reform impacts youth in particular. Using an additional data set from one large hospital in the comparison group, we also document that the majority of alcohol-related hospital admissions among young people takes place in late evening and during the night. Hence, the late-night alcohol ban is likely to be most binding for adolescents and young adults.

Indeed, we find that the policy change reduces alcohol-related hospitalizations among adolescents (ages 15–19) and young adults (ages 20–24) by about 7%. For older individuals, there is no empirical evidence of a significant reduction. Our findings are robust to alternative definitions of the control group (e.g., only states in western Germany, only the southern states of Bavaria and Hesse, a synthetic control group), different restrictions of the sample, the addition of further control variables (e.g., county-specific time trends) and various estimation issues (e.g., estimation in logs, Tobit model). We provide evidence that the ban impacts both male and female adolescents/young adults, though the effect is stronger for males. Furthermore, we find empirical evidence that the late-night off-premise alcohol sales ban reduces overall hospitalizations due to diagnoses that are often related to violent assaults. However, we do not find evidence of complementary effects on illicit drug use, as the ban does not decrease drug-related hospitalizations.

Overall, our empirical results suggest that the late-night off-premise alcohol ban is an effective policy strategy for reducing excessive alcohol consumption among adolescents and young adults. Hence, the ban can work as a measure against negative externalities of excessive alcohol consumption, such as violence, traffic accidents,

and noise (Parry et al., 2009) and as a commitment device for individuals with time-inconsistent preferences (Hinnosaar, 2012). The empirical findings contribute to the literature on whether and how policies can influence problematic drinking behaviors. The results are also informative for policy makers in other countries who are considering or planning to implement similar late-night alcohol sales bans: the investigated ban can be considered to be a fairly "light touch" regulation compared to other alcohol control policies, as it restricts the sale of alcoholic beverages only at a specific time of the day (10 pm to 5 am) and only for a specific type of outlet (off-premise outlets).

The outline of the paper is as follows. Section 2 discusses the literature on related alcohol control policies, Section 3 provides background information on the late-night ban and other relevant alcohol policies in Germany, and Section 4 describes the data. Section 5 discusses the empirical approach, and the main results are presented in Section 6. Section 7 probes the robustness of the findings and Section 8 reports further results (e.g., effect heterogeneity, evolution of the treatment effect, length of hospital stay, and other diagnoses). Section 9 concludes.

## 2. Related literature

Proponents of alcohol control policies often point out that excessive alcohol consumption is a negative externality as it can compromise others either directly (as, e.g., in the case of crime, traffic accidents, and noise) or indirectly (e.g., through higher costs for the health care system). Additionally, alcohol control policies are often justified with reference to time-inconsistent preferences of alcohol consumers (Hinnosaar, 2012). For instance, in the morning, individuals with time-inconsistent preferences may plan to drink less or no alcohol that evening, but when evening comes, they find themselves unable to resist the urge for a drink. Therefore, a ban on late-night alcohol sales can be seen as a kind of commitment device for individuals with time-inconsistent preferences (Bryan et al., 2010): during the day they plan to consume fewer beverages in the night and therefore purchase less alcohol during the day, but when the night arrives, they go to the