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Ramadan, fasting and educational outcomes[☆]

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ABSTRACT

Using a difference-in-differences framework, we estimate the impact of Ramadan on educational outcomes of Muslim students living in a non-Muslim country. For identification we exploit that the number of Ramadan weeks during the course that we study, varies from year to year, ranging from zero to four. Our main finding is that Ramadan observance has a negative impact on performance; one additional Ramadan week lowers the final grade of Muslim students by almost 10% of a standard deviation.

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1. Introduction

This paper examines the impact of Ramadan on the academic performance of Muslim students in the economics program at the VU University Amsterdam in the Netherlands. Like in other non-Muslim countries, the number of Muslim-students in the Netherlands is expanding, and will continue to expand in the near future ([Pew Forum on Religion and Public Life, 2011](#)). This makes it increasingly important to know to what extent academic achievement is affected, if at all, by observing Ramadan. A key element of Ramadan is the fast, which means that for a

period of 29 or 30 days all healthy post-pubertal Muslims avoid the intake of all food and drink between sunrise and sunset. Eating is only allowed during the night ([Kocurk, 2002](#)). Fasting is assumed to teach patience, modesty and spirituality. Individuals who cannot fast for legitimate reasons (traveling, illness, and menstruation) should compensate for this by fasting an equal number of days at some other time. The month of Ramadan may also come with sleep deprivation, but this is to a large extent due to the fact that people, who observe the fast during daytime, eat more during nighttime and go to bed later. Indeed, [Margolis and Reed \(2004\)](#) find that observant Muslim medical students successfully adapt and avoid a rise in daytime somnolence by increasing daytime sleep hours during Ramadan. If fasting is the main mechanism through which Ramadan affects academic performance, our results are informative about the relation between nutrition and educational outcomes.

Based on previous research, we hypothesize that observing Ramadan, and especially observing the fast,

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will have a negative impact on participants' academic achievement. Research among people observing Ramadan indicates lower mental activities during daytime and increases in these activities after sunset. Self-perceived abilities to perform mental activities follow this same pattern (Waterhouse, Alkib, & Reilly, 2008, see also Roky, Iraki, HajKhlifa, & Lakhdar Ghazal, 2000).¹ In a study among 265 university students who observed the Ramadan fast, Afifi (1997) reports reduced activity, less desire to study and lower ability to concentrate among more than 50% of the subjects.² These behavioral responses to Ramadan are observed within Muslim societies, although the study by Waterhouse et al. (2008) also covers 31 Muslims in the United Kingdom. Our study inquires the impact of Ramadan on students' academic achievement in a non-Muslim setting in which teaching schedules and exam dates and times are not adjusted to Ramadan. This deviates from a Muslim environment in which teaching schedules are adjusted to Islam's holy days.³

Although Ramadan observance entails more than only the fast, it is likely that the fast is the main element affecting academic performance (cf. Almond & Mazumder, 2011; Van Ewijk, 2011). An extensive experimental literature shows the importance of nutrient intake for the cognitive functioning of school children (Benton, 2008; McEwan, 2013; Muthayya et al., 2007; Simeon & Grantham-McGregor, 1989; Taras, 2005; Wesnes, Pincock, Richardson, Helm, & Hails, 2003). The vast majority of this literature focuses on short-run effects of short-lived interventions, and not much is known about long-run effects or the effects of long-lasting interventions.⁴ Based on a survey of the literature, Taras (2005) states that "[l]ong-term studies are recommended as an important next step for researchers in the field of school nutrition." The literature on long-run effects of nutrient intake mainly focuses on periods of malnutrition during childhood, and mainly considers developing countries. Benton (2008) provides some evidence that malnutrition early in life or even during pregnancy can have lasting effects on brain development. Most of this evidence does not come from

randomized experiments like the evidence on short-run effects discussed above. An exception is Maluccio et al. (2006), who find for Guatemala that a nutrition intervention during the first three years after birth improves educational outcomes. Belot and James (2011) consider school meals in the United Kingdom. In a difference-in-differences setting they find that the switch from low-budget to healthier primary school meal improves outcomes and reduces absence. McEwan (2013) applies a regression-discontinuity design to evaluate the impact of a large school feeding programs in primary schools in Chile and finds no evidence that additional calories affect school outcomes.

In this study, we examine how the performance of Muslim students on an introductory course in microeconomics is affected by exposure to Ramadan. To identify this impact, we use a difference-in-differences approach. The first difference contrasts Muslim students and non-Muslim students, thereby assuming that non-Muslim students are unaffected by Ramadan. The second difference uses that the number of Ramadan weeks during the course differs across years. This is due to the fact that the timing of Ramadan follows the Islamic calendar in which a year is about 11 days shorter than in the commonly used Gregorian calendar. As a result, during our period of observation (2003–2007) Ramadan shifts over the course which always starts in the first week of September and lasts until the second week of October.

Our study differs in some important respects from previous studies that examine the link between fasting and cognitive outcomes. First, we focus on a different population, undergraduate students instead of school children. Second, we consider the performance of these students in a real-life setting in which they have a strong incentive to perform as good as possible on the test. This incentive is often absent in the experimental evidence mentioned above. Finally, Ramadan implies one entire month of changed nutrient intake, which is much longer than the usual experiments. This implies that our study goes beyond the short spells of fasting usually considered in the literature.

Our main finding is that one additional week of Ramadan exposure reduces the final grade of Muslim students for the microeconomics course by almost 10% of a standard deviation and there is no difference between male and female students. Since not all Muslim students actively participate in Ramadan and we do not have information which students actually did participate, this estimate should be interpreted as an intention-to-treat effect for Muslim students. This is a lower bound on the actual treatment effect. The decrease in performance is not the result of reduced attendance, i.e. we do not find any evidence that due to Ramadan Muslim students attend fewer classes.

The remainder of the paper continues as follows. The next section provides details of the institutional setting, which is the first year of the undergraduate economics and business program at the VU University Amsterdam. Section 3 describes the data and provides summary statistics. It also reports results from a questionnaire we conducted in 2007 and which gives information about

¹ Waterhouse et al. (2008) studied 64 Muslims concerning their food and fluid intake, naps, physical, mental and social activities, and their ability to perform physical and mental tasks. Information was gathered through five questionnaires per subject per day for a period of eight weeks (two before, four during and two after Ramadan).

² Afifi (1997) conducted a cross-sectional study to explore the effect of the Ramadan fast on daily practices, health and performance. More people got involved in stress reducing and spiritual activities. They drank less caffeine-containing beverages and smoked less. Food intake appeared to improve during Ramadan with higher proportions eating foods from all food groups. The amount of food did not differ significantly except in case of food from the cereal, meat and vegetable groups.

³ Sander (2010) documents that in the United States, Islam and Judaism have similar positive effects on educational attainment relative to Protestants and Catholics. Using data from Lebanon, Hajj and Panizza (2009) show that the gender gap among Muslims is not different from that of Christians.

⁴ The findings of Figlio and Winicki (2005) suggest that schools are aware of the link between nutrition and short-term cognitive functioning. They find that school districts having schools that face potential sanctions under the school accountability system respond by increasing calories in their menus on testing days, while districts without such immediate pressure do not change their menus.

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