The Intergenerational Effects of Economic Sanctions*

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Abstract

Economic sanctions have become the defining foreign policy tool of the 21st century. While sanctions are successful in achieving political goals, can hurt the civilian population. A large literature has documented the negative welfare effects of sanctions on current generations, but these effects could be even more detrimental and long-lasting for future generations. This paper quantifies the effects of the United Nations Security Council sanctions imposed on Iran in 2006 on investment in children's education. Exploiting variation in the strength of sanctions across industries and using unique survey data with detailed information on children's education and living circumstance, I obtain two main findings. First, the sanctions decreased children's total years of schooling by 0.2 years and the probability of attending college by 8.7%. This effect is larger for children at crucial ages and children from low income families. Second, households reduced expenditure on children's education by 61% - particularly on expenditure for school tuition. This finding indicates households respond to the sanctions by substituting away from higher-quality private schools towards lower-quality public schools for their children. This negative effect on education expenditure is larger for children from middle income families. The sanctions impact on children's education is larger than implied by the income elasticity estimates from the previous literature likely because sanctions have persistent effects on parent income. Taken together the results imply that sanctions have a larger effect on permanent income of children than their parents. Therefore, ignoring the effects of sanctions on future generations significantly understates their total economic costs.

Keywords: Education; Parental investment; Economic sanctions; Intergenerational effects.
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1 Introduction

Economic sanctions have become the defining foreign policy tool of the 21st century, sometimes as a prelude to warfare, and sometimes as an alternative to it.[1] While humanitarian impacts often feature prominently in the debate about economic sanctions, traditional estimates of the effects of sanctions have mainly focused on the effectiveness of sanctions in achieving political objectives (Hufbauer et al. (2010)). More recent literature has investigated the adverse consequences of sanctions on the civilian population while sanctions are in place (Petrescu (2016)). However, as the effects of sanctions may last beyond the lifting of sanctions, effects on current generation may not fully capture the negative impacts of sanctions. In particular, if sanctions reduce the educational attainment of young people, the effects of sanctions may last long after they are lifted. In this paper, I evaluate how economic sanctions affect investment in children's education by using Iranian data.

The theoretical effect of sanctions on children's education is ambiguous. Sanctions significantly reduced household income, which is the major source of education funding in Iran.[2] How income matters for children's education is a hotly debated issue. On the one hand, a rich theoretical literature following Becker and Tomes (1986) argues that parental resources may affect educational decisions through budget and credit constraints because education is a consumption good, not only an investment. On the other hand, another influential literature following Cameron and Heckman (2001) argues that parental investment in children's human capital needs not be related to parental income. One possible reason for this disagreement is that temporary and persistent, small and large changes in household income may have different effects on children's education. Households are more likely to reoptimize the consumption in response to large and persistent shocks. Therefore, a large and persistent reduction in household income would be expected to affect children's education, whereas a small and temporary reduction in household income will not necessarily affect children's education. As Browning and Crossley (2009) suggests, households who are temporarily constrained (if they are unable to smooth through borrowing) will cut back more on goods that exhibit high intertemporal substitution, e.g., luxuries because the utility cost of fluctuations would be lower. Thus, parents can invest in their children's education by reducing other expenditures, selling assets, or raising their own working effort. However, a persistent reduction in household income hampers their ability to consumption smoothing, especially when the shock increased uncertainty about future income (Stephens Jr (2001)). Moreover, the same shock can have different effects on households

[1] Economic sanctions are trade and financial restrictions imposed against a targeted country by one or more countries. Sanctions are designed to pressure the targeted countries to change offending policies, and/or to weaken the ability of them to govern (Askari et al. (2001)). For the first time, the United Nations (UN) applied multistate sanctions to Southern Rhodesia in 1991. Since that date, the Security Council has established 25 sanctions regimes, in South Africa, the former Yugoslavia, Haiti, Al-Qaida and the Taliban, Iraq, Iran, etc. Today, there are 14 ongoing sanctions regimes which focus on supporting the political settlement of conflicts, nuclear non-proliferation, and counter-terrorism.

[2] Household expenditure on education as a percentage of GDP is 5% and government expenditure on education is 4% of GDP in 2006. Moreover, like most Middle Eastern countries, a large share of Iranian government spending on education is allocated to post-secondary education in large urban areas. The main reason for this allocation is that governments are very sensitive to demands of the urban middle class, and college education is very important for this group (Richards and Waterbury (1996)).

consumption depend on households' characteristics including budget constraints, adjustment costs, and their preferences.[3] Even when parental spending on children's education reduces, much of which may be offset by financial aid, e.g. college loans. Economic sanctions may also affect children's education through changes in government spending. While direct benefits of public spending on education are widely agreed upon, the effect of sanctions on public spending is unclear. Economic sanctions target government revenues by imposing trade and financial restrictions. However, the effect of a government revenue shock on sub-categories of government expenditures (e.g., expenditure on education) is not clear and depends on fiscal and political institutions.

In this paper, I investigate the effects of a persistent negative income shock caused by targeted economic sanctions to identify the impacts of family income on children's education. On 23 December 2006, the UN Security Council passed Resolution 1737 and imposed economic sanctions after Iran declined to suspend its uranium enrichment program. The UN sanctions include trade and financial restrictions. Trade restrictions targeted specific firms and individuals including oil and gas production and shipping companies, nuclear research and production companies, and military and security services companies owned or controlled or performing on behalf of the Islamic Revolutionary Guard Corps. Theses sanctions mostly targeted investments in and export of oil and gas. Financial restrictions include any transactions with the Central Bank of Iran, disconnecting Iranian bank from the SWIFT, and freezing assets of specific firms and individuals. A consequence, crude oil exports declined to less than one million barrels per day and the growth rate reached -6% in 2012. The targeted sanctions were associated with large, sudden reductions in households' income and consumption. As Figure 1 shows, very shortly after the implementation of the sanctions, the average real income of Iranian households decreased and the decreasing trend lasted for seven years. During 2007-2013, households' real income on average decreased by 35%. As a result, households cut their spending on education by 43%. The reduction in education spending reflects both young children not attending school and parents cutting back on school expenditures.

My identification strategy uses variation in the impact of sanctions on labor income across industries. The empirical strategy to evaluate this negative income shock relies on a difference-in-difference approach. I define households in which the head works in the oil and gas industry as the treated group because these households were directly affected by the sanctions through labor earning reductions. I use water supply and information industries as the control group because there are little income changes for households in these industries, as they are heavily regulated by the government. Therefore, the sanctions have little effects on wages and employment levels of these sectors. Moreover, these industries are not dependent on trade, thus making them unaffected by the changes in the exchange rate. As I show later, these two groups have parallel trends in education outcomes in the absence of the sanctions.

[3]On average, changes in household income or liquidity cause significant changes in household spending among households with low liquid wealth or low income, even when the shock is predictable (Johnson et al. (2006); Stephens Jr (2008); Jappelli and Pistaferri (2014)). Moreover, adjustment costs vary across households depends on their consumption commitments. For example, an adjustment is more costly for homeowners who have to pay the mortgage, especially in the short run. Consumption of many other durable goods (vehicles, furniture) and services (insurance, utilities) may also be difficult to adjust (Chetty and Szeidl (2007)).

My analysis reveals two main findings. First, sanctions decreased the years of schooling significantly by 0.2 years and probability of attending a four-year college by 8.7%. This effect on children's education is more than six times larger than previous estimates of the effect of family income on attending college (e.g., Acemoglu and Pischke (2001); Blanden and Gregg (2004); Hilger (2016)) likely because of the persistent shock and lack of adjustment possibilities.[4] I also find this effect is larger for children at crucial ages (high school dropout age and matriculation at a university) and children from low income families (marginal students). Education outcomes of these subgroups of children who are known as academically at-risk youth are more sensitive to family income. In particular, the economic sanctions decreased the probability of attaining college at age 18 and 19 (the average age of matriculation) by 37% and decreased the enrollment rate at the high school by 12% among children at high school dropout age (16 years old). Furthermore, only children from the lowest income quintile experienced a reduction in the years of schooling. I consider a simple back of the envelope calculation to understand the economic significance of these results. My calculation shows if these children were able to enroll in college at the same rate as college enrollment in the year 2006 and have the wage rates of the year 2006, their lifetime earnings would increase by 41%.

Second, I examine the effects of the decrease in parental resources on investment in children's education by looking at household spending on education. I find that after the sanctions, households reduced expenditure on education by 61% - particularly on expenditure for school tuition. This finding indicates households respond to the reduction in income by switching their children from higher-quality, more expensive private schools to lower-quality, free public schools.[5] This negative effect on education expenditure is larger than implied by the income elasticity estimates from the previous literature (Qian and Smyth (2011); Huy (2012); Acar et al. (2016)). Most of these studies find that the income elasticity of education spending is significantly less than one.[6] I find an income elasticity of 2.2, indicating households allocate a smaller share of their budgets to education spending after the sanctions. I also find this negative effect is larger among children from middle income families (-72%).[7]

Overall, the persistent reduction in family income has large negative effects on both educational attainment and investment in education measured by family education spending. The adverse effects on children's education are larger for children at crucial ages, and children from low and middle income families. This reduction in children's education will reduce their future earnings (by 41%) such that affected children will experience a larger decline in their earnings than their parents.

This paper adds to the literature on the effects of economic sanctions by assessing the effect of

[4] Acemoglu and Pischke (2001) find a 10% decrease in family income is predicted to decrease college enrollment by 1-1.4 percentage point. Other studies find even smaller effects, for example, Hilger (2016) finds a father's layoff reduces children's college enrollment by less than half of one percentage point, despite dramatically reducing current and future parental income (by 14% initially and 9% after 5 years). He explains that much of reduction in parental spending on education may be offset by greater financial aid.

[5] In contrast, expenditures on consumption goods, health, savings, etc did not decrease as much as the expenditure on education.

[6] Previous studies find that even for those group of household that education spending is a luxury good, income elasticity is less than 2.

[7] These effects are not significant for children from high income families.

sanctions on current and next generations. While humanitarian impacts often feature prominently in the debate about economic sanctions, traditional estimates of the effects of sanctions have mainly focused on the effectiveness of sanctions in achieving political objectives (Hufbauer et al. (2010)). More recent literature has investigated the adverse consequences of sanctions on the civilian population while sanctions are in place (Petrescu (2016)). However, as the effects of sanctions may last beyond the lifting of sanctions, effects on current generation may not fully capture the negative impacts of sanctions. In particular, if sanctions reduce the educational attainment of young people, the effects of sanctions may last long after they are lifted. As early human capital investment is hard to substitute with the investment in later life (Heckman (2011)), sanctions could put affected children at a disadvantage for the rest of their lives.[8]

The key empirical challenge of measuring the effects of sanctions on children's education is one of identification. Sanctions that are not confounded with other factors, that also affected children's education, are difficult to come by. Farjo (2011) finds a reduction in primary school enrollment during 1990-2003 when the UN imposed economic sanctions on Iraq. However, its causal implications are limited because this study does not distinguish the effects of sanctions from the effects of several other relevant factors such as war and political instability.[9]

The second challenge is a dearth of reliable data. In most cases, the presence of conflicts poses a substantial obstacle to the collection of survey data especially on the displaced populations and people in conflict areas (Barakat et al. (2002)). Even if data are collected, their accuracy is an open question. For estimation of the sanction effects on children's education, the Iranian setting is well suited for two reasons. First, other factors which affect children's education (e.g., political stability) arguably remain unchanged after the sanctions (Borszik (2016)). Second, there are rich data, Iranian Household Income and Expenditure Survey (HIES), that roughly span the four decades from the 1980s to 2010s (before, during, and after the sanctions). These surveys collected detail information on the children's years of schooling and their family income and expenditure including spending on education. Using this unique survey data, I find the targeted sanctions had large negative effects on children's education. I also find that 45% of the costs to the society associated with the reduction in earnings comes from decreased earning for the current workers, and 55% comes from decreased earning for the next generation. It suggests that the cost estimates using only earnings of current generation may only capture less than half of the overall cost. Although the effects of sanctions depend on the context and severity of the sanctions and how government and households cope with

[8]Economic downturns, caused by recessions, sanctions, etc may affect children's education through the family and society level mechanisms (Weiland and Yoshikawa (2012)). Unlike recessions, which people anticipate economic recovery sooner or later, people could not predict whether sanctions would be lifted or not. While the literature on business cycles finds that education attainment increases during recession, this paper finds that education attainment decreases.

[9]Although there are a few studies which analyze the education trends during the years of sanctions, there is a growing literature on the effect of armed conflict on schooling. The results of these studies cannot be generalized to the sanctions cases. Besides that the overall evidence is mixed (depending on the context of conflict and intensity of recruitment during warfare), channels through which education might have been affected are different. Children's education usually decreases during the war because of child soldiering, forced migration and displacement, household labor allocation decisions, security shock, changes in returns to education, and changes in quality and availability of school facilities (Verwimp and Van Bavel (2013), Justino (2011)).

this shock, establishing this potential negative shock to human development can edify future policy regarding the use of the economic sanctions.

This paper also contributes to the literature on the effect of family income on children's education in several ways. First, my analysis adds to recent quasi-experimental literature that exploits income shocks by estimating the effect of a persistent income shock caused by the 2006 UN sanctions and lasted seven years (2007-2013). As explained before, persistent changes in family income could have different effects on children than do temporary changes. Most of previous studies exploits temporary income shocks generated by, for example, lotteries, cash transfer, tax credit, housing prices, and oil revenue (Bleakley and Ferrie (2016); Bulman et al. (2016); Dahl and Lochner (2012); Duryea et al. (2007); Løken et al. (2012); Lovenheim (2011); Lovenheim and Reynolds (2013); Manoli and Turner (2018)). The estimated results vary widely (from more than one percentage point per $1,000 to less than one percentage point per $100,000) likely because the research designs (the affected populations, the size, and timing of changes) are different (Bulman et al. (2016)). Despite these differences, all of these papers look at the case in which the exogenous shock in family income is temporary and find small effects compared to my results. Even when the shock is large e.g. lotteries, as Bulman et al. (2016) and Manoli and Turner (2018) show, households usually spend lump-sum transfers on durable goods e.g. housing. Therefore, these shocks have small effects on children's education. In the case of parental job loss that the shock has a long-run effect on family income, in developed countries much of reduction in parental resources is offset by greater financial aid e.g college loans (Coelli (2011), Pan and Ost (2014), Hilger (2016)). There are a few studies examine the effect of parental job loss on children schooling in cases that other financial resources are not available to children. Skoufias and Parker (2006) and Duryea et al. (2007) find no effect and positive effect on children schooling during economic crises in Mexico and Brazil respectivly. During recessions, the opportunity cost of education decreases. Moreover, people anticipate economic recovery sooner or later. Thus, recessions may have a positive effect on children's education. Di Maio and Nisticò (2016) show parental loss job caused by a conflict in the Occupied Palestinian Territories increases child school dropout. My study complements these papers by studying a case in which the income shock is persistent and the exception is different because people could not predict whether sanctions would be lifted or not.

Second, I add to the distributional debate about the burden of family income effects. Unlike the existing studies, I estimate differential effects on education investment for households with low, average, and high income. As explained before, households respond to an income shock could vary across different income quintiles.[10] The results of existing studies that exploit persistent income shocks are limited to a specific population. For example, Akee et al. (2010) and Bastian and Michelmore (2018) evaluate persistent income changes generated by a casino revenue and tax credits policy respectively. They find larger effects compared to the above studies (1.3 and 4.3 percent increases the likelihood of high school and college completion per $1,000). Different responses of households to a persistent versus a temporary income shock could explain these larger effects. The

[10]For example, as many studies show, lower income families have a higher income elasticity of education expenditure whereas the higher income families have a lower income elasticity of education.

results of these studies are limited to the population of low-income households.[11] Thus, there was no change for middle and high income households. Contrary, the sanctions affect treated households at any level of income. Therefore, I can estimate the causal effects for high income households as well as low income households. Moreover, these studies look at positive shocks in the family income. Household responses to upward versus downward shocks could be asymmetric. My paper complements this literature by studying the effects of a negative persistence shock in the family income. By comparing the effects for heterogeneous groups of households, I find that sanctions decreased educational attainment most for children from low income families, and investment in education most for children from the middle income households.

This paper proceeds as follows. In section 2, I provides the institutional setting. In Section 3, I discuss mechanisms behind the impacts of the 2006 UN economic sanction on children's education and outline a simple model of investment in schooling. In section 4, I describe the data and present the identification strategy. In Section 5, I present the main empirical results on the impacts of the 2006 UN economic sanction on children's education. Section 6 reports some robustness checks. Section 7 explores heterogeneous effects. Section 8 concludes the paper.

2 Institutional Setting

2.1 The 2006 UN Sanctions

On 23 December 2006, after Iran declined to suspend its program for uranium enrichment, the UN Security Council passed Resolution 1737 and imposed economic sanctions against Iran. While Iran's programs to enrich uranium were stopped in 2002, they restarted in late 2005. In July 2006, the UN Security Council in Resolution 1696 had expressed concern at the intentions of Iran's nuclear program and asked Iran to stop its uranium enrichment program by August 31. Although, Iran did not comply with the requirements of the Security Council and the International Atomic Energy Agency (IAEA), the Council did not show any action after the ultimatum, because Iran warned it would break off all talks over nuclear program if any sanctions were imposed. Unexpectedly, in December 2006, the Council imposed trade and financial sanctions on Iran. UN sanctions targeted the oil and gas industry (by imposing restrictions on investments in oil and gas productions, and exports of refined petroleum products) and the Iranian Revolutionary Guard Corps (by banning any business dealings with it). Trade restrictions targeted specific firms and individuals including oil and gas production and shipping companies, nuclear research and production companies, and military and security services companies owned or controlled or acting on behalf of the Islamic Revolutionary Guard Corps. Theses sanctions mostly targeted investments in and export of oil and gas. Financial restrictions encompass banking and insurance transactions (including any transactions with the Central Bank of Iran and Iranian commercial banks). The 2006 sanctions were effective to pressure

[11] The casino revenue studied in Akee et al. (2010) is distributed to all Indian households regardless of their characteristics. However, American Indians are a particular group with a low level of income and a high rate of poverty. EITC studied in Bastian and Michelmore (2018) is an antipoverty program that focuses on families whose incomes lie between 75% and 150% of the poverty line.