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Does ICT in schools affect residential adoption and adult utilization outside schools?

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ABSTRACT

Policymakers around the world are considering whether to invest in putting information and communication technology (ICT) in schools, and how. While educational impact is likely to be the primary objective, such investments can also affect residential adoption and adult utilization of ICT in the communities, thereby reducing the digital divide. Using a census survey of Thailand for a time when ICT was available in roughly half of the nation's schools, this study employs logistic regression and propensity score matching (PSM) to show that placing ICT in schools does have significant spill-over effects outside schools. This effect is larger for ICT in primary schools than secondary schools, and larger in schools with both Internet and computers than schools with just computers. The effects are observed in households of all incomes and educational levels. Considering these spill-over effects when allocating resources should lead to greater welfare gains for the amount of resources spent. The study also finds that there is a sizable portion of the adult population that chooses not to use ICT even after adopting this ICT in their households for their children, thereby eliminating any barriers to use related to cost and convenience. For this group, policy-makers should seek ways to decrease other impediments to ICT use, such as increasing ICT literacy through training.

1. Introduction

Policymakers around the world are considering whether to invest in putting information and communications technology (ICT) in schools. While the primary impact of this ICT is likely to be on the education that students get while at school, there may be *spill-over effects* that are worth considering, where any impact outside the school is considered a spill-over effect. This study measures the spill-over effects of bringing ICT to students in their schools on adoption of ICT in the households of these students, and on utilization of ICT by adults who live with these students. The specific ICT considered consists of computers and Internet access (either dial-up or broadband). Many believe it is important for a society to increase adoption and utilization of Internet and computers because this has benefits such as improving healthcare (Lua, Xiao, Sears, & Jacko, 2005), facilitating civic engagement (Norris, 2003), and improving education (Tinio, 2003). This paper presents an econometric study of how putting ICT in schools in Thailand (UNESCO, 2007) affected the adoption and use of ICT in the surrounding communities. This study also looks at how adult utilization of ICT is affected by living with students, and indirectly, by living with ICT that was likely brought into the households for those students.

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Past studies conducted in developed countries have found that households with children are more likely to adopt ICT (Holloway & Valentine, 2003), and adults in these households are more likely to use ICT (Horrigan, 2009). Whether this is the result of or even related to whether those children use ICT at school is unclear. To understand the spill-over effects of ICT in schools, this study first examines the impact of having students who do not use ICT at school in a household. Then the study examines how this impact might change depending on whether students have access to computers or the Internet at school. Thus, these research questions are addressed

- To what extent does the presence of students in a household have spill-over effects on household adoption of ICT or utilization of ICT by family members of students?
- To what extent does giving students access to ICT at school have spill-over effects on household adoption of ICT or utilization of ICT by family members of students?

Some may assume that a spill-over effect that leads households to adopt ICT will also lead adults in those households to use ICT, and vice versa. By separating these two forms of spill-over effect, this study will show that this is actually not the case. There are many circumstances in which there is a profound effect on household adoption of ICT, but limited or no change in the use of ICT by adults in that household. Moreover, for those identified cases in which greater household adoption does not lead to greater utilization of ICT by adults, neither cost nor convenience is the real barrier.

This study quantifies the spill-over effects of Thailand's SchoolNet project, which deployed ICT in K-12 schools throughout Thailand (UNESCO, 2007). This study analyzes data from a survey of households in Thailand in 2007, with variables associated with each household and its family members related to ICT adoption and utilization, geographic, and demographic information. The survey was conducted at a time when some but not all schools had ICT, allowing the study to compare the impact of schools with no ICT, schools with computers but no Internet access, and schools with computers and Internet access. This paper also explores how these spill-over effects depend on factors such as the educational level of a student, the number of students in a household, household income, and the education level of adults in that household. Results are based on logistic regression and propensity score matching.

Clearly, many factors influence an adult's decision to use ICT somewhere, and to adopt ICT in the household, including demographics, geography, and whether there are children in the household. A spill-over occurs if giving a child access to ICT at school further changes the behavior of adults who live with that child, as shown in Figs. 1 and 2. This may occur in a variety of ways. Once children become ICT users, then parents may adopt ICT in the household for their children's benefit. Moreover, the presence of ICT in their own home may cause parents to become ICT users. On the other hand, children may teach their parents how to use ICT or at least how to see the value of ICT, which can lead adults to use ICT and perhaps then to adopt it. It is even possible that giving children access to ICT at school would decrease ICT adoption, because children could still access ICT without the cost to their families. As analysis will show, the actual nature of spill-over effects can and do depend on a variety of factors.

This study has both policy and theoretical implications. Results may help policymakers answer important questions. For example, should they invest even more in putting ICT into schools than the educational benefits alone would justify? Should they put limited funds into stand-alone computers, or Internet connections as well? How much of the funding should go to primary schools and how much to secondary schools? This paper will show that these investments can affect residential adoption and adult utilization of ICT in their communities, and that some investments have greater impact on these digital divide metrics than others. Policy-makers should allocate resources accordingly. This study also helps policy-makers to understand the policies that can help overcome impediments to ICT adoption and utilization. Since there are

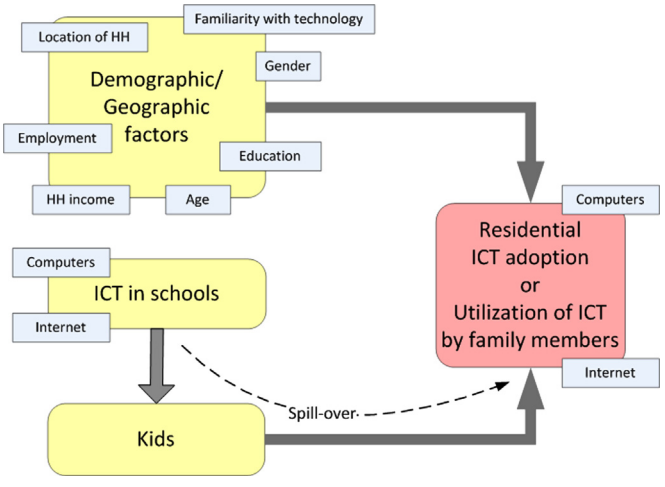

Fig. 1. Theoretical model of spill-over effects of ICT in schools on household adoption and adult utilization of ICT.