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|  |     |
|--|-----|
| Evidence on Policies to Increase the Development Impacts of International Migration<br>David McKenzie and Dean Yang                                      | 155 |
| Child Development in a Changing World: Risks and Opportunities<br>Jo Boyden, Stefan Dercon and Abhijeet Singh  | 193 |
| Can You Help Someone Become Financially Capable? A Meta-Analysis of the Literature<br>Margaret Miller, Julia Reichelstein, Christian Salas and Bilal Zia | 220 |
| Diet Quality, Child Health, and Food Policies in Developing Countries<br>Alok Bhargava   | 247 |
| Drivers of Entrepreneurship and Post-entry Performance of Newborn Firms in Developing Countries<br>Francesco Quattraro and Marco Vivarelli               | 277 |

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# Evidence on Policies to Increase the Development Impacts of International Migration

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David McKenzie and Dean Yang

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*International migration offers individuals and their families the potential to experience immediate and large gains in their incomes and offers a number of other positive benefits to the sending communities and countries. However, there are also concerns about the potential costs of migration, including concerns about trafficking and human rights, a desire for remittances to be used more effectively, and concerns about a loss of externalities from skilled workers. As a result, there is increasing interest in policies that can enhance the development benefits of international migration and mitigate these potential costs. We provide a critical review of recent research on the effectiveness of these policies at three stages of the migration process: pre-departure, during migration, and directed towards possible return. The existing evidence base suggests some areas of policy success: bilateral migration agreements for countries whose workers have few other migration options, developing new savings and remittance products that allow migrants more control over how their money is used, and efforts to provide financial education to migrants and their families. Suggestive evidence, together with theory, offers support for a number of other policies, such as lowering the cost of remittances, reducing passport costs, offering dual citizenship, and removing exit barriers to migration. Research offers reasons to be cautious about some policies, including policies enforcing strong rights for migrants, such as high minimum wages. Nevertheless, we find the evidence base to be weak for many policies, with no reliable research on the impact of most return migration programs or whether countries should attempt to induce communal remitting through matching funds. Migration policy, Remittances, Return Migration, Impact Evaluation JEL codes: O15, F22*

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International migration offers individuals the potential to experience immediate and large gains in their income, with these gains far exceeding those from any other development policy intervention (Clemens, Montenegro, and Pritchett 2009; McKenzie, Gibson, and Stillman 2010). These gains are typically shared with the household members who accompany migrants and, through remittances, with the family members who remain in their home country. Both the number of migrants and the remittances they send have grown rapidly over the past two decades. The number of people living outside their country of birth totaled 232 million in 2013, up from 154 million in 1990,<sup>1</sup> whereas recorded remittances sent to developing countries totaled \$321 billion in 2010 compared to only \$49 billion in 1990.<sup>2</sup> In addition to the direct effects of higher incomes, research has found that migration provides a number of other positive benefits to the sending country, including facilitation of trade, technology transfer, foreign direct investment, incentives for greater investment in globally marketable skills, and the transmission of democratic norms.

However, these positive impacts of migration are accompanied by concerns over a number of potential costs. These include concerns about human trafficking and abuse of migrant rights; concerns about the abilities of households that receive large, temporary, flows of remittances to save appropriately; concerns that the benefits of migration do not spread far beyond the immediate household; and concerns that developing countries are losing the positive externalities of highly skilled workers.

There is increasing interest among development institutions and developing country governments in identifying policies that can enhance the development impacts of international migration by facilitating more of the benefits and mitigating some of the potential costs. This interest has led to the deployment of a wide range of migration policies that occur throughout the different stages of the migration process (pre-departure, while the migrant is abroad, and upon possible return) and that cover a wide range of different areas (e.g., financial sector, social protection, employment policies).

However, the substantial policy interest and growing policy efforts stand in stark contrast to the limited empirical evidence that can help to guide policy. The vast majority of existing research on migration and development is focused on measuring and understanding the determinants of migration and the impacts of migration and remittances on development rather than on the effects of policies designed to change these impacts. This situation has begun to change in the last few years, with a number of innovative studies explicitly testing the impacts of migration policies relative to a counterfactual of some alternative policy that could be implemented. In this paper, we review this new literature and assess the state of evidence on the impacts of different policies intended to improve the development impacts of international migration. This means that we do not consider policies whose primary

goal is the well-being of firms and workers in migrant-receiving developed countries. We focus on international migration and do not discuss internal migration policies. Rather than summarizing the results in the literature, we also offer our assessment of the rigor and reliability of these results to identify areas where there is considerable policy effort without reliable evidence of its effects.

We note that the existing literature has largely addressed the question, “*Does* a particular policy work as intended?” rather than “*Should* this particular policy be implemented?” As we will discuss, the evidence base on whether policies work as intended is still rather weak in many policy areas, and even fewer studies measure the costs of implementing such policies. In addition, because the first-order effects of migration occur largely for the migrants themselves and their families, some readers may question the rationale for spending public money on increasing these benefits. There are several key reasons for this rationale. First, some migration policies provide public goods, such as the legal infrastructure in which migration takes place and the regulatory policies under which remittances occur. Second, a number of more activist policies are intended to overcome market failures in the information, credit, insurance, and labor markets. Third, other policies, such as home-town association programs, are intended to overcome collective action problems. Fourth, a set of policies is designed to reduce the perceived negative externalities of highly skilled emigration. Fifth, other policies are designed to reduce inefficiencies associated with behavioral biases and intra-household decision-making under asymmetric information. In the presence of these constraints, the existing levels of migration and remittances are likely to differ from the socially optimal levels. The result is that many governments *are* implementing policies designed to increase the development impacts of migration, and it is therefore of interest to understand what the effects of such policies have been.

We begin with a discussion of policies that occur at the pre-migration stage. These include efforts to facilitate more migration and pre-departure training sessions to provide migrants with more information and skills. We then turn to policies directed towards migrants and their families while migrants are abroad. These include rights policies, efforts to expand financial access, policies to make it easier and cheaper for migrants to remit, policies to channel remittances towards purposes with broader development impacts, policies to encourage communal remittances and the development of home-town associations, and integration policies. Finally, we examine policies directed towards returning migrants. These include efforts to remove regulatory, bureaucratic, and informational barriers that inhibit return migration, policies intended to change the incentives to return, and policies designed to make return migrants more productive and reintegration easier. We find the evidence base to be weak for many of these policies, especially those directed towards return migration, and we discuss possible reasons for this lack of research before concluding.

## Pre-Migration Policies

Much of international migration takes place without explicit policy actions by developing country governments. Destination countries set their immigration policies, and individuals who are eligible to move under these policies decide whether to do so, whereas others migrate illegally. However, survey results show that many more people around the world express a desire to move to another country than currently do so (Esipova, Ray, and Pugliese 2011), a number of migration quotas, such as the US Diversity Visa program (Green Card lottery) and the H1B visa category, are heavily oversubscribed, and many potential migrants remain misinformed of the potential gains from moving (McKenzie, Gibson, and Stillman 2013). Bureaucratic, financial, informational, and other constraints prevent many individuals who would benefit from moving from doing so. As a result, one key avenue for migration policy to enhance development impacts is by facilitating more people's migration and ensuring they are well informed when doing so. The main policy levers used to do this are explicit policy efforts to facilitate migration and pre-departure orientations or training programs designed to ensure that migrants are well informed about conditions abroad. Table 1 summarizes these types of policies and the evidence for each, which we discuss in detail below.

### *Policy Efforts to Facilitate (or Hinder) Migration*

There are two categories of policy actions that developing country governments have taken to facilitate international migration. The first consists of bilateral actions, which involve cooperation with governments or employers in destination countries, leading to formal agreements to allow labor migration of specified numbers and types of workers. A leading example of this type of policy action has been the Philippines, which has signed at least 49 bilateral migration agreements with 25 destination countries. Large migration flows have occurred through some of these migration agreements. Given the importance of legal barriers in regulating migration, it seems likely that such agreements have allowed more migration from the signatory countries. However, we are unaware of research that has identified how much of this migration would have happened in the absence of such signed agreements; hence, there is a lack of evidence on the causal effect of such policies.

One exception to this lack of research comes from bilateral migration policies negotiated between New Zealand and several Pacific Island nations (including Samoa, Tonga, and Vanuatu) to allow seasonal migration to New Zealand through the Recognized Seasonal Employer (RSE) program. Gibson and McKenzie (2014) examine the impacts of this program on households in Tonga and Vanuatu. They find that individuals who participate in the program lack almost any other opportunity to migrate internationally; therefore, the program generates new migration,

**Table 1.** Examples of Pre-Migration Policies

| Policy  | Examples   | What does it do?  | Potential impact on development  | Evidence   |
|---|--|---|--|--|
| Pre-departure training  |  |   |  |  |
| Training and orientation of workers in legal rights, customs and language overseas, productive skills, etc. | Philippines' Pre- Departure Orientation Seminars (PDOS); IOM migrant training sessions   | Eases migrant adjustment to new country and work environment and protects in cases of abuse | Increases worker productivity and earnings; allows workers to escape abuse | Non-existent, but one study (Omar Mahmoud et al) ongoing.  |
| Financial literacy training for workers and their families  | Included in Philippine PDOS; small programs implemented as part of research studies  | Improves financial decision-making among migrants and their families left behind            | Raise savings and investment; improve ability to cope with risk            | Evidence from RCTs among Indian workers in Qatar (Seshan and Yang 2014), Indonesian migrants and their families (Doi, McKenzie, Zia 2014), and among Pacific Island migrants to Australia and New Zealand (Gibson et al. 2014) |
| Policies to facilitate migration  |  |   |  |  |
| Bilateral migration agreements  | Philippines with 25 countries Pacific Islands with New Zealand   | Legal agreement to allow labor migration of set numbers or types of workers                 | Allows more individuals to migrate abroad                                  | Strong evidence of positive effects from the New Zealand RSE program through matched difference-in- differences (Gibson and McKenzie 2014)   |
| Lower passport costs and procedures   | Many countries   | Makes it less costly to migrate   | Makes it less costly to migrate  | Suggestive evidence from regressions with other controls (McKenzie, 2007)  |
| Remove exit barriers  | Many countries don't have these barriers, but a number restrict women migrating, and others require govt permission for all emigration | Makes it less costly to migrate   | Allows more individuals to migrate abroad                                  | Suggestive evidence from regressions with other controls (McKenzie, 2007).   |

and this migration results in large increases in income and consumption for the participating households. These authors use a matched difference-in-difference strategy to identify these program impacts, arguing that the newness of the program and the limited availability of places in the program facilitates finding comparable households to those selected to participate in the program.

The second set of actions countries can take are unilateral actions, which do not require the cooperation of other governments. These actions are most evident when used to hinder migration. For example, a number of countries restrict the rights of women to migrate (e.g., Gabon, Libya, Saudi Arabia), and others require all citizens to obtain government permission to travel abroad (e.g., Cuba, Iran, North Korea). [McKenzie \(2007\)](#) shows in a linear regression that countries with such restrictions have 5 to 6 percent fewer migrants per capita than countries with similar income, population, and governance levels that do not have these restrictions. Countries can also affect the ease of migration by imposing high passport fees and cumbersome procedures for obtaining a passport. [McKenzie \(2007\)](#) shows that the cost of a passport exceeds 10 percent of per capita income in some countries, and higher passport costs are associated with less migration. This association continues to hold after controlling for population, per capita income, and government effectiveness.

Governments can also take more positive unilateral actions to facilitate migration. [Beam, McKenzie, and Yang \(2014\)](#) conducted a large-scale randomized experiment in the Philippine province of Sorsogon to test the impact of unilaterally facilitating international labor migration. Households assigned to treatment groups received one or more of several possible interventions intended to facilitate international migration. The interventions targeted the following reasons people might not migrate internationally: 1) information barriers (information about job search, migrating abroad, financing migration, and passport processing); 2) frictions in job search (assistance in enrolling in an online job-finding website to lower search costs and facilitate matching between recruiters and workers); and 3) documentation barriers (assistance and a full subsidy for passport application). Overall, the authors find no evidence that any of the individual interventions or combinations of interventions led to increases in international migration. The most intensive treatment that combined all these interventions led to increases in job search and doubled the rate of international job offers, but it had no identifiable effect on international labor migration. The authors conclude that unilateral migration facilitation will, at most, induce a trickle, not a flood, of additional emigration.

A related study was conducted by [Beam \(2014\)](#), also in Sorsogon province, Philippines. The study randomly assigned participants to a control group or one of a set of treatment groups. The treatments involved offering information on wages and qualifications for typical overseas jobs or the provision of an incentive (a restaurant voucher) conditional on attending a “job fair” (an event at which job-seekers

connect with placement agencies for overseas jobs). The study found that the information treatments improved knowledge about overseas wages and job qualifications. Neither information treatments nor the job fair incentive treatment led to increases in search activity for overseas jobs. Along with the previous study, this work suggests limits to the ability of unilateral facilitation policies to foster more migration.

### *Pre-Departure Orientation or Training Programs*

A number of programs are designed to provide potential migrants with some type of orientation or training prior to departure. These include programs aimed at easing the transition to life abroad, programs that provide technical skills to enhance productivity abroad, programs designed to prevent human trafficking and abuse, and programs designed to teach financial literacy (which we discuss separately in the next sub-section).

Pre-departure orientations have been implemented in a variety of contexts. Perhaps the most prominent is the Philippine government's Pre-Departure Orientation Seminar (PDOS), a one-day session that has been required since 1983 for labor migrants departing for new jobs overseas and is administered by the government as well as by non-government organizations (NGOs) under contract with the government. The stated aims are to prevent abuse of migrant workers, protect their labor rights, and educate workers on the laws, culture, and customs of destination countries. Additional topics covered include health and safety, financial literacy, and travel procedures and tips. Starting in 2009, the PDOS was expanded to include 4–6 days of training for migrant household service workers on job skills, first aid, language, culture, and stress management (known as the Comprehensive Pre-Departure Education Program, or CPDEP) ([International Labor Organization 2013](#)).

Other important examples of pre-departure training programs are the wide range of programs conducted by the International Organization for Migration (IOM). The IOM has been conducting training for migrants since the 1950s, with 352,000 migrants involved in their training programs over the 2001–10 decade ([International Organization for Migration 2011](#)).

Impact evaluation of pre-departure orientation training has been minimal thus far. A large number of evaluation reports have been conducted, but to our knowledge, these are primarily “process” evaluations that involve audits of activities via examination of internal documents, site visits, and in-depth interviews with key internal and external stakeholders. Examples include [Norad \(2010\)](#) and [Asis and Aguinas \(2012\)](#). Of the more limited number of impact evaluations, to our knowledge, none use credible research designs that can allow the identification of causal effects of the programs on migrant welfare or other outcomes. For example,

IOM (2006) seeks to assess the impacts of an anti-trafficking informational program in Cambodia on knowledge of anti-trafficking messaging among individuals remaining in Cambodia (non-migrants). It uses survey data on program participants and compares the responses to surveys of non-participants, finding that participants have better knowledge about information relevant for anti-trafficking. The study does not describe how study participants and control group respondents were selected, so it is not possible to assess whether the two populations can be credibly compared to establish the causal impact of the program.

Given the popularity of these programs, it is important to conduct prospective, randomized evaluations of pre-departure trainings. One ongoing study (Mahmoud et al. 2013) is doing this by randomly assigning departing labor migrants from the Philippines to different types of modified pre-departure orientation seminars and tracking impacts on migrants over time.

### *Financial Literacy Programs for Migrants and Their Families (Whether Before or After Departure)*

Due to the large wage gains possible when individuals migrate from developing to developed countries and the large amounts sent home by migrants in the form of remittances, migrant-origin households are very often faced with managing amounts of money that are substantially larger than the household budgets of those without migrant members. This situation has raised concerns among policy-makers and non-government organizations that financial decision-making in migrant households may be suboptimal, particularly in households whose members migrated relatively recently. Motivated by such concerns, a common type of intervention provides financial literacy or financial education training to migrant workers and their families who remain behind in the home country. Financial literacy programs are commonly conducted as part of pre-departure orientation training programs (discussed in the previous section).

Important evidence on the impact of providing financial education to migrant workers and their families is provided by Doi, McKenzie, and Zia (2014), who implemented a randomized controlled trial among Indonesian women about to depart for overseas work as household servants (maids) and these women's families. Study participants were randomly assigned to either a control group (that received no training) or to one of three treatment groups in which financial literacy training was provided prior to the migrant's departure for overseas for either 1) the migrant alone, 2) a left-behind family member alone, or 3) both the migrant and the family member. The training covered financial planning and management, savings, debt management, sending and receiving remittances, and migrant insurance. The study examined impacts on families that remained behind in Indonesia, finding that each type of treatment increased financial knowledge. In addition, training both the

migrant and family led to increases in savings in the origin household, but the other two treatments (migrant only and family only) did not have a similar savings impact. None of the treatments had substantial impacts on remittances received. The study highlights the complementarities of training both migrants and family members.

Financial literacy training also occurs frequently at the destination, targeting the migrant. [Seshan and Yang \(2014\)](#) examined such a program for married male migrant workers in Doha, Qatar who were from Kerala, India and whose wives remained behind in India. Participants were randomly assigned to either a control group or a treatment group. The treatment group was invited to attend a one-time motivational session on personal financial management that stressed the importance of savings and of making joint financial decisions with spouses who remained behind in India. Impacts were measured via follow-up surveys of both the migrants in Kerala and their wives in India. The treatment led both the migrants and their wives to be more likely to report that they made joint financial decisions with their spouses, and wives became more likely to seek out additional financial education themselves. Among migrants with lower savings at baseline (prior to treatment), the treatment led to higher total (Qatar plus India) household savings and higher remittances sent by migrants to wives.

[Gibson et al. \(2014\)](#) implemented a randomized controlled trial of a financial literacy intervention among migrants in Australia and New Zealand. The study coincided with the introduction of a new online tool for comparing remittance transaction fees across providers and the introduction of a new remittance method in New Zealand (provision to migrants of a second ATM card that could be sent to family members back home to allow withdrawals from the migrant's New Zealand bank account). The study sample consisted of migrants from Tonga, East Asia, and Sri Lanka. Study participants were randomly assigned either to a control group that received no training or a treatment group that was invited to a financial education session that focused on helping migrants compare among different remittance-sending methods. The authors find that the treatment led to increases in financial knowledge and in seeking information about remittance methods for the Tongan and East Asian participants. The authors also find no effects of the treatment on remittance frequency or total amounts of remittances sent. The authors consider this absence of a treatment effect on remittance outcomes to be partly due to barriers to the use of alternative remittance methods for remittance receivers.

These studies suggest the diversity of possible impacts of different types of interventions in different populations. A particular financial education intervention could have different impacts in different subpopulations, suggesting that differentiated interventions targeted at the particular needs of subpopulations would be worth exploring. Future studies could also examine the impact of financial literacy interventions among family members *after* the migrants have departed for overseas.

## Policies while Migrants are Abroad

The widest range of policies designed to enhance the development impacts of migration occur once migration has taken place. Table 2 summarizes the range of policy instruments and the evidence for their effectiveness. A first set of policies involves ensuring adequate rights for migrants, with debate as to which rights should be protected. A second broad area of policy concerns financial access and remittances, with policies to ensure that migrants and their families have access to appropriate financial products, efforts to lower the cost of sending remittances, and policies to encourage migrants to contribute more towards activities with broader development outcomes. A related area attempts to encourage migrants to form home-town associations to build communal public goods. Finally, policies directed towards migrants who intend to stay abroad can affect their ability to integrate successfully into their new countries.

### *Rights Policies for Migrants*

The United Nations International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (CMW) of 1990 stipulates a comprehensive set of civil, political, economic, and social rights for migrants. It is based on the principal of equal treatment of migrants and nationals, including the right not to have identity documents confiscated, the right to equal treatment with nationals before the courts, the right to form associations and trade unions, and the right to equal treatment with regard to remuneration. However, this convention is the least ratified of all the major international human rights treaties; by 2012, no major migrant-receiving country had ratified it (Ruhs 2013). The question that arises is whether it would be good for development for more destination countries to grant all these rights.

In almost all cases, we would expect migrants who experience more rights to be directly better off as a result. However, a number of these rights impose costs on the host country government or the host country employers. Consequently, we should expect to see greater rights for migrants resulting in either lower wages or in fewer migrants being hired. Ruhs (2013) documented this pattern across countries, finding that countries that provide migrants with more rights in terms of access to retirement benefits, unemployment benefits, and public education have less open migration programs. McKenzie, Theoharides and Yang (2014) examined a particular type of economic right: the right to a minimum wage or to a wage equal to the prevailing wage for natives. They conduct a difference-in-differences analysis of the effect of a minimum wage change for Filipina domestic workers. They found that doubling the minimum wage that these workers must be paid resulted in higher wages for the workers who migrated but also resulted in a 55 to 57 percent

**Table 2.** Examples of Policies While Migrants are Abroad

| Policy  | Examples   | What does it do?  | Potential impact on development  | Evidence   |
|---|--|---|--|--|
| Rights policies for migrant workers                               |  |   |  |  |
| Comprehensive economic rights                                     | Requiring migrants to be paid the same wages as nationals of the destination country         | Sets minimum wages that migrants must be paid; potentially also gives migrants access to unemployment benefits and welfare programs | Can raise the income of the migrants receiving the policy, but reduce the demand of employers for labor, and openness of governments | Evidence shows a trade-off between the number of individuals who get to migrate and the economic rights they receive (Ruhs 2013; McKenzie et al. 2014).  |
| Basic rights  | Freedom to leave, freedom from abuse, ensuring migrants receive pay for the jobs they do     | Protects migrants from abuse, gives them the ability to leave, and ensures they get paid for work done                              | Ensures migrants receive income promised, and protects against physical and sexual abuse   | No empirical evidence to measure impacts of changes in these rights, but theory strongly suggests they should be beneficial for development  |
| Financial access for migrants and their families                  |  |   |  |  |
| Facilitating remittance-linked savings accounts in origin country | El Salvador's Banco Agricola accounts offered to migrants in US                              | Allows migrants to set up accounts in home country and remit funds directly into them   | Raises asset accumulation and allows self-insurance via buffer stock accumulation  | Evidence from RCT among migrants from El Salvador (Ashraf et al. forthcoming) that offering migrants accounts in home country can raise savings, but only when migrants have joint or sole ownership of the accounts |
| Facilitating savings accounts for migrants in the host country    | <i>Matricula consular</i> (consular ID card) issued to Mexican migrants by Mexican consulate | Formal identification document facilitates bank account opening in US   | Raises asset accumulation and allows self-insurance via buffer stock accumulation  | Evidence from RCT among Mexican migrants (Chin et al. 2011) that issuing <i>matricula consular</i> raises account opening and savings in host country  |

*Continued*

**Table 2.** *Continued*

| Policy   | Examples  | What does it do?   | Potential impact on development  | Evidence  |
|--|---|--|--|---|
| Policies to lower remittance costs and to induce migrants to remit more        |   |  |  |   |
| Lower remittance prices  | Remittance price comparison websites; reductions in remittance fees | Allows migrants to take advantage of lower remittance fees                                 | Fee savings for migrants; could raise total money amount of remittances sent over and above remittance fee savings | Evidence from RCTs among Salvadoran migrants ( <a href="#">Aycinena et al. 2010</a> ) and among Guatemalan and Salvadoran migrants ( <a href="#">Ambler et al. 2014</a> ) that remittance fee discounts lead to large increases in dollar value of remittances sent, over an above remittance fee savings. However, no rigorous evidence on how much policies have contributed to lowering remittance fees. |
| Improve communication and/or information flows within transnational households | Reductions in telecommunications costs                              | Improves communication and reduces information asymmetries within transnational households | Higher remittances; better monitoring by migrants of remittance recipient expenditures                             | Evidence from lab-in-field experiment among Salvadoran migrants that migrants send more remittances when recipients are made aware of an income windfall ( <a href="#">Ambler 2013</a> ); evidence from RCT among immigrants in Ireland ( <a href="#">Batista and Narciso 2013</a> ) that reducing.   |

|   |                         |  |   |  |
|---|-------------------------|--|---|--|
| Policies to encourage communal remitting and home-town associations |                         |  |   |  |
| Setting up hometown associations                                    | Malian HTAs in France   | Joins migrants together to potentially send collective remittances                 | Can increase public goods like water, roads, and electricity  | Promising evidence that HTAs increase public good provision from time series, difference-in-differences, Heckman selection (Beauchemin and Schoumaker 2009; Chauvet et al. 2013; Duquette-Rury 2014). No evidence on policies to increase set up of HTAs |
| Matching funds for collective remittances                           | 3x1 program in Mexico   | Offers migrant association a government match for each dollar in funding they send | Can lead to more remittances being sent for community needs. May crowd out family remittances. May crowd out other uses of public funds | No evidence to show that match leads to more funding being sent than would be sent otherwise; evidence that program can end up being regressive and politically targeted (Duquette-Rury 2014).   |
| Integration policies for migrants                                   |                         |  |   |  |
| Language training   | Norway, Germany, Sweden | Teaches migrants to speak destination country language                             | Can increase job prospects, and hence earnings of migrants; may help in social integration  | Strong associations between language proficiency and earnings in many countries, but little evidence on impact of training.  |

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*Continued*

**Table 2.** *Continued*

| Policy                        | Examples                | What does it do?  | Potential impact on development  | Evidence   |
|-------------------------------|-------------------------|---|--|--|
| Migrant introduction programs | Norway, Germany, Sweden | Language training, job search assistance, teaches civics and values of host society | Can increase job prospects, and hence earnings of migrants; may help in social integration | Mixed. Strong impacts for unemployed individuals in Finland in a regression-discontinuity ( <a href="#">Sarvimäki and Hämäläinen 2012</a> ); benefits don't exceed costs in randomized experiment adding job counselling to basic program in Sweden ( <a href="#">Joonas and Nekby 2012</a> ). |

reduction in the number of workers going to destinations where this new law was binding.

An example of a law change that granted more rights to migrant workers comes from [Naidu, Nyarko, and Wang \(2014\)](#), who examined a reform in the United Arab Emirates that gave migrant workers the right to change employers after their contract ends without having to receive a letter of no objection from their previous employer. Using variation in the end date of worker contracts around the reform, they find that workers whose contract ended post-reform experienced a 10 percent increase in real earnings relative to workers whose contracts ended before the reform. The right to be able to change employers and move from one job to another clearly conveys benefits on migrant workers. However, the authors were not able to examine whether employers adjusted to this reform by changing their recruiting or wage-setting for new workers. It is possible that employers might be less willing to hire new workers or might offer them lower initial wages if there was a greater possibility of them leaving for a different employer.

Existing evidence therefore suggests that there is a trade-off between the rights of migrants to be paid equally to native workers in destination countries and the opportunities for poor people from developing countries to dramatically increase their incomes through migration. Requiring higher minimum wages does limit the number of people who are able to migrate. In contrast, a different set of more basic rights involves freedom from abuse and exploitation and freedom to leave. This right involves migrants' ability to retain their passports and depart the country at any time they like, to be paid the amount they are contracted to be paid, to be protected from being beaten or sexually abused by their employer, and to report any abuse that does occur and to see employers who violate these rights face the consequences of doing so. Failure to provide migrants with these rights directly reduces the development impact of their migration (lowering migrants' incomes and their well-being) and makes it difficult to use revealed preference as an argument for positive migration benefits because violations of these rights typically are violations of the conditions assumed by migrants in making their migration decisions. Although we are unaware of studies that examine the impact of reforms in these more basic rights, there seems little economic rationale not to provide these types of rights to workers.

### *Financial Access for Migrants and their Families*

Transnational households have special characteristics that have implications for the emphasis and design of financial access interventions. Reliable remittance services, in particular, are crucial for allowing migrants to support family members who are left behind in the origin country. The fact that high proportions of transnational households already use remittance services also means that it can be practically

feasible for financial access interventions to be linked in some way to remittance services (Hall 2010). An example is offers of savings accounts into which migrants can remit in the home country, which help them meet an often-heard policy objective of seeking to raise savings levels in transnational households.

Two recent randomized field experiments have provided evidence among migrants in the US of the effectiveness of different approaches to promoting savings in transnational households. A randomized controlled trial among migrants from El Salvador by Ashraf et al. (forthcoming) tested ways to stimulate savings in El Salvador. The study was particularly interested in whether migrants sought to control or influence how much was saved by family members in the home country, so the treatments that were offered varied in the degree to which migrants could monitor and control family members' savings in account at a bank in El Salvador. Migrants were much more likely to open savings accounts at the partner bank in El Salvador and to accumulate more savings at the partner bank if they were assigned to the treatment condition that offered the greatest degree of monitoring and control. Strikingly, the savings impact of offering an account that was only in the name of someone else in El Salvador was much smaller in magnitude and not statistically significantly different from zero. This result reveals that the frequently made policy recommendation to foster savings in migrants' home countries by encouraging migrants to remit directly into savings accounts of remittance recipients would be much less effective compared to interventions that also improved and encouraged migrant monitoring and control over home-country savings.

A related experiment was conducted among Mexican migrants in Texas by Chin Karkoviata, and Wilcox (2011). That study was interested in understanding the impact of facilitating migrant access to savings accounts in the *host* country (in this case, the United States) rather than in the origin country. The study randomized Mexican migrants into either a control group or a treatment group that was given assistance in obtaining a *matricula consular* identity card from the Mexican Consulate. The primary benefit of this card was that it could be used as identification when opening a bank account in the United States. The study found that migrants in the treatment group were more likely to open United States savings accounts, accumulated more savings in the United States, and remitted less to Mexico. The study also found heterogeneity in treatment effects: for migrants who reported at baseline (prior to treatment) that they had no control over how their remittances were used by recipients in Mexico, the treatment had larger positive impacts on United States bank account take-up and savings and led migrants to shift more savings from Mexico to the United States.

These existing studies have documented the positive impacts of interventions to facilitate savings access for transnational households with account offers in both the host and origin countries. There is also consistent evidence that migrants have preferences for how remittance recipients in the home country use remittances,

particularly how much of the remittances are saved. A policy lesson is that if an objective is to raise savings levels in the origin country, interventions should give priority to savings services that offer migrants some ability to monitor or control savings. If the policy aim includes increasing savings by migrants in the host country, then facilitating access to host-country savings facilities can help to achieve this objective.

### *Policies to Lower Remittance Costs and to Induce Migrants to Remit More*

Motivated by the positive development impacts of remittances (see [Yang 2011](#) for an overview), several efforts are underway to seek to reduce barriers to remittance flows. In 2009, the G8 Heads of State Summit agreed to an objective of reducing the average cost of sending remittances from 10 percent to 5 percent in five years (the so-called “5X5 objective”) via policies such as improved information, transparency, and promotion of competition in the money transmission market ([G8 2009](#)).

An important approach that has been attempted in a variety of contexts is to improve migrants’ ability to compare remittance transaction fees. Migrants who are able to access lower-fee money transmitters may send more remittances. In addition, improved ability to comparison shop may increase competition across money transmitters and lead them to lower their prices. One example is Remittance Prices Worldwide, a website (<http://remittanceprices.worldbank.org>) maintained by the World Bank that provides remittance fee prices across 226 country corridors covering 32 major remittance-sending countries and 89 receiving countries. Governments and institutions such as the World Bank have also set up remittance-price comparison websites targeted at specific markets, such as Mexico ([www.remesamex.gob.mx](http://www.remesamex.gob.mx)), the United Kingdom ([www.sendmoneyhome.org](http://www.sendmoneyhome.org)), and Australia and New Zealand ([www.sendmoneyhomepacific.org](http://www.sendmoneyhomepacific.org)); the latter were the subjects of the [Gibson et al. \(2014\)](#) remittances financial literacy experiment.

Although remittance costs have fallen following these policy efforts, it is unclear how much of the reduction in costs is due explicitly to the policy actions per se rather than to technological advances and competition that might have lowered costs. Several recent randomized field experiments offer insights into how migrants are likely to react to reductions in remittance costs.

The existing evidence suggests that response to fee reductions can be quite large. [Aycinena, Martinez, and Yang \(2010\)](#) implemented a randomized field experiment that estimated the causal impact of remittance transaction fees on remittances. In partnership with a money transfer operator, Salvadoran migrants in Washington D.C. were randomly assigned differently sized discounts on remittance transaction fees. The remittance fee reductions led to higher transaction frequency by remitters: each \$1 fee reduction led to an additional 0.11 transactions per month, with no change in the dollar amount remitted per transaction. These remittance responses to price reductions are large in magnitude. A \$1 reduction in the remittance transaction

fee leads to average fee savings per month of only \$0.47, but the corresponding increase in average remittances sent per month is an order of magnitude larger, \$25.

In a related study, [Ambler et al. \(2014\)](#) confirm and build on these results. Migrants from Guatemala and El Salvador in Washington D.C. were randomly chosen to be offered \$3 discounts on remittance fees (off a base price of \$8) for remittances sent through the partner organization. The discounts were valid for 10 weeks for as many transactions as the respondent chose to conduct. These discounts led to large increases in the number of transactions and total amount remitted (measured using administrative data from the partner money transfer company). These effects of the discounts persisted up to 20 weeks after migrants were no longer eligible to receive them. These were real increases in remittances; follow-up survey responses helped rule out the possibility that migrants were sending remittances on behalf of others or shifting from other remittance channels.

An important question that arises from the findings of both of these studies is why migrants send so much more in total remittances in response to relatively small changes in remittance fees. [Ambler et al. \(2014\)](#) suggest that this pattern of results could be generated if remittance recipients in the home country have reference-dependent preferences regarding their expected level of remittances, which evolve slowly as remittance levels change, and if migrants are partially naïve about the extent to which recipients' preferences exhibit such reference dependency. With this characterization of preferences, migrants might respond to the remittance fee discounts by sending more remittance transactions during the discount period, intertemporally substituting for remittances later (post-discount remittances). However, once migrants increase their remittance frequency during the discount period, recipients in the home country raise their reference point for remittance receipts (now expecting higher total amounts per time period). Migrants therefore do not immediately return to their previous level of remittances, but only do so in a gradual fashion.

Other non-experimental work comes to similar conclusions that reductions in remittance fees raise remittances. [Gibson, McKenzie, and Rohorua \(2006\)](#) provide evidence on remittance responses to fee reductions from survey hypotheticals. Tongan migrants in New Zealand said that they would send substantially higher remittances in response to reductions in the fixed-cost component of the remittance fee. The estimated elasticity of remittances to changes in the fixed-cost component of the remittance fee was -0.22. [Freund and Spatafora \(2005\)](#) use cross-country data to show that remittance fees are negatively correlated with total remittance flows at the country level.

On the policy front, this evidence suggests that reforms that reduced migrant remittance fees can have larger impacts on remittance flows than might have been expected. Such reforms include increases in competition in money transmission markets or improvements in information for migrants on the relative costs of different money transmission services.

## *Policies to Channel Remittances towards Purposes with Broader Development Impacts*

A large variety of initiatives are ongoing to channel migrants' remittances towards longer-run household investments (enterprises, housing, human capital investments) as well as public goods at the community level. One example is an initiative in collaboration with a Brazilian state-owned bank, Caixa Economica Federal, and the Brazilian Service of Support to the Micro and Small Enterprise (SEBRAE) to catalyze small enterprise investment in Brazil by Brazilians in the United States. The project provides web-based entrepreneurship training for migrants and a suite of financial products (remittance, credit, and savings) to support the establishment and development of the new businesses in Brazil (Hall 2010). Programs that are more oriented towards promoting investments by home-town associations are covered in the next section.

Evidence on the demand for and impact of mechanisms that help migrants make such investments in the home country is somewhat limited at present, but two studies provide initial insights. Both studies are focused on the use of remittances for education and seek to enhance migrants' ability to channel funds towards the education of particular individuals (of their choice) in their home country.

Ambler et al. (forthcoming) implemented a randomized controlled trial to test migrants' demand for a mechanism that allowed them to channel remittances towards educational expenditures for a particular individual of their choice in the home country. Salvadorean migrants in D.C. were offered a new remittance product, named "EduRemesa", that allowed them to target remittances towards the education of a specific student they selected in El Salvador. The EduRemesa did not actually control the use of the funds for education, but sponsored students were told that the funds were intended to support their education. Three treatment groups differed in the level of subsidy provided for the EduRemesa. The study found no demand at all (exactly zero take-up) for EduRemesa among migrants in the "no match" treatment group, a small amount of take-up (7 percent) in the 1:1 match treatment, and 19 percent take-up in the 3:1 match treatment. The 3:1 match treatment led to statistically significant increases in total educational expenditures on the target student, a reduction in that student's labor supply, and an increase in the likelihood that the target student attended private school. This study therefore found no evidence that migrants have an unsubsidized or "pure" demand for control over the use of remittances for educational purposes. However, migrants do appear interested in channeling remittances towards the educational expenditures of specific students when given matching funds to do so, and when this occurs, there are positive impacts on the beneficiary students.

In a complementary study, De Arcangelis et al. (2014) partnered with a Philippine bank (Bank of the Philippine Islands) with branches in Rome to design

and pilot test a new remittance product, called EduPay. This product allowed migrants overseas to channel tuition payments for particular students directly to those students' educational institutions in the Philippines, avoiding the need to send tuition payments via family members or others in the Philippines who might not be completely trusted to make such payments reliably. Proof of concept was demonstrated by successfully implementing a total of 178 EduPay payments for 55 students in the Philippines. A lab-in-the-field experiment indicated that migrants are willing to remit more to beneficiaries in the Philippines when their transfers can be "labeled" as intended for educational expenses. The impact of allowing labeling was an increase in transfers of 15.3 percent. In addition to this "labeling", the impact of actually channeling funds to educational institutions was relatively modest (only a 2.2 percent increase on top of the labeling). These results indicate that a remittance product that simply allowed senders to label remittances as intended for education could have nearly as much impact on remittance sending as a product that actually channeled payments to schools. Note that this result is inconsistent with the finding of [Ambler et al. \(forthcoming\)](#), discussed above, that Salvadoran migrants had zero demand for the unsubsidized EduRemesa educational remittance product. The inconsistency in results across these studies means that it is important to investigate the relative impacts of education-labeled vs. education-channeled remittance products in follow-up work to ascertain whether the experimental responses found by [De Arcangelis et al. \(2014\)](#) hold up in a real-world setting.

### *Policies to Encourage Communal Remitting and Home-Town Associations*

A home-town association (HTA) consists of a group of migrants from the same community in the migrant-origin country. Often, these associations have been spontaneously created by migrants as a way of socializing with one another, providing services for new migrant arrivals, and potentially working together to implement social projects in their home community. [Beauchemin and Schoumaker \(2009\)](#) use event history models to show that, controlling for other observables, villages in Burkina Faso with a migrant association are four times as likely to have a health center, 2.8 times as likely to have a primary school, and 2.6 times as likely to have a road, suggesting that these HTAs help to build local infrastructure. [Chauvet et al. \(2013\)](#) examine the impact of Malian HTAs in France on the provision of local public goods in Mali using panel data analysis. They use a difference-in-differences strategy to compare changes in infrastructure in villages that have an HTA to changes in villages without HTAs. They find evidence that Malian HTAs have helped to improve schools, health centers, and water amenities in Mali. A challenge facing both studies is the non-random formation of HTAs and their activities, which can only be partially addressed by methods such as difference-in-differences.

Nevertheless, these results suggest that HTAs can have positive effects on local infrastructure provision, helping to alleviate concerns that collective remittances may simply substitute for public finance or end up being spent on projects that have more limited development impacts for their home communities. This finding raises the question of whether policy should attempt to encourage the formation of such associations and/or to encourage such associations to engage in more activities. One simple thing governments can do is to not stand in the way of such associations. [Chauvet et al. \(2013\)](#) note that French law prohibited foreigners from gathering in associations, and the rise in Malian HTAs occurred following a change in this law. However, a number of migrant-sending countries also implement policies to actively encourage HTAs and to attempt to encourage them to send more collective remittances.

The most famous example of such an approach is the Mexican *tres por uno* ( $3 \times 1$ ) program. This program has a long history; it began in the state of Zacatecas in the 1970s, where some municipalities agreed to match the contributions of migrant associations towards public works (1 for 1). In 1992, the state government added to the match so that each dollar sent by migrants was matched by a dollar each from the municipality and state ( $2 \times 1$ ). In 1999, federal funding was added to the match to make it three dollars matched for each dollar contributed by the association ([Garcia Zamora 2007](#)). The program became a nationwide program in 2002, and by 2010, it had a program budget of \$1.7 billion ([Duquette-Rury 2014](#)). The money is used to finance local development projects such as electrification, water, road paving and maintenance, education and health projects, and town beautification ([Aparicio and Mesguer 2012](#)).

Despite its long history, until very recently, the program had not been subject to any rigorous evaluation. One key challenge is the non-random selection of municipalities to participate in the program. [Aparicio and Mesguer \(2012\)](#) examine the correlates of participation and find that participation is, unsurprisingly, higher in high migration communities. However, because very poor municipalities have little migration ([McKenzie and Rapoport 2007](#)), the result is that the program can be somewhat regressive, directing state and federal funding towards somewhat wealthier communities. Moreover, the program was launched nationwide by President Vicente Fox of the PAN party, and the authors find that municipalities and states with greater PAN electoral support were more likely to participate.

[Duquette-Rury \(2014\)](#) provides the first evaluation of the program that attempts to control for selective participation. She estimates the impact of participating in  $3 \times 1$  over the 2002–8 period on changes in public goods infrastructure between 2000 and 2010. To attempt to deal with selection, she estimates a Heckman selection equation to model participation in the program with the exclusion restriction that having a PAN incumbent in the 2000 electoral cycle, conditional on vote shares in later elections, predicts participation in the program but has no

independent effect on public goods provision. Under this assumption, she finds  $3 \times 1$  program expenditures to significantly and positive affect household access to sanitation, water, and drainage in participating rural villages. However, she also finds that households receive less family remittances as collective remittances to their municipalities increase.

Taken together, this evidence supports the idea that HTAs can increase the provision of local infrastructure. A number of qualitative studies have expressed concerns about the extent to which these projects are sustainable, with funding not often being provided for maintenance (Torres and Kuznetsov 2006). However, the larger concern from the policy perspective is twofold: first, it is empirically unclear to what extent the matching funds lead more such projects to be undertaken versus crowding out funding that the associations would otherwise provide on their own. In particular, evidence from the charitable giving literature has found that 2 for 1 and 3 for 1 matches lead to no increase in giving relative to 1 for 1 matches (Karlan and List 2007). Second, given the sometimes regressive nature of such programs, it is unclear whether public funding devoted to this program is better for development than other uses for this social funding. For example, in Mexico, SEDESOL also runs the Progresas/Oportunidades program, and it is far from clear that additional dollars going towards  $3 \times 1$  have a greater impact than using this funding for cash transfers to poor households. Because a number of other countries, including Haiti, Somalia, the Philippines, Peru, and Colombia (Duquette-Rury 2014), are looking to implement their own co-financing programs with HTAs, additional evaluations to answer these questions are important.

In addition to promoting collective remittances, several countries attempt to encourage their migrants abroad to invest in projects in the origin country. For example, the Philippines Embassy in Qatar brings agricultural projects to pitch as potential investments to migrants there. Most of these programs seem relatively small in scale, and it is unclear whether the government has a comparative advantage in identifying investment projects. A notable example is the *Mi Comunidad* (My community) project that was launched in 1996 by the Mexican state of Guanajuato. The idea was to use investments by migrants to start small *maquiladora* garment manufacturing plants in migrants' communities of origin. The state provided technical assistance, worker training, and assistance to get the projects working. Torres and Kuznetsov (2006) examined the program around 2000 and viewed it as highly promising, noting that it had set up 21 plants and generated 500 permanent jobs in the home communities. However, Iskander (2005) noted that the program was a dramatic failure, with only four *maquilas* surviving after five years, and those that remained were struggling. She notes several issues: the very physical isolation and lack of opportunity that was a spur for migration also isolated plants from production and supply chains, and workers, once trained, often migrated for better prospects in larger cities or abroad.

## *Integration Policies for Migrants*

A number of destination countries offer public programs designed to facilitate the economic and social integration of immigrants. In some cases, these are voluntary, whereas in other cases, they are compulsory for certain groups of migrants, such as asylum-seekers or migrants receiving welfare benefits. These programs have been used for some time in the Nordic countries, but they have also been introduced recently in several other countries, such as Germany (Rinne 2013). Such programs can include language training, assistance finding jobs, and information on the culture and norms of the country. These programs can improve development outcomes to the extent that they allow migrants to access better jobs, earn higher incomes, and/or have better mental health and subjective well-being through easier assimilation.

There is a large body of literature that shows associations between earnings and proficiency in the language of the destination country (e.g., Chiswick and Miller 1995), although some evidence suggests that the returns to knowing the native language can be relatively low for low-skilled occupations (Berman, Lang, and Siniver 2003). Despite this finding, there is very little rigorous evidence that shows that stand-alone language training for migrants is successful in increasing language proficiency and raising employment outcomes. A before-after study of migrants in Canada by Weiermair (1976) found gradual improvement in immigrant wages after undertaking a language course, but it is unclear how much of these wage gains would have occurred anyway. Hayfron (2001) uses an instrumental variables approach to measure the impact of language training in Norway and find positive impacts on proficiency but no impact on earnings. However, the instruments used for language proficiency (whether they had a Norwegian wife and their mother tongue) seem likely to also have independent effects on labor market outcomes.

More rigorous evidence comes from an evaluation of an immigrant integration program in Finland (Sarvimäki and Hämäläinen 2012). These authors take advantage of a discontinuity induced by a law change whereby participation in the integration program was only obligatory for those who entered the population register less than two years before the reform was launched. Using regression-discontinuity analysis to compare outcomes for migrants on either side of the reform deadline, they estimate that the integration plan increased employment and annual earnings threefold and halved social benefits. These authors suggest that one of the main impacts of the reform was to provide more resources for language training and to allow immigrants to retain unemployment benefits while taking a language course. The training course is relatively expensive (13,000 euros), but the benefits in terms of higher earnings for those induced to take the courses appear to be larger than this expense. However, the authors note that even with this program, the average person induced to take courses as a result of the reform was still out of work for half of his sixth year in Finland.

A related set of policies aims to better connect immigrants to jobs. Rinne (2013) and Butschek and Walter (2013) provide overviews of evaluations of active labor market policies intended to help immigrants, noting that few of these programs are explicitly targeted at immigrants. Jooa and Nekby (2012) use a randomized experiment in Sweden to examine whether more intensive counselling and coaching by public employment caseworkers improves the employment of immigrants relative to those who only participate in the standard introduction programs for new immigrants. They find that intensive coaching results in a six percent higher probability of being employed. Based on this finding, however, they calculate that the costs of the program exceed the benefits.

## Policies Directed towards Returning Migrants

Given the large expected income gains most international migrants face when comparing working abroad to working in their home country, staying abroad may be the privately optimal option for many migrants. Nevertheless, many migrants do return. This situation is most obvious for temporary worker programs, which require workers to return at the end of a specified period, and migrant-receiving countries use a number of policies to attempt to ensure that these workers return. However, return rates can also be quite high for migrants who do not participate in temporary programs. For example, Dumont and Spielvogel (2008) reported exit rates within the first five years of residence ranging between 19 percent in the United States and 60 percent in Ireland, whereas Gibson and McKenzie (2012) showed high return rates for the highest academic achievers from five countries. This return can be motivated by preferences to be closer to family or to other non-income aspects of their home country, by relative changes in the circumstances of the home and destination countries that change the relative attractiveness of the two, by particular migrants not doing as well in finding work as they expected *ex ante*, and by target savers having achieved some savings goal abroad that enables them to carry out a desired investment in their home country.

Many migrants are thus choosing whether to return or stay abroad and presumably making what they feel is the best choice for them. There are three broad types of policies that interact with these decisions. The first are policies that seek to remove regulatory, bureaucratic, and informational barriers that prevent individuals who might want to return from doing so or from being as productive as they could be upon return. The second are policies that seek to encourage people to return who would otherwise choose not to by changing the financial and other incentives for their return decision. The third are policies that focus on making return migrants more productive and reintegration easier for migrants when they do return. Table 3 summarizes these types of policies, and we discuss each in turn. However, note that, in practice, these categories are not mutually exclusive; a

**Table 3.** Examples of Types of Return Migration Policies

| Policy  | Examples   | What does it do?   | Potential impact on development   | Evidence   |
|---|--|--|---|--|
| Policies to remove regulatory, bureaucratic, and informational barriers |  |  |   |  |
| Dual citizenship  | 84+ countries allow  | Allows migrants to maintain rights of a citizen in their home country and in destination country | Can enable migrants to earn more while abroad, and make it easier for them to return to their home country                      | Promising. Cross-sectional associations and difference-in-differences (Le Blang 2011; Mazzolari 2009). |
| Pension portability   | Over 1,000 bilateral agreements                            | Allows migrants to retain access to retirement benefits accrued even if they return              | Can increase incomes of return migrants, and removes a disincentive to return   | Non-existent.  |
| Job fairs and migrant databases   | Jamaica returning resident program<br>Bulgaria's job fairs | Help migrants find out about job opportunities in home country                                   | Can remove informational barriers to migration, allow migrants to find better jobs at home                                      | Non-existent.  |
| Go-and-see visits   | UNHCR programs IOM programs                                | Allow refugees to see whether home communities are now suitable for return                       | Can remove information barriers preventing return migration, allow refugees to return to home communities                       | Non-existent.  |
| Policies changing financial and other incentives for return             |  |  |   |  |
| Assisted Voluntary Return   | IRRANA, available to Afghans in Norway                     | Pay for travel and logistics for rejected asylum seekers to return                               | Not clear, since alternative is usually deportation   | Non-existent, although take-up rates suggest relatively little demand from many migrants               |
| Pay-to-go schemes   | Spain's Voluntary Return Program, Aide au Retour in France | Pays migrants to return to their home countries  | Lowers cost of return for those intending to return anyway, potentially provides capital that can be used to set up livelihoods | Non-existent, although take-up rates suggest relatively little demand from many migrants.              |

*Continued*

**Table 3.** *Continued*

| Policy   | Examples                               | What does it do?   | Potential impact on development  | Evidence   |
|--|--|--|--|--|
| Temporary return of qualified migrants   | TOKTEN TRQN                            | Connects highly-skilled emigrants to home country institutions for 3 months of consulting/ knowledge-sharing             | Potentially helps transfer knowledge, ideas, and technology from abroad, with spillover benefits to others in home country                       | Extremely limited. Qualitative evidence reveals some mixed effects, scale of programs typically too low for large effects. |
| Permanent return of qualified migrants   | Return of Qualified African Nationals  | Provides funding, and other incentives to bring highly-skilled migrants back to countries of origin                      | Potentially helps transfer knowledge, ideas, and technology from abroad, with spillover benefits to others in home country                       | Extremely limited. Qualitative evidence reveals some mixed effects, scale of programs typically too low for large effects. |
| Policies to make return migrants more productive and adjust reintegration easier |  |  |  |  |
| Reintegration support programs   | The Philippines' reintegration program | Provides start-up funding and loans for setting up businesses; business or vocational training; psycho-social assistance | Potentially helps overcome credit constraints and skill constraints to allow migrants to earn more. May help migrants re-adjust to home society. | Non-existent.  |
| Recognition of skills earned abroad  | Argentina's RAICES program             | Translate and accredit qualifications earned abroad  | Make it easier for return migrants to be rewarded for skills learned abroad, increasing their incomes  | Non-existent   |

Source: Authors reading of the literature.

number of policies have components of each of these types. Furthermore, we note that the evidence base is extremely weak for almost all of these policies.

### *Policies to Remove the Regulatory, Bureaucratic, and Informational Barriers that Inhibit Return Migration*

There are a number of regulatory and bureaucratic barriers that can make it more difficult and costly for migrants to return to their home countries. One important example is citizenship or residency rights. Migrants from countries without dual citizenship may have had to give up their home country citizenship to gain citizenship abroad. If they wish to return later to their home countries, they may face difficulties in being allowed to move back permanently as well as the disincentive of having to close off the option of migrating again by potentially giving up their newly acquired foreign citizenship. Individuals with only legal residency abroad may be even more reluctant to move back than those with foreign citizenship because returning home may result in violating continuous residence requirements required for them to retain permanent residence status. For example, permanent residents in the United States can lose their permanent residence status if they remain outside the United States for more than one year.

[Le Blang \(2011\)](#) use cross-sectional data on migrants in Spain and Germany and finds an association whereby migrants from countries that offer dual citizenship send more remittances and express higher intents to return. Dual citizenship also can confer benefits on migrants if they do not return. [Mazzolari \(2009\)](#) use a difference-in-differences approach to compare immigrants in the United States from five Latin American countries that granted dual citizenship rights in the 1990s to migrants from other Latin American countries and finds the migrants who were granted dual citizenship rights increased employment and wage earnings and reduced their use of welfare benefits relative to the comparison group. The number of countries that allow for dual citizenship has grown dramatically, from only 26 in the mid-1970s to 84 countries in 2006 ([Le Blang 2011](#)).

Dual citizenship makes it easier for migrants to return. However, many migrants marry citizens of other countries, so another constraint they face is a limit to the ability of their non-citizen spouse and children to live, work, and attend schools in the migrant's country of origin. Malaysia gives permanent residence status to foreign spouses and children as part of its efforts to facilitate return migration ([Lowell 2001](#)). It is likely that such efforts help, and they are certainly unlikely to reduce development impact, but we are unaware of any evaluation evidence.

An additional bureaucratic constraint to return migration for many migrants concerns the portability of their social benefits, particularly retirement benefits. There are two issues here. The first is that migrants who work in multiple countries may not accrue enough years of work to become fully vested in the pension systems

of either their home or their destination countries. The second is whether migrants retain eligibility to receive pension payments if they return to their home countries. OECD countries have many bilateral agreements, but coverage is very limited for migrants who move from one developing country to another (Avato et al. 2010). Pension portability can directly improve the well-being of return migrants, but we are unaware of literature that quantifies this finding or that examines the impact of pension portability on the rate of return migration.

In addition to regulatory and bureaucratic barriers, informational barriers may prevent some migrants from returning. Information may be lacking about specific job opportunities at home or about changes in conditions in the home country. A number of governments attempt to reduce job search frictions by making it easier for domestic firms to locate emigrant workers who may be interested in returning and vice versa. For example, Jamaica's returning residents program has a databank of migrants abroad that prospective employers can use (Thomas-Hope 2004), Bulgaria runs an annual job fair to attempt to initiate direct contact between Bulgarian emigrants and leading companies in Bulgaria (TFMI 2012), and Moldova has held job fairs in Italy to provide information about job opportunities in Moldova. It is unclear how successful any of these efforts have been in terms of increasing return migration or improving the jobs that return migrants obtain.

A more specialized information barrier faces refugees, who may not have migrated for work reasons and who may wish to return to their home communities providing that peace and reconciliation efforts or disaster recovery make their home community safe for return. They may lack information about the conditions on the ground, making them cautious about returning. The UNHCR and IOM programs for the reintegration of refugees organize "go-and-see" visits that are intended to overcome this constraint.<sup>3</sup> However, there does not appear to be evidence as to whether this leads to more return and better outcomes for these refugees.

### *Policies Intended to Change Financial and Other Incentives to Return*

Even in the absence of regulatory, bureaucratic, and informational barriers, many migrants may not choose to return to their home countries. There are two main cases in which policy efforts attempt to change these private decisions. The first case concerns asylum seekers and some refugees and unemployed migrants, with two potential policy motivations – a desire of migrant-receiving countries to avoid the costs and expenses of either forcefully deporting individuals or of having individuals depend on welfare benefits and the idea that these are vulnerable groups that may be financially constrained from returning and setting up viable livelihoods. The second, quite distinct case concerns high-skilled emigrants. The idea is that their return will have positive externalities for their home countries that they fail to take into account in their private decisions. We discuss these two cases.

Assisted voluntary return (AVR) programs offer rejected asylum seekers assistance in returning to their country of origin. The typical program involves paid transportation and logistics facilitation to enable travel to the home country, with some programs also offering grants to set up small businesses or access to training programs once they arrive. Destination country governments find these programs to be considerably less costly (between one-tenth (Black, Collyer, and Somerville 2011) and one-quarter (Strand et al. 2008) of the cost) than the forced return of rejected asylum applicants (who may otherwise go through appeal processes and involve costly deportation procedures). The counterfactual here is not clear because in the absence of the program, migrants may end up being forcefully deported, but they could also potentially gain the right to remain in the destination country through an appeal process. The limited available evidence suggests that these programs are often not very popular. Strand et al. (2008) discuss the case of Afghan nationals in Norway, where close to 2000 people had received a final rejection of their asylum application; however, only 69 Afghan adults chose to return through this program over a two-year period, with more than 206 forcibly returned over the same time frame.

The situation is a bit different for refugees and unemployed migrants, who have the option of remaining in the destination country. A number of destination countries have voluntary return programs or “pay-to-go” schemes intended to entice refugees to return to their countries of origin after conflict has ended and to entice unemployed migrants to return to their home countries rather than receive welfare assistance. These programs have a long history; France’s *Aide au Retour* program launched in 1977 to target unemployed migrants in France, offering 10,000 French Francs for migrants to return permanently to their country of origin (Plewa 2012). The programs typically provide airfare, some reintegration assistance, and a lump sum resettlement amount, which can be reasonably sizeable (e.g., Denmark offered Iraqi immigrants up to \$9,000 per adult and \$10,500 per child; Dumont and Spielvogel 2008). Black, Collyer, and Somerville (2011) have identified 128 such programs, noting a resurgence in interest during the recent global economic crisis. As an example, they note Spain’s Voluntary Return Plan, which was launched in November 2008 and targeted unemployed foreign nationals. However, by April 2010, only 11,400 immigrants had agreed to leave Spain through this program, which was a tiny fraction of the unemployed immigrant population and mostly consisted of Latin Americans, although the target of the policy was Moroccans. The low take-up rates for these voluntary return programs suggest that most migrants do not think that participating in these programs will improve their well-being. It remains unclear to what extent such programs largely subsidize the returns of those who would have returned anyway.

Concerns about “brain drain” and a desire to benefit from the skills and knowledge that migrants have gained abroad motivate a range of policies designed to foster the temporary or permanent return of highly skilled migrants. Temporary return programs typically aim to link highly skilled emigrants with opportunities to

help their home countries, relying on a combination of altruism and coverage of the costs of participating. A prominent example is the UNDP's TOKTEN (Transfer of Knowledge Through Expatriate Nationals) program, launched in 1977.<sup>4</sup> The program relies on volunteers who return to their country of origin for a period of between two weeks and three months to share their expertise. They are paid travel costs and a small allowance, but not professional fees. Approximately 5,000 people have participated in this program in nearly 50 developing countries over a 20-year period (Dumont and Spielvogel 2008). The number of consultants involved in any particular country can be small; Sri Lanka received 43 consultants over the eight-year period of 1996 to 2004 who went to universities, government ministries, and NGOs. A qualitative assessment of the performance in Sri Lanka by Wanigaratne (2006) revealed incidences in which universities appear to have benefited from this exchange as well as cases in which consultants made technical recommendations that were not suitable for local conditions. The assessment noted that the sporadic nature of the engagement made sustained impacts doubtful.

Such programs are also offered by developing countries themselves rather than through international agencies. Thailand's Reverse Brain Drain project aims to facilitate technical linkages between Thai institutions and migrants abroad, whereas Argentina's RAICES program supports short-term returns of scientists to Argentina (Lowell 2001; Jonkers 2008). A related example comes from the Temporary Return of Qualified Nationals to Afghanistan (TRQN) project studied by Kuschminder (2013), which brought 59 highly-skilled Dutch-Afghans to work with a variety of public and private institutions in Afghanistan for three months. The participants are officially volunteers who receive living, travel, accommodation, and travel allowances within Afghanistan that total up to \$2,000 per month. Kuschminder gives as examples participants who helped teach new computer skills or helped design new curricula for university courses and a participant who was a trained engineer who taught a specialty course on electrical engineering to workers from private firms. The participants and those they worked with complained that the time period was too short in many cases, and it is unclear how much value these migrants were able to add beyond what would have occurred in their absence. This second point is perhaps less of an issue in post-conflict societies with severe skill shortages, but there is little evidence to date to measure actual impacts.

Other programs seek to encourage highly skilled migrants to permanently return to their countries of origin or, at least, to return for a period of several years. Countries provide a broader range of incentives in an effort to do this. These incentives have included features such as tax exceptions, interest-free or low interest loans, temporary salary supplements to facilitate career entry, and assistance with housing, schooling for children, and employment for spouses (Lowell 2001; Jonkers 2008; TFMI 2012). An example is Malaysia's Returning Expert Program,<sup>5</sup> which provides a flat tax of 15 percent on employment income for five years, the ability to import

two cars tax-free, and permanent residence status to a foreign spouse and children within six months.

Perhaps the best known of these programs is the Return of the Qualified African Nationals (RQAN) program managed by the IOM, which has since evolved to become the Migration for Development in Africa (MIDA) program. The RQAN provided airline tickets for return migrants and their dependents, shipment of their possessions, purchase of professional equipment needed for their work, settling-in expenses, and assistance finding positions in their home countries (Lowell 2001). It placed approximately 2,000 highly skilled persons in 41 African countries between 1974 and 1990 (World Bank 2006), so the effective placement in any given African country in a particular year was low on average. Existing “evaluations” of this program appear to consist largely of surveys that directly ask those who participate whether they feel they are contributing to development in their home country and whether they feel the program was important in their decision to return (e.g., Pires, El Nour, and McMahon 1996).

The main purpose of such programs is to generate externalities for others in the developing countries of origin. However, the numbers of people involved in these programs have often been relatively small, which, coupled with qualitative evidence on the types of activities in which these participants have been involved, suggests that the aggregate externalities are likely rather limited. In many cases, the programs may end up subsidizing the return of individuals who were likely to return anyway (potentially speeding up this return), and as Dumont and Spielvogel (2008) note, these policies can have adverse effects in terms of feeding resentment among non-migrants or even potentially encouraging more people to emigrate to obtain these benefits upon return.

### *Policies Intended to Make Return Migrants More Productive and Reintegration Easier*

A final set of return migration policies is intended to make it easier for returning migrants to be productive, earn more, and re-adjust to life in their home countries. One of the most comprehensive of these types of programs is the Overseas Foreign Worker (OFW) reintegration program provided by the Philippines. This program attempts to address both the economic and social needs of returning workers. Training programs are offered for those who would like to start small businesses, and a psycho-social component includes services such as family counselling, stress debriefing, and community organizing programs intended to help the migrant fit back into life in the Philippines (Tornera 2003). As a second example, Poland offers returning migrants dedicated websites and a “return migrant handbook” with information on programs to help them find work and deal with the logistics of resettlement (TFMI 2012).

Reintegration programs that involve training and/or credit to start small enterprises are also widely used in programs that help refugees resettle. [Strand et al. \(2008\)](#) provide qualitative evidence on the success of this approach for Afghans returning from Norway. They note that in a few cases, moderately successful businesses were established; however, the majority appeared to exist only on paper, with participants using the business as a mechanism to convert start-up business grants into cash and most respondents stating an intention to re-migrate.

Although such programs can sound intuitively appealing and potentially overcome financial or skill constraints that limit the ability of migrants to work productively, there is no existing evidence of their success. Moreover, there are at least three concerns with such programs. The first is that not everyone wants to be an entrepreneur; many return migrants have been working in wage jobs with no experience in running a business. Second, existing evaluations of training programs have had, at best, mixed results, even among those individuals who are interested in starting businesses ([McKenzie and Woodruff 2014](#)); there is no reason to expect return migrants to be particularly good at running businesses. Third, it is unclear why such programs should be targeted explicitly at return migrants rather than being part of a portfolio of training and work assistance options offered to all individuals in a given region.

Finally, policymakers can help make return migrants more productive by facilitating recognition of the qualifications and skills gained abroad. For example, Argentina's RAICES program offers the translation and accreditation of qualifications formally earned abroad ([Jonkers 2008](#)). The Bologna Process aims to formalize recognition of higher education qualifications within Greater Europe, but many migrants from developing countries still experience difficulties obtaining overseas qualifications that are recognized within their home countries. A second issue is to how to obtain recognition for on-the-job skills learned abroad and for qualified migrants to be able to return to employment systems that principally reward years of service. [Gibson and McKenzie \(2012\)](#) find this to be an issue for highly skilled migrants returning to public sector jobs in developing countries. However, there does not appear to be research that demonstrates the impact of policy efforts to recognize skills earned abroad.

## Why is the Evidence Base so Limited?

The above discussion has shown wide variation in the extent of evidence for different policies. The vast majority of evidence is very recent and comes from randomized controlled trials that explicitly allocate migrants to one policy regime or another. The areas in which these trials have most often occurred are certain financial services interventions and financial education. These interventions are

relatively cheap to implement, do not require a change to the migration decision itself, and can involve large numbers of individuals.

In contrast, the evidence base is more limited for other types of migration policies. Table 3 shows that almost all of the policies directed towards returning migrants have no rigorous evidence of their effects. The following example from IOM (2005) is representative of the state of most evidence on return migration policies: “This evaluation report summarizes the findings, conclusions and recommendations of a multistakeholder team using participatory approaches to an evaluation of IOM’s reintegration projects . . . It reflects the application of a ‘learning-focused’ process, aimed more at identifying lessons learnt than at assessing actual performance or impact levels”. That is, the standard approach, if an evaluation is conducted at all, is to attempt to examine the process of the policy with no reference to a counter-factual of what would have happened without the policy.

We can speculate about several reasons why very little in the way of rigorous evaluations has been done for these types of policies. A first reason is that the size of many of these programs is very small; a program that takes 20 or 30 highly skilled workers over a couple of years will find it very difficult to have sufficient statistical power to detect any impact of the program unless the impacts are massive. A second, related reason is that many of these programs have not been very popular. As a result, there is seldom a natural comparison group of people who wanted to participate in the program but who were not able to be accommodated. A third reason is that some of the intended outcomes (such as spillovers from highly skilled emigrants returning) can be difficult to measure. A final reason may concern the types of organizations that conduct these policies. The IOM and national government migration agencies are the main implementers of many of these policies, and these agencies have not typically funded or had staff trained in rigorous evaluations. However, we believe that none of these obstacles is insurmountable. Especially given the dire state of existing knowledge, there is ample scope for future work to provide more credible evidence on these types of policies.

## Conclusion

Currently, strong evidence is lacking on the impacts of the wide range of policies intended to enhance the development impacts of international migration. Nevertheless, in the last few years, a growing body of literature has begun to demonstrate the impacts of some of these programs. The evidence to date largely comes from a few studies of specific cases, and more research is needed to examine the generalizability of these results. Nevertheless, the preliminary evidence suggests some areas of policy success: bilateral migration agreements for seasonal migration with countries whose workers have few other migration options; developing new savings products for migrants that allow them some control over how this money is used;

and efforts to provide financial education to migrants and their families. In some other areas, there is suggestive evidence, which combined with theory, offers a rationale for policy action: efforts to lower the cost of remittances, reduce the cost of a passport, provide dual citizenship, and remove exit barriers to migration. Finally, existing research suggests reasons to be cautious about some other types of policies; enforcing strong rights for migrants, such as high minimum wages, does make some migrants better off, but at the cost of reducing the opportunity to migrate for others. Similarly, integration programs that provide language training and job search assistance for migrants can have positive effects, but at relatively high costs.

Nevertheless, there are many types of programs for which the only existing evidence is largely case study or process evaluation at best, with no consideration of a counterfactual. This is particularly the case for a large range of return migration programs, but it is also true of popular policies such as matching funds to encourage communal remittances. Moreover, although one can think of reasons to justify these programs (e.g., subsidies to get highly skilled migrants to return might be justified in terms of the externalities they bring), there are also reasons to be apprehensive about the true impacts of these programs (e.g., subsidies might end up funding the return of people who would return anyway or could even deter return by signaling that the home country is so undesirable that it requires subsidies to induce someone to live there). Therefore, there is a strong need for research to provide better evidence on many of these migration policies to ensure that they can enhance the development impacts of international migration.

## Notes

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1. [http://esa.un.org/unmigration/documents/The\\_number\\_of\\_international\\_migrants.pdf](http://esa.un.org/unmigration/documents/The_number_of_international_migrants.pdf) [accessed May 5, 2014].

2. Amounts are expressed in constant 2011 US dollars and sourced from the World Development Indicators, as reported in Clemens and McKenzie (2014). Clemens and McKenzie (2014) note that much of this increase in remittances likely reflects changes in measurement rather than genuine growth.

3. <http://www.unhcr.org/pages/49c3646cfe.html> [accessed 26 March 2014].

4. [http://www.ilo.org/dyn/migpractice/migmmain.showPractice?p\\_lang=en&p\\_practice\\_id=26](http://www.ilo.org/dyn/migpractice/migmmain.showPractice?p_lang=en&p_practice_id=26) [accessed March 26, 2014].

5. <http://www.talentcorp.com.my/malaysians-abroad/returning-expert-programme/> [accessed March 26, 2014].

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# Child Development in a Changing World: Risks and Opportunities

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*This review explores current understandings of child development and the consequences for children of risk exposure in low- and middle-income countries by integrating empirical evidence from development economics with insights from allied social science disciplines. It provides a holistic perspective that highlights the synergies between children's developmental domains, drawing particular attention to dimensions such as self-efficacy, self-esteem and aspirations, which have had only limited treatment in the economics literature to date, especially in developing countries. It concludes that there is strong evidence of dynamic relationships between risk factors in early childhood and later outcomes across multiple developmental domains, emphasizing the heightened effect of shocks to the care environment and the cumulative effect of multiple shocks. It also concludes that risk is distributed unevenly, with children who are both in poverty and disadvantaged socially according to, for example, their ethnicity bearing the greatest burden; within a household, gender, birth order and other factors mean that some suffer disproportionately from shortfalls and incomplete protection. However, this review finds that low endowments in early childhood can be at least partially compensated for through improved environments and investments in later childhood, emphasizing the resilience of some children. The review goes on to explore the impact on children of dramatic socio-economic changes that have occurred in recent years with rapid growth across most developing countries. It highlights four key forces for change—fall in absolute poverty, increased access to services, changing household incentives for investing in children, and changing social and cultural values—and stresses the ambiguous effects on the welfare of children and their long-term prospects. In so doing, the review aims to consolidate emerging evidence on how risks and opportunities for child development may have changed in these dynamic contexts. JEL codes: O15, I15, I24, I25, I3, J13, J16, Y8*

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The last two decades have seen unparalleled global interest in the survival and development of children. This interest reflects commitments made under the terms of the UN Convention on the Rights of the Child and the Millennium Development Goals recognizing improvements to children's life chances and well-being as a legitimate goal of development. Growing awareness that childhood experience is crucial to the adults whom we become has emphasized that enhancing children's condition is crucial for broader economic and societal development. Thus, investing in children is not simply the right thing to do for their survival and quality of life; it is also vital for creating and sustaining broad-based economic growth ([Commission on Growth 2008](#)). Moreover, there is mounting global consensus that economic growth facilitates, but is not sufficient for, the realization of this human potential.

With many children in low- and middle-income countries continuing to experience numerous threats to their well-being (e.g., [Engle et al. 2011](#); [Grantham-McGregor et al. 2007](#); [Walker et al. 2011](#)), this review explores current understandings of child development and the developmental consequences of exposure to risk. It integrates empirical evidence from development economics with insights from allied social science disciplines, where most evidence is overwhelmingly focused on European and North American contexts ([Bornstein et al. 2012](#)). Recognizing the long-term impacts of early deprivation and the potential for significant change in developmental momentum in middle and late childhood, this review adopts a life-course perspective and reports on research covering early childhood to youth. It takes a broad view of child development encompassing the entire range from conception to early adulthood. This view is consonant with the UN Convention on the Rights of the Child, which defines a "child" as a person below the age of 18 years, and with research evidence indicating that it is not only the early years of life but also adolescence and youth that can crucially influence functioning and adaptation in adulthood ([Durkin 1995](#); [Prentice et al. 2013](#)). Moreover, given that human capital formation in different periods of childhood builds upon investments in previous periods, available evidence can be integrated into a more comprehensive framework. In doing so, this review stresses the importance of understanding the specific risks and protective factors and the developmental milestones and outcomes that are salient in each of the phases of childhood.

Integrating this body of evidence from low- and middle-income countries<sup>1</sup> into a single discussion informed by decades of research on child development provides fresh insights into the dynamic and complex nature of child development. First, this approach offers a holistic perspective that highlights the synergies between children's developmental domains, drawing particular attention to dimensions such as self-efficacy, self-esteem and aspirations, which are important components of human agency<sup>2</sup> and that have received only limited treatment in the economics literature to date, especially in developing countries. The aim is to provide a coherent framework that draws on a large body of literature on child development to situate

the many relevant empirical studies in development economics. This review also hopes to broaden the discussion of risks and protective factors as it is usually addressed in the child development literature on high-income countries by integrating empirical evidence from developing countries within the same conceptual framework.

The review attempts to be forward-looking and engage directly with the impact on children of dramatic socio-economic changes that have occurred in recent years with rapid growth and the expansion of public services across most developing countries. Specifically, it aims to consolidate emerging evidence on how risks and opportunities for child development may have changed in these very dynamic contexts. There has been a concerted push in several of the areas of services that most affect children, such as primary education and immunization, and there has been increasing attention in many countries to social safety nets, sometimes with an explicit focus on the young. At the same time, dramatic social change presents the possibility of new risks to children that have as yet been little researched or acknowledged. These developments have coincided with a sharp rise in rigorous empirical research on changes in and the impact of interventions on child well-being within economics and other social sciences, encouraging discussion of policy and practice. The emergence of these new opportunities and risks poses important challenges for both policy and scholarship on child well-being. This review consolidates this emerging evidence on selected dimensions, situating it within the context of previous literature across disciplines and signposting areas where knowledge remains patchy.

The article is structured as follows. It first discusses the current state of knowledge about child development from a variety of disciplines, focusing specifically on the malleability of childhood development and the environmental<sup>3</sup> risks confronted by children. The article then discusses changes to the socio-economic and policy contexts that have taken place in developing countries in recent years and the implications for the welfare of children. It concludes by discussing the areas for further research on child well-being and development in low- and middle-income countries.

## What Do We Know about Children's Development?

### *The Importance of Environmental Influences*

Child development, by definition, involves the changes that occur during childhood, the factors that shape these changes, and the outcomes for children in both the short and the longer term. Recognizing the high prevalence of environmental risks and the scarcity of empirical evidence on the outcomes of risk exposure during childhood in low- and middle-income countries, this review is particularly concerned with these

external influences that are brought to bear in children's development. It follows other studies (Aber et al. 1997, 47; quoted in Dawes and Donald 2005, 8) in delineating child development as "the acquisition and growth of the physical, cognitive, social and emotional competencies required to engage fully in family and society". This definition highlights that development entails adaptation to specific social and cultural contexts and comprises multiple functional domains, each of which includes an array of states and competencies. These domains exist in a synergistic relationship; the operation of one affects performance in the other(s), and the influences travel in all directions. For example, neurological shocks can affect social functioning as much as emotional well-being can impact physical growth.

Although the diverse developmental domains are both malleable and interacting, they are not all equally liable to change under external influence. Thus, for example, social and emotional competencies are far more responsive to external forces than are sensory and motor functions, which tend to remain relatively stable regardless of experience (Schaffer 1996, 392). Accordingly, children's feelings about identity, self-worth, and personal well-being are highly dependent on how they understand their relative social position, relative competence, and potential to access opportunities for personal, social, and economic advancement. These are not, for the most part, individualized processes; they are experienced as part of a family group, peer group, and community (Ridge 2002). In this way, children who experience approval, acceptance, and opportunities for skill development are far more likely to be resourceful and resilient than are those who are subjected to humiliation, rejection, or failure (Boyden and Mann 2005).

Contemporary thinking is noted for the diversity of its conceptualizations of child development. However, there is broad agreement that the process involves a complex transaction between genotypic, biological, and maturational processes that are shaped by children's experiences, actions, and interactions and by wider environmental influences (Walker et al. 2011; Wachs and Rahman 2013), including the values of their caregivers, which are embedded in diverse cultural contexts (Rogoff 2003; Sameroff 2009). As such, individual characteristics (for instance, personality) and biological forces (including genetics, epigenetics, and neurobiological factors) work together with family dynamics (for example, family functioning) and broader historical, socio-cultural, economic and other environmental factors to influence children's growth and adaptation.

Bronfenbrenner's (1979) ecological systems theory has been particularly persuasive in bringing external contextual influences to the fore in child development research and in specifying what the nature of these influences might be.<sup>4</sup> One of Bronfenbrenner's key contributions has been the idea that "what matters for behaviour and development is the environment as it is *perceived* rather than as it may exist in 'objective' reality" (Bronfenbrenner 1979, 4). In other words, he drew attention not only to material conditions but also to context-specific values and meanings as

crucial in children's development. In all contexts, there are different types and amounts of material and psychosocial resources to support children's development as well as different levels and types of knowledge and beliefs about how best to raise them. These beliefs fundamentally affect children's everyday lives, including the things that they are taught or encouraged to do and to whom they turn for guidance—all of which produces great variety in the developmental challenges and opportunities that boys and girls experience (Rogoff 2003).

Bronfenbrenner envisioned the environment as a series of nested and interdependent structures, of which the most significant for child development are micro-systems such as the family and/or peer group. These constitute the most proximal environments for the young and exercise a direct impact on their development through routine interactions and participation in close relationships and recurring activities. Bronfenbrenner was concerned with highlighting how micro-systems influence children's development through their interaction, such as when family poverty impairs children's school performance. He labelled this interaction "meso-systems". His concept of exo-systems refers to the settings that affect the people who are in proximal relationships with the child while not directly influencing that child, such as when caregivers are members of community associations that moderate the impacts of adversity. Bronfenbrenner's macro-system refers to the broader political-economic and socio-cultural contexts that shape all other systems. Finally, in his formulation, "chronosystem" refers to the relationship between human-developmental time and the other systems as they evolve over time.

In the transactional model outlined by Sameroff and Chandler (1975), changes in the child and in his/her environment are dynamic and mutually constitutive. As such, the child context interface may have very different effects on a child's development at different ages (see also Sameroff and Fiese 2000). It has been argued that it is the recurrent, lasting, and reciprocal interactions between an active child and his/her environment that have the most significant effects on the development of characteristics at different points in the life cycle (Rogoff 2003). Consequently, the time spent in poverty or prosperity makes a significant difference.

Not only do developmental requirements and outcomes change as children mature, but there are also periods during which children's responses to external stimuli are heightened (Shonkoff, Boyce, and McEwen 2009; Shonkoff and Levitt 2010). This phenomenon leads to greater vulnerability to long-term harm arising from risk exposure in these periods, but it also offers a window for focusing on policy interventions that will be most potent. Early childhood is generally recognized as the most crucial life phase in terms of developmental malleability because this is when change is accelerated and genotypic milestones emerge. Importantly, the time sensitivity of early childhood is also socially structured by influences that include the institutions of education because early cultural learning selects and reinforces specific cognitive and psychosocial competencies. Unequal participation in

early childhood and primary education further determines long-term trajectories in the sense that institutions, teachers, and assessment systems all tend to promote some children over others depending on their perceptions of children's characteristics and potential (Woodhead et al. 2009).

Child environment influences operate in both directions. This phenomenon calls attention to the fact that children do not simply absorb and react to external forces but are instrumental in shaping their own environment by "selecting and even creating those settings that are compatible with their individual characteristics" (Schaffer 1996, 394). In other words, the young are seldom the passive victims of overwhelming circumstances but rather are social agents whose aspirations, sense of self and actions affect their own destinies. Even among boys and girls at heightened risk of poor outcomes due to extreme adversity, there is considerable variation in individual capacity to achieve developmental tasks. Some children thrive despite experiencing multiple developmental threats (Cicchetti and Garmezy 1993; Masten and Obradović 2006; Obradović and Boyce 2009).

Different children, households, communities, and societies experience different levels of hazard and risk at various points in time. Some contexts, such as those involving high levels of exposure to toxic substances, chronically inadequate nutrition, or routinely unresponsive social stimulation, are liable to be deleterious to all children and have thus been labelled "chaotic environments" (Weisner 2008). Exposure to multiple risks may have cumulative and/or compound effects, whereby varying causal, moderating, and/or mediating influences at the individual, family, and societal levels interact and intersect to bear down on and overwhelm children (Stevens 2006; Burchinal et al. 2008). The burden of risk varies widely in accordance with children's social attributes, in that different social groups, distinguished, for example, by ethnicity, religion, or caste, are subject to very different levels and forms of structural constraints and challenges. Gender is frequently emphasized as the most significant marker of social difference in childhood, with girls consistently and substantially disadvantaged compared with boys. Gender disparities are generally interpreted as evidence of deep-rooted prejudice and discrimination that is associated with lower levels of parental and societal investment in females as well as their heightened exposure to harmful practices, such as sexual violence.

Given that the effects of adversity on children are contingent upon both supportive and detrimental elements in the wider environment, some researchers have focused on identifying and examining the promotive or protective processes and mechanisms that operate at multiple levels to shield children from various forms of adversity (Rutter 1987). This research has even shown that under certain circumstances, exposure to stress may be associated with increased resistance to later stress, termed a "steeling effect" (Rutter 2012). Diverse personal and collective resources that shape both the strategies children use for overcoming misfortune and their opportunities for mastery are brought to the fore. The characteristics of

individual children may be especially salient, as may the quality of relationships in the family and school and among peers. The availability of wider formal and informal mechanisms of support, such as the extended family, self-help groups, social protection programs, health services, and education, is also understood as a central part of this complex environment of protection.

### *Empirical Evidence from Development Economics*

The growing evidence from empirical studies in low- and middle-income countries offers a more detailed understanding of some of the key ways in which external factors influence child development, consistent with the framework in the previous section. In this section, we explore these links directly, making explicit how several streams of research in development economics are of immediate relevance to the findings from allied social sciences.

*Complementary domains of child development.* As discussed, one of the key insights of the developmental sciences literature is that child development is multidimensional and that its many domains interact with each other over time.

Intuitively, of course, this has long been recognized in economics. A large body of work has examined the links between nutrition and learning in children.<sup>5</sup> For example, an influential study by [Glewwe, Jacoby, and King \(2001\)](#) found that Filipino children who are better nourished in early childhood perform significantly better in school later, both because they enter school earlier and because of greater productivity per year of schooling. Recent research, however, has considerably broadened the empirical evidence on cross-productivity and dynamic complementarities between domains of child development. In particular, in papers based on longitudinal data from the United States, Cunha and co-authors have focused the attention of economists on the importance of “non-cognitive skills”<sup>6</sup> and the way in which they interact with “cognitive skills”, as measured conventionally by test scores, throughout childhood as well as the way they continue to shape labor market outcomes and academic achievement in later life (e.g., [Cunha and Heckman 2008, 2009](#); [Cunha, Heckman, and Schennach, 2010](#)). Comparative quantitative evidence from developing countries is very scarce. The only peer-reviewed study of which we are aware is that of [Helmers and Patnam \(2011\)](#), which builds on the methodology in [Cunha et al. \(2008\)](#) and applies a Linear Structural Relations (LISREL) model to data collected in 2002 and 2007 in the state of Andhra Pradesh in India by the Young Lives study.<sup>7</sup> For the younger cohort of children born in 2001–2, they highlight strong evidence of dynamic relationships between risk factors at the age of one, health in early childhood, and early cognitive achievement (at the age of five). For the older cohort born in 1994–5, they find strong evidence of cognitive skills at the age of eight leading to a greater stock of both cognitive skills

and psycho-social competencies at age 12. Although they document the cross-productivity of cognitive skills on future psycho-social competencies, in contrast to [Cunha and Heckman \(2008\)](#), they do not find any significant evidence in the opposite direction (i.e., higher psycho-social competencies producing higher cognitive skills in the future).

[Dercon and Sanchez \(2013\)](#) examine the links between nutritional status at seven to eight years of age and three psychosocial traits, i.e., self-efficacy, self-esteem, and aspirations,<sup>8</sup> measured at the age of 12 in the four Young Lives countries. They document that lower height-for-age at eight years of age is strongly predictive of future psychosocial traits. This association remains significant statistically and in magnitude, even upon the inclusion of controls for current household expenditure, maternal psychosocial traits, past cognitive achievement, current body mass index of the child, and community fixed effects. This evidence cannot necessarily be taken as causal because omitted variable bias may persist even after including the control variables. However, the strong pattern of correlations, even when the most common sources of omitted variable bias are controlled for, is suggestive of the type of causal pathways in skill formation that are indicated by the child development literature and the work of Cunha, Heckman and colleagues in economics. Using the same dataset, [Dercon and Singh \(2013\)](#) find that sense of agency and aspirations may be a channel through which inequalities between sexes are reproduced over time. They show that parents in India have significantly higher educational aspirations for their sons than for their daughters when the children are eight years old. This pattern in parental aspirations is transmitted (albeit not perfectly) to children's aspirations at the age of 12, which, in turn, is associated with a lower sense of self-efficacy, lower test scores, and lower school enrollment among girls at the age of 15.

The results in these studies are highly suggestive that there may be important gains in the engagement of economists with the child development literature on skill formation, the role of aspirations in determining investments in children, and the nature of different domains of functioning that develop over the course of childhood.<sup>9</sup>

*Critical periods in child development.* We have argued that the child development literature emphasizes the critical periods during childhood when some aspects of children's development are especially susceptible to influence. In particular, deprivations and shocks during early childhood are known to have profound and lasting effects across distinct developmental domains. The implication is that recovery is unlikely.

Recognition of these critical phases has perhaps been most evident in the field of nutrition. It is now widely accepted that early nutrition deficits have significant impacts on later life outcomes. The literature in this sub-field has increased rapidly in recent years (see [Currie and Almond 2011](#) for an authoritative review of the

current state of knowledge concerning the long-run impact of shocks in utero and early childhood). This literature is overwhelmingly focused on studies from OECD countries, for which the evidence base is now particularly rich, although there is a growing body of evidence from developing countries. For instance, in an influential study of a sample of women in Indonesia, [Maccini and Yang \(2009\)](#) report that higher rainfall in a respondent's birth year leads to a lower incidence of (self-reported) poor health, greater terminal height, a greater number of grades completed in school, and a larger accumulation of assets at 25 to 50 years of age.<sup>10</sup>

A more open question is the extent to which children show resilience through recovery from early deprivations and shocks, or whether deficits in early childhood can be compensated for by remedial measures in later life. One domain for which remediation has been thought to be doubtful is nutritional deficits in early childhood, which lead to stunting (linear growth retardation). There is extensive evidence that early growth deficits persist into adult height, and it is commonly thought that stunting is irremediable after the first two years of life. Nonetheless, a small body of research is now questioning the premise that lifelong height impairment is, in fact, inevitable and is asserting that "catch-up growth" may be possible. The Cebu longitudinal study provided some of the first developing-country evidence on this, with [Adair \(1999\)](#) reporting that almost one-third of the children in the sample who were stunted at two years of age experienced catch-up growth by the time they reached 8.5 years. Similarly, using data from Peru, [Crookston et al. \(2010\)](#) found that a large proportion of the children who were stunted at 6–18 months years of age had caught up by the age of five. In both studies, the magnitude of recovery in children who do catch up is very large (in excess of one standard deviation of the height-for-age z-score). [Coly et al. \(2006\)](#) document a similar magnitude in Senegal, with large changes for those children who were stunted at preschool.<sup>11</sup> In a recent contribution using panel data from Brazil, Guatemala, India, Philippines, South Africa, and the Gambia, [Prentice et al. \(2013\)](#) similarly document substantial catch-up in height between the age of 24 months and mid-childhood and again between mid-childhood and adulthood.

The potential for catch-up has important implications for public policy. Although preventing nutritional deprivation in early childhood remains the key priority and the most efficient form of intervention, it raises the possibility that there may be a role for remedial action for children who have suffered early nutritional deprivation. [Currie and Almond \(2011\)](#) survey a large body of literature on remedial welfare measures, including cash transfers, food stamps, tax credits, health insurance, and home visits by social workers and medical staff. The presence and magnitude of gains differs across interventions and evaluations, but there seems to be clear evidence that low endowments at the time of birth can be at least partially compensated for through improved environments and investments in later childhood. As they note in their conclusion, ". . . evidence for long term effects of early insults should

*not be a cause of pessimism. While children can be permanently damaged at this age, the damage can be remediated. The picture that emerges is one of vulnerability but also of resilience”.*<sup>12</sup>

Recent evidence from Young Lives is consistent with this possibility. [Singh, Park, and Dercon \(2014\)](#) investigate whether a large, universal, nationally mandated school feeding program in India, the Midday Meal Scheme, which operates in all government primary and upper primary schools, could help ameliorate the impacts of severe droughts in early childhood on children who were approximately five years of age at the time of the intervention. They compare children who attend schools (and have access to the Scheme) with those who have yet to enroll. They use a non-linearity in the effect of age on enrollment as an instrumental variable to correct for self-selection into the Scheme while controlling linearly for age, various socio-economic characteristics, and their nutritional status when the children were aged approximately one year. They find that although drought in early childhood had large and significant negative impacts on children’s height-for-age and weight-for-age z-scores, the school meals entirely compensated for this effect through catch-up growth among the children in the Scheme.<sup>13</sup>

[Crookston et al. \(2010\)](#) further document that the Peruvian children who were stunted at age one but were no longer stunted at age five demonstrated levels of cognitive functioning, measured by testing receptive vocabulary and grasp of quantitative concepts, similar to children who were never stunted.<sup>14</sup> This finding raises the possibility that not only may catch-up be possible for a longer period than was previously thought likely, but it may even ameliorate the well-documented deleterious impact of nutritional deprivation on cognition. However, the evidence on recovery in cognitive outcomes is mixed. Explicitly testing the existence of a critical window around the first 1000 days, [Barham, Macours, and Maluccio \(2013\)](#) find that there is catch-up in the height of children whose households (experimentally) received conditional cash transfers in later childhood compared with children whose households received these transfers starting in utero and during the first two years of life. Nevertheless, there remains a significant difference in the cognitive outcomes of the two groups, indicating that any catch-up in cognitive functioning is only partial at best.

*Vulnerability to household shocks.* We have noted that a significant proportion of children in low- and middle-income countries continue to face a multitude of risks of many forms and that exposure to multiple risks can have cumulative effect. In a discussion of risks to child development, it is vital to understand how micro-systems factors, such as family and/or household dynamics, affect children and how children negotiate these dynamics insofar as they have agency to do so. It is widely accepted that the care environment, generally constituted by a child’s activities and relationships within the home-based family, is the most salient external influence in

children's lives, especially during the earliest years of life. Unsurprisingly, shocks to the care regime have been shown to have a significant impact on children's outcomes across several domains.

[Bhalotra \(2010\)](#) uses individual data on infant mortality for approximately 150,000 children born in 1970–97 across 15 major Indian states, merged by cohort and state of birth with a state panel containing information on aggregate income, to investigate child mortality and its relation to aggregate income shocks. Specifically, she compares the effects of annual deviations from general trends in income on the mortality risks of children born at different times to the same mother conditional upon a number of state-time-specific covariates, including rainfall shocks and state social expenditure. She finds that rural infant mortality is counter-cyclical in that a negative income shock of a median size (4.4 percent) leads to a rise in infant mortality by 0.136 percentage points, which is almost half of the total annual decline in mortality in India in 1970–99. Bhalotra documents that these effects are most likely mediated by changes in health-seeking behavior and maternal labor supply in response to the income shock. Thus, in a downturn, rural Indian mothers are significantly less likely to give birth outside the home or to seek antenatal care and are more likely to work outside the home. They are also far less likely to obtain immunization or treatment for their children. In a similar vein, [Baird, Friedman, and Schady \(2011\)](#), in the most geographically comprehensive investigation undertaken on the subject using data on 1.7 million births in 59 developing countries, record a large, negative association between per capita GDP and infant mortality.<sup>15</sup>

The death of parents or other caregivers is a direct shock to the care environment of children and often to household income. [Beegle, De Weerd, and Dercon \(2006\)](#) examine a sample of 718 non-orphaned children in AIDS-afflicted areas of Tanzania who were surveyed in 1991–9 and then traced and re-interviewed as adults in 2004. Nearly one-fifth of the sample had lost one or more parents by the age of 15, allowing for an assessment of the permanent health and education impacts of orphanhood during childhood. The authors control for a wide range of child and adult characteristics before orphanhood as well as community fixed effects and find that maternal orphaning has a permanent adverse impact of 2 cm of final height attainment and one year of educational attainment. Expressing welfare in terms of consumption expenditure, they find a gap of 8.5 percent compared with similar children whose mothers had survived until at least their 15th birthday.<sup>16</sup>

*Not everyone is equally vulnerable.* Both the development economics literature and the child development literature emphasize that some households are significantly more vulnerable to adversity than others because of their location, social status, or economic factors. Typically, the burden of risk is greatest for poor households, which are also generally the least able to smooth income shocks ([Dercon 2002](#)).

Moreover, household poverty is a key indicator for multiple developmental risks in children, including malnutrition, environmental toxins, low maternal education level, and family conflict (Wachs and Rahman 2013).

We have noted that children's social characteristics can be a significant indicator of the burden of risk they bear. In poor households, it is the children who are disadvantaged by gender, birth order or other characteristics who are likely to suffer most from shortfalls and incomplete protection because limited resources are frequently distributed unevenly among household members. Bhalotra (2010) shows that not only is the income effect on child mortality significantly larger for children with uneducated mothers (or fathers) and mothers who became pregnant before the age of 18 but that, comparing brothers and sisters, the impact of income shocks is also much larger in girls; indeed, boys are fully protected. Baird, Friedman, and Schady (2011) report that infant mortality in females is more sensitive to negative income shocks than it is in males, and Maccini and Yang (2009) establish that the links between rainfall shocks in the birth year and adverse later life outcomes in Indonesia are apparent only in women.

Households are not, in most cases, powerless against shocks, nor do they passively suffer their consequences. Attempts to reduce vulnerability and/or ameliorate impacts include diversification of income sources and crops, informal group-based risk sharing, and increasing labor supply. Coping strategies may result in children moving (temporarily or permanently) into the home of relatives who are better off or in need of more labor, and this can be a source of either developmental risk or learning and social support (Boyden and Howard, 2013). This practice of fostering has been documented quantitatively using data from Burkina Faso by Akresh (2009). He shows that households experiencing negative idiosyncratic income shocks, with gender imbalances among children, located further from primary schools, or with more "good" quality network members (fewer subsistence farmers and unmarried individuals and more educated individuals) are significantly more likely to send a child away.

Children commonly share responsibility for household maintenance, very often making significant contributions by undertaking domestic chores, unpaid work in a family enterprise, or paid employment or by caring for younger siblings or incapacitated adults (Bourdillon et al. 2010; Heissler and Porter 2013). For many boys and girls, playing an active part in the household economy is vital to their social inclusion and hence is an important source of identity, pride, and self-efficacy. It also enables them to gradually learn life skills appropriate to their gendered adult roles. Nevertheless, these risk-coping mechanisms can be damaging for the young. For example, Beegle, Dehejia, and Gatti (2006) document a rise in child work in response to shocks to crop income in rural Tanzania.<sup>17</sup> Jacoby and Skoufias (1997) similarly report a reduction in children's school attendance following shocks in agricultural income in rural India.

Even when individual and household coping mechanisms provide a shield during crises, they do not always offer complete insurance against the effects of shocks or enduring hardship. Often, this is most evident with adversities that affect entire communities insofar as they commonly limit the ability of households to share risks. Even within households, risk sharing may not be complete. [Dercon and Krishnan \(2000\)](#) test for perfect risk sharing in households confronting adverse shocks and examine whether individuals are able to smooth consumption over time and within households. These authors establish that poorer households are not able to do so. They find that in southern Ethiopian villages, the brunt of adverse shocks and of incomplete risk sharing in the household is borne by women.

This discussion of environmental risks is not exhaustive. It is merely intended to illustrate that children, households, communities and population groups may be prey to a multitude of risks, some bearing a far higher risk burden than others, and that such risks may have severe consequences for children that can persist throughout their lives. An understanding of the nature and extent of such risks is therefore crucial for appreciating the potential loss of developmental potential among children in low- and middle-income countries.

## Changing Contexts in Developing Countries and Their Effects on Children

Many parts of the developing world have undergone rapid socio-economic transformations over the last two decades. In this section, we highlight the impact on children. We identify four significant trends, as follows: an (uneven) fall in absolute poverty; increased access to services, especially education; changing household incentives for investing in children; and changing social and cultural values.

### *Fall in Absolute Poverty*

One of the most notable trends in recent decades has been the steady decline in absolute poverty, as measured by the ability to meet the cost of “basic needs”, across most parts of the developing world. [Chen and Ravallion \(2010\)](#) analyze 675 representative household surveys from 115 countries together with internationally comparable price data to examine trends in global poverty between 1981 and 2005. They report that whereas 52 percent of the population of the developing world was below a poverty line of \$1.25 per day in 1981, the comparable figure was 25 percent in 2005. The rate of decline in poverty over this period was 1 percent per year. This decline was far more significant in Asia (especially China) than it was in sub-Saharan Africa, where the gains have been more modest. Importantly, gains have been unequal within countries. For example, whereas India has experienced

rapid economic growth and impressive rates of poverty reduction, it remains home to more poor people than any other country in the world.

These trends have direct relevance for children's well-being in low and middle-income countries, with three important implications. First, given that poverty is a significant risk factor for children, any reduction in poverty is certainly good news in and of itself.<sup>18</sup> Second, however, there are important grounds for caution. Chen and Ravallion's analysis (2010) reveals a large "bunching" of people between the poverty line of \$1.25 per day and \$2 per day. In other words, whereas much of the developing world may now have escaped poverty, many populations remain significantly vulnerable to income shocks. As shown in the previous section, even temporary income shocks can directly prejudice children's outcomes, with long-term consequences. Thus, in households that are close to the poverty line, any gains from a reduction in poverty are likely to be significantly lessened by vulnerability to shocks, especially in the absence of supplementary social protection measures. Finally, the trends outlined by [Chen and Ravallion \(2010\)](#) imply that poor households (and, by extension, children in poor households) will increasingly be in middle-income countries, highlighting the importance of measures that address inequalities and cater to children in particularly disadvantaged groups.

### *Access to Services and Inequality in Outcomes*

Another force for change that crucially affects children in developing countries is the expansion of public infrastructure and services, particularly those services that are aimed at the young, such as education and immunization. This expansion is significant in at least three respects: it affects the absolute level of child well-being; it can change the level of inequality in the distribution of child outcomes as well as the nature and relative importance of different dimensions in inequality; and it changes the focus of policy debates around public services and of interventions.

It is not *a priori* clear that access to social services will affect equality between children over time inasmuch as increased access does not necessarily have a monotonic relationship to societal inequalities. [Oster \(2009\)](#) presents a theoretical model that predicts that when starting at lower initial levels of access, an expansion of services will lead to higher inequality, whereas when starting at a high level of access, service expansion will reduce inequality. She tests this theory using data on vaccinations for children in India, with the location of health camps as identification. She rigorously documents that although an increase in the number of health camps initially led to a rise in gendered inequality in vaccinations, further increases led to its decline. This trend directly maps into mortality: in areas that begin with high levels of vaccination, excess female mortality decreases over time.

Perhaps the starkest illustration of how increased service access shifts the nature and level of inequalities among children as well as the boundaries of public

discourse is found in recent advances in primary education in developing countries. Following the push for Education for All and the Millennium Development Goals, primary school enrollment has risen sharply across the developing world, and ever-enrollment into primary schooling is near-universal in most places (Grant and Behrman 2010; World Bank 2012). This expansion has been accompanied by important changes in inequalities in educational investments. In India, for example, data from the mid-1990s reflect that the primary channel for gender bias in education was through enrollment, with boys significantly more likely to be enrolled than girls, but that, conditional on enrollment, there were no significant biases in spending on education (Kingdon 2005). However, this pattern has almost entirely reversed since then. Using data from 2005 and replicating the methodology of Kingdon (2005), Azam and Kingdon (2012) report that fewer states present evidence of gender bias in 2005 compared with 1993 and that there is little evidence of any gender bias in enrollment in the five to nine year age group (although there is some evidence for later years). Maitra, Pal, and Sharma (2011) use the same data to document that the gender gap in private school enrollment is double that in enrollment overall and has increased over time in rural areas.<sup>19</sup>

Given the above, it should not be surprising to find that the relative importance of diverse axes of inequality is very different from the received wisdom, with gender differences as the most obvious example. Dercon and Singh (2013) systematically investigate gender bias at the ages of eight, 12 and 15 years for children in the four Young Lives countries.<sup>20</sup> They show that gender preferences are often specific to age, contexts, and indicators and are not always as expected. Not only are the gaps associated with other socio-economic factors often larger, but gender gaps may also be absent across most outcomes (in Peru) and may even reveal a pro-girl bias (in Vietnam). Using DHS data from 38 countries, Grant and Behrman (2010) also document considerable heterogeneity in gender bias across regions of the developing world and phases of childhood. Interestingly, they find that, conditional on ever-enrollment, girls seem to have a consistent *advantage* in school progression, leading these authors to conclude that “developing countries are becoming more like developed countries with gender gaps that increasingly favor, rather than discriminate against, females” (2010, 71).

The rise in school availability has also changed the academic and policy discourses about education. The focus is shifting from access, which dominated policy discussions until the 1990s (embodied, for example, in several enrollment-related targets in the MDGs), to quality and relevance. As much work has documented, education quality remains poor, and problems of school accountability are endemic in many low- and middle-income countries. In an influential study, Chaudhury et al. (2006) found that in six developing countries, up to one-quarter of teachers were absent at the time of unscheduled visits to schools. In India, half of the teachers who were present were not teaching. Moreover, many children complete primary

school without the ability to perform basic tasks, such as reading a simple sentence or resolving a simple division problem (Pratham 2012).

Recently, there has been a marked rise in private schooling in many low- and middle-income countries, reflecting, at least in part, the poor quality of education in government schools.<sup>21</sup> Although causality is debated, several studies have documented the higher median achievement of children in private schools, though the average expenditure per child tends to be far lower than that in government facilities. For example, using yearly child-level panel data on private and state school pupils, this pattern has been documented for rural areas of Pakistan by Andrabi et al. (2011). Bold et al. (2011) report similar findings from Kenya using several years of data from an exam administered to primary school students throughout the country. Muralidharan and Sundararaman (2013) and Singh (2013) both report much greater productivity of private schools and causally greater absolute effects on some aspects of learning (notably English) in India.

This remarkable transformation in the educational landscape, with high enrollment (at least at the primary level), shifting inequalities, and a burgeoning private sector, presents both opportunities and potential risks for children's development, some of which are only now being explored in depth. The important consideration here is not to definitively pronounce the aggregate implications of such changes, which may not be possible given the significant gaps in our knowledge. Rather, it is important to note that an understanding of child development in low- and middle-income countries must necessarily consider recent policy developments.

### *Changing Household Incentives for Investing in Children*

Inequalities and differential investments in and opportunities presented to different children are also affected by broader economic trends in developing countries. To emphasize these links, this sub-section highlights two studies that show how even the most entrenched inequalities may be affected. We focus on gender discrimination in India, which has been widely documented in the literature and builds on our previous discussion.

Concentrating on educational access, Munshi and Rosenzweig (2006) document how patterns of enrollment across public and private schools changed in a part of urban Bombay (Mumbai) between 1980 and 2000 in response to a transformation in the labor market returns to English-medium education. In stark contrast with results from the rest of the country, these authors find that although the gaps in the proportion of children studying in English-medium schools have declined considerably between different caste groups in this period, the decline has mostly been caused by a rapid increase in the proportion of enrollment among girls from lower castes. They explain this finding using caste networks in employment, which provide lower-caste boys with blue-collar jobs in manufacturing that have not

traditionally required familiarity with English.<sup>22</sup> Clearly, an understanding of trends in inequality needs to account for the changing incentives experienced by households in the context of economic growth.

Jensen (2012a) presents striking evidence of how transformations in economic opportunities in developing countries can affect investments in children and youth at different ages. He uses an innovative experimental research design to examine the impact of expanding labor market opportunities for women in India. Women in randomly selected villages were connected to recruiters for the Business Process Outsourcing (BPO) industry. Jensen evaluated the effect of this (by design) exogenous change in labor market outcomes on outcomes for girls and young women in these villages. Using panel data spanning a three-year period, he found that women aged 15 to 21 at baseline from villages exposed to the intervention were 4.6 percentage points more likely to work in a BPO job than were women in control villages and 2.4 percentage points more likely to work at all for pay outside the home. Additionally, these young women expressed a greater interest in working throughout their lives, even after marriage and childbirth, indicating shifting aspirations toward paid work as a career. The higher educational requirements and greater returns to human capital in the BPO sector also led to increased investments for women. The cohort of 15- to 21-year-old women from treatment villages was significantly more likely to enroll in computer or English-language courses at private, for-fee training institutes, indicating a willingness to invest in getting a job or building a career when suitable opportunities are available. Significantly, even younger, school-aged girls had increased school enrollment and a greater body mass index (BMI), reflecting better nutrition and/or health investments.

### *Changing Social and Cultural Values*

In many developing countries, economic growth and the expansion of infrastructure and social policy has occurred alongside the spread of information and communications technology and the media, all of which can have dramatic and lasting effects on material conditions, norms, values and practices. In this section, we highlight recent evidence of social changes that have led to important differences in individual and community outcomes. Although the link has not been made explicitly, the implications for children's development are likely to be significant.

La Ferrara et al. (2012) study how fertility choices in Brazil shifted significantly between 1970 and 1991 in response to the introduction of television, specifically soap operas. They identify the effect through variation in the timing of the introduction of the main television network in different areas and show that their results are robust to possible concerns of selection bias. The decline in fertility occurs not through delayed commencement of childbearing but by stopping childbearing earlier.<sup>23</sup> Similarly, Jensen and Oster (2009) study the impact of the introduction of

cable television on women's status in India using a three-year individual-level panel dataset and find that it led to a decline in female fertility. Equally importantly, they also report evidence of a decline in the acceptability of violence against women and an increase in school enrollment among younger children, which they hypothesize as arising from an increase in women's participation in decision making.<sup>24</sup>

Not all of the outcomes of new information and communications technology and entertainment sources are beneficial. [Olken \(2009\)](#) uses the variation in television and radio reception across 600 different Indonesian villages to investigate the impact on social capital. Using arguably exogenous variation induced by differences in terrain and in the timing of the introduction of private television and radio,<sup>25</sup> he demonstrates that increased signal reception leads to less participation in social organizations and lower self-reported trust. Although his analysis does not include child outcomes, it is likely that these types of changes have had indirect effects on children growing up in these communities.

The rapid recent expansion of television availability is only one of many changes that may affect the social values that shape children's lives; this example was selected here mostly because of the availability of peer-reviewed evidence. Our key point is that such changes need to be studied explicitly if we want to understand trends in child well-being in the rapidly changing contexts of many developing countries.

## Conclusions and Future Directions

The broad spread of our discussion precludes us from offering specific directions for either research or policy. However, it does allow us to draw out commonalities between the strands of research that have proven most fruitful and to frame how the effect of changing environments on children may best be understood.

The first lesson we draw from reviewing current evidence is the importance of cohort studies that encompass diverse dimensions of child well-being. We argue that data of this type are extremely important for at least two crucial reasons. First, child development is a sequential process involving dynamic complementarities; thus, the long-term consequences of external influences at different stages of childhood and adolescence can only be convincingly studied if data are available for the same individuals over time. Although some questions, such as the impact of shocks in early childhood, may be examined by matching previous external data sources to existing cross-sectional studies such as the DHS and LSMS surveys, others (such as the possibility of catch-up growth in later childhood) cannot be persuasively researched without access to high-quality panel data. It is precisely in the latter type of questions that our empirical evidence may be most effectively augmented. The second reason is more specific to developing countries. Rapid change in socio-economic contexts has ambiguous effects on the welfare of children and their long-term prospects.

Significant changes may occur even in a very short period of time and may not be foreseen, and the outcomes for children may be unknown. This understanding will be critical for designing timely and effective policy responses to changing circumstances to safeguard children's well-being. An existing system of longitudinal surveys is perhaps the best means for evaluating change as and when it occurs.

More specifically, we would like to highlight two particular strands of research in child development that could benefit from much greater attention. The first seeks to understand which periods are critical for different domains of child development, whether deprivations or abuses to children in these critical periods are irreversible, the relative costs of later remediation, and, finally, how remediation may best be achieved. The answers to these questions are of first-order importance for policy. Even if prevention remains the most cost-effective form of intervention, it is vital to be able to offer effective support to recovery, if possible. Our knowledge in this area remains patchy.

The second area of research involves seeking better understanding of the interdependence and complementarities across domains of children's development. The recent focus in the economics literature on outcomes beyond nutrition and cognition is welcomed. However, as we have highlighted, evidence on developing countries remains sparse, and it cannot be presumed that the relationships documented in OECD countries, such as in the interaction between cognitive and psycho-social skills, would necessarily be generalizable to developing countries. Children's development is not merely driven by biological imperatives but is also shaped by social and other environmental factors that differ greatly both across and within developing countries. It is vital that this complex process be studied in specific socio-economic contexts. Furthermore, the synergies between developmental domains call for the need to employ an integrated approach to policy across different sectors and levels of government and in international agencies.

We end by highlighting that policies aimed at supporting households can have major impacts on children. Although this point may seem rather obvious (and has been recognized frequently in previous work), very often, such policies work from assumptions rather than evidence of the challenges children face, their needs and the impacts of interventions on them. Supporting households without attending to the specific conditions and circumstances of children may be inefficient at best and detrimental to the young at worst. Children merit consideration not merely on ethical grounds but also because even temporary setbacks can have significant long-term impacts on their lives.

## Notes

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Oxford, (at the time of writing, Stefan Dercon was also Chief Economist of the UK Department for International Development, DFID), Abhijeet Singh, Department of International Development, University of Oxford. Young Lives is funded by UK aid from the Department for International Development (DFID) and co-funded by the Netherlands Ministry of Foreign Affairs from 2010 to 2014, and by Irish Aid from 2014 to 2015. The views expressed here are those of the author(s). They are not necessarily those of Young Lives, the University of Oxford, DFID or other funders.

1. The challenges of delivering basic services, such as health and education, and the volume and severity of threats to children's well-being in developing countries have recently provided growing momentum to research on selected aspects of child development within development economics (e.g., Edmonds 2007; Glewwe and Miguel 2007; Glewwe and Kremer 2006; Ferreira and Schady 2009; Almond and Currie 2011).

2. The term 'agency' is used here to refer to the capacity of an individual to take action in a particular situation.

3. In this paper, "environment" includes the physical, institutional, social, and cultural factors that are external to the individual.

4. Bronfenbrenner critiqued theories prevalent in the 1970s in which environmental factors were "limited to a few crude and undifferentiated categories that do little more than locate people in terms of their social address" (1979, 17), listing family size, single- versus two-parent households as well as variation by social class or ethnic background as examples of factors typically used in studies to describe contexts. He further criticized models that limit environmental influences on behavior and development to interpersonal processes, such as modelling, identification, and social learning. He argued that these do not sufficiently account for non-social aspects of the environment, including the substantive nature of the activities engaged in, and he delimited the concept of environment to a single immediate setting containing the subject. His concern with the latter was that it could distort the attribution of the determinants, processes, and potential of human development because it does not consider a larger scope of potential effects.

5. See Glewwe and Miguel (2007) for an authoritative review of several studies documenting a link between the health and educational outcomes of children.

6. Referred to in this paper as "psycho-social competencies" to emphasize that this is an important area of child development in its own right that contains several distinct domains with associated skills and states and is not merely an umbrella for everything that is not cognition. These are also referred to in some disciplines as socio-emotional skills.

7. Young Lives <[www.younglives.org.uk](http://www.younglives.org.uk)> is a longitudinal study of childhood poverty in Ethiopia, India (Andhra Pradesh state), Peru and Vietnam. It follows nearly 12,000 children in two age cohorts. Currently, three rounds of household-based data have been collected and are available for public use.

8. The authors use self-esteem to refer to an individual's feelings of his or her own merit and competence and follow Albert Bandura's definition of self-efficacy as "belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (1997, 31). Aspirations refer to an individual's desired goals or objectives. The hypothesis is that individuals who perceive themselves to be more worthy and efficacious and with higher aspirations are more motivated and likely to achieve desired goals.

9. This interaction between allied social science disciplines can be an advantage for both theoretical and empirical work in economics. Although this review is overwhelmingly focused on recent empirical evidence, Mookherjee, Napel, and Ray (2010) provide an interesting theoretical contribution in which they model how parental aspirations influence investments in children and how these aspirations are themselves affected by social interactions with peers.

10. Other studies from developing countries that examine the long-term impacts of early childhood shocks include Alderman et al. (2001), Glewwe and King (2001), Glewwe, Jacoby, and King (2001) and Maluccio et al. (2009).

11. The phenomenon of catch-up growth and older available evidence is reviewed in Golden (1994) and [Boersma and Wit \(1997\)](#).

12. There are two important points to note about the [Currie and Almond \(2011\)](#) review: it relies mostly on evidence from OECD countries, and the primary focus is on remediation in cognitive skills and behavioral outcomes. Their insight on the possibility of remediation in these outcomes is shared by the child development literature ([Rutter 2012](#)).

13. See also [Schott et al. \(2013\)](#), who present factors at the household and community levels that are associated with catch-up in the four Young Lives countries. Although this evidence is correlational, it may hold valuable information for designing possible interventions to aid recovery from stunting.

14. See also several related contributions based on Young Lives data, particularly [Lundeen et al. \(2013\)](#), who document that the incidence of recovery from stunting between 5 and 8 years ranged from 27 percent in the Vietnamese sample to 53 percent in the Ethiopian sample; [Crookston et al. \(2013\)](#), who document that changes in growth after infancy are significantly associated with test scores and being in the right grade-for-age at the age of 8 years; and [Fink and Rockers \(2014\)](#), who, similar to [Crookston et al. \(2010\)](#), document that children who recover from stunting show smaller cognitive deficits compared to persistently stunted children.

15. These recent explorations of the effects of aggregate economic shocks on infant mortality highlight the importance of not uncritically generalizing findings from research on childhood in OECD countries. The relationship between economic cycles in OECD countries has been shown to be the opposite of the relationship documented in these papers. Recent longitudinal research on the US, for example, finds that child mortality is *lower* in recessions and *higher* during periods of growth. This may reflect the substitution of time away from the labor market into health-preserving activities by mothers during recession ([Dehejia and Lleras-Muney 2004](#)). Note, however, that this does not negate the possibly important role of heterogeneity between developing countries. Miller and Urdinola (2011) find that the relationship between global coffee prices and infant mortality in Colombia (a major coffee exporter) is similar to the results of economic shocks in the US: infant mortality is lower when coffee prices are low and higher when coffee prices are high, a result that is in stark contrast to those of [Bhalotra \(2010\)](#) and Baird, Friedman, and Schady (2011).

16. These studies highlight that shocks, even in middle childhood, can have large negative impacts, and vulnerability in many key domains remains even beyond early childhood.

17. Child work is not inherently damaging to children, but it can be harmful under certain conditions and may detract from children's schooling. Beegle, Dehejia, and Gatti (2009) show that child work at around 10 years of age in Vietnam, arising in response to changes in rice prices, resulted in significantly lower educational attainment, a lower probability of being enrolled in school, and a much greater probability of taking up wage labor five years later.

18. Whether income growth translates into improvement of outcomes for children depends crucially on questions of intra-household allocation of resources. As our previous discussion highlights, it is not obvious that all children will benefit from these gains (for example, there may be important intra-household differences based on gender or birth order), but, on aggregate, the rise in incomes is a cause for optimism.

19. A similar pattern has been documented by Woodhead, Frost and James (2013) using Young Lives data from Andhra Pradesh.

20. [Dercon and Singh \(2013\)](#) investigate gender biases across 13 different indicators relating to nutrition (height-for-age, weight-for-age and BMI-for-age z-scores); education and achievement (enrollment as well as test scores in arithmetic and the Peabody Picture Vocabulary Test); educational aspirations (reported by children and parents); subjective well-being (reported by children using the "ladder of life", a measure of life satisfaction); and four psychosocial competencies (agency and efficacy, trust, pride and self-esteem, and sense of inclusion).

21. In India, for example, even in rural areas where private schooling accounted for only 10 percent of the enrollment in 1993 ([Kingdon 2007](#)), its share had risen to approximately 25 percent of total enrollment by 2011 ([Pratham 2012](#)). The availability of private schools is considerably higher in urban areas. As the data from the India Human Development Survey (2005) document, in many

populous states such as Andhra Pradesh, Uttar Pradesh, Punjab, Haryana and Madhya Pradesh, the share of private schooling is considerably higher than the share of state schools in the enrollment of 6- to 14-year-old children in urban areas.

22. Our discussion above should not be taken to imply that rapid changes in the incentives to invest in education have not been documented previously. For example, [Foster and Rosenzweig \(1996\)](#), using panel data on Indian households in 17 states, document that the Green Revolution raised returns to education, which increased private investments in education. The change from the pattern demonstrated there and the pattern documented in [Munshi and Rosenzweig \(2006\)](#) is that in the latter, returns to a particular type of education (English-medium education) have grown much faster post-liberalization than returns to vernacular education. Furthermore, there are documented heterogeneities in the rates of return for different types of children (boys and girls). These results, and the previous results of [Foster and Rosenzweig \(1996\)](#), highlight that to understand the impact of aggregate economy-wide changes on educational investments (or investments into childhood more broadly), we need to focus on heterogeneous impacts across children in different categories.

23. Although they do not explicitly evaluate the effect of television availability on children's welfare, it is quite plausible that the rapid decline in fertility documented in the paper has direct implications for the welfare of children in these households. The general literature on the relationship between family size and investments in children (the "quality-quantity trade-off") is vast and has used several strategies to examine this effect, including unanticipated shocks to fertility from twin births ([Rosenzweig and Wolpin 1980](#)) and the sex composition of the first two children ([Angrist and Evans 1998](#)). For example, [Jensen \(2012b\)](#) demonstrates a direct link between higher fertility and child malnutrition, using secondary infertility as an instrument to correct for endogenous fertility choices.

24. A central concern in their identification strategy is whether the results merely reflect differential trends across communities that received cable TV and those that did not. They argue convincingly that there is no evidence of pre-existing trend differences between communities that received access to cable TV during the period of their study and other communities and that the results are causal.

25. Olken does not differentiate between the effect of radio and television reception in this study but rather reports the combined effect. In his data, television and radio reception are very strongly correlated even within districts.

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# Can You Help Someone Become Financially Capable? A Meta-Analysis of the Literature

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*This paper presents a systematic and comprehensive meta-analysis of the literature on financial education interventions that focuses on financial education studies designed to strengthen the financial knowledge and behaviors of consumers. The analysis identifies 188 papers and articles that present impact results of interventions designed to increase consumers' financial knowledge (financial literacy) or skills, attitudes, and behaviors (financial capability). These papers are diverse across a number of dimensions, including objectives of the program intervention, expected outcomes, intensity and duration of the intervention, delivery channel used, and type of population targeted. However, there are a few key outcome indicators where a subset of papers are comparable, including those that address savings behavior, defaults on loans, and financial skills such as record keeping. The results from the meta-analysis indicate that financial literacy and capability interventions can have a positive impact in some areas (e.g., increasing savings) but not in others (e.g., reducing loan defaults). Financial education, financial literacy, meta Analysis. JEL codes: C93, D03, D14, O12, O17*

A decade ago there was limited interest in the topic of financial literacy. Now this issue is at the top of the policy agenda for national regulators, international organizations, researchers, and private financial institutions. An important reason for the increased attention to financial literacy is the global financial crisis, which highlighted the importance of financial knowledge and skills for consumers. Anecdotal evidence from the crisis immediately suggested that people had taken on financial products—and risks—that they did not fully understand. Empirical studies confirmed this relationship, including [Klapper et al. \(2013\)](#), who utilize data from

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Russia, and Gerardi et al. (2010), who link outcomes in the subprime housing market in the United States with consumers' financial knowledge and skills. Furthermore, Lusardi and Mitchell (2011) present evidence from around the world suggesting that individuals (even in developed countries) have a difficult time understanding basic financial concepts.

While financial literacy can clearly be a factor in avoiding financial risks, it can also be important for taking advantage of financial opportunities. Studies have shown that financial knowledge is linked to higher levels of retirement planning and savings (Behrman et al. 2012; Alessie et al. 2011; Bucher-Koenen and Lusardi 2011; Lusardi and Mitchell 2012; 2007); investment decisions such as diversification (Abreu and Mendes 2010) and investments in equities (Van Rooij et al. 2011; Christelis et al. 2010); credit management and satisfaction; and mortgage performance (Gerardi et al. 2010; Quercia and Spader 2008; Ding et al. 2008).

At the lower end of the financial market where consumers are seeking their first access to financial products and services such as opening basic accounts or borrowing small sums of money, there is also evidence that financial literacy may be important. Cole et al. (2011) find that the use of insurance in India and bank accounts in Indonesia are both linked to higher levels of financial literacy. Using data from *Finscope*<sup>1</sup> in Africa, Honohan and King (2009) likewise find a positive relationship between financial knowledge and the use of financial products and services.

There is also ample evidence that financial literacy levels are relatively low across a wide range of countries and negatively correlated with per capita income,<sup>2</sup> suggesting that while financial literacy is important for engaging in financial markets, it remains low for many consumers. It is thus not surprising that a recent informal global poll of country officials and financial sector experts—the Financial Development Barometer<sup>3</sup>—undertaken for the 2014 World Bank *Global Financial Development Report* (GFDR) identifies financial education as the leading response to the question “What is the most effective policy to improve access to finance among low-income borrowers?”

What remains to be proven is whether this faith in financial education is substantiated by evidence of impact. Are there approaches to teaching financial skills or modifying financial behaviors through educational programs, training, or other outreach activities that have reliable, positive results? The objective of this paper is to analyze the evidence of impact for financial literacy and capability interventions through a systematic review of the evidence. The review includes the use of meta-analysis, a statistical technique that pools data from different studies to test for significance in the enlarged sample of observations this creates. This paper is different from most previous narrative reviews in that it focuses exclusively on research that analyzes the impact of financial education interventions. Key characteristics of 188 papers are coded to create a rich data set with the characteristics of the interventions, as well as statistical information on the impact of programs on outcome

variables such as general savings, retirement savings, and credit performance. This data set is then used for a descriptive analysis of the literature and for empirical tests using meta-analysis.

More than 140 of the 188 studies identified through this review indicate that financial education can be helpful in improving financial outcomes, although it is important to note that most of these employ non-rigorous empirical methods and may suffer from selection bias or other econometric concerns. Some of the more recent studies employ rigorous analytical tools such as randomized control trials (RCTs), and the impacts reported across these papers are more reliable. Examples of positive impacts come from [Cai et al. \(2013\)](#), who find that financial education sessions for rural farmers increase take-up rates for insurance in China. In South Africa, financial messages delivered through a popular soap opera are shown to improve desirable financial behaviors such as borrowing from formal financial institutions rather than from higher-cost options such as retailers ([Berg and Zia 2013](#)). In India, [Sarr et al. \(2012\)](#) find that financial education increases the use of a no-frills savings account even months after the intervention ended. In the United States a non-RCT study of the Money Smart financial education curriculum by the [FDIC \(2007\)](#) finds that participants are more likely to open deposit accounts, save money, and adhere to a budget.

However, our review of the literature also finds numerous papers (approximately 40 in our sample) citing either no impact or only a modest impact from the intervention, which may not justify the cost of financial education. [Cole et al. \(2011\)](#), for example, find that a financial education intervention among unbanked consumers in Indonesia is less effective at stimulating savings accounts than a small monetary incentive. Likewise, results from a media intervention in Kenya that included comics with financial literacy messages find no significant impact on key variables, including savings rates ([Eissa et al. 2013](#)). In the United States, [Cole et al. \(2013\)](#) evaluate mandated personal finance courses in high schools and find that they have no effect on financial outcomes, while training in mathematics is shown to benefit students through greater levels of financial market participation, more investment income, and better debt management. Similarly, [Hung and Yoong \(2010\)](#) study retirement savings behaviors of adult populations in the United States and find that unsolicited financial advice has no impact on savings and investment decisions.

Pooling and systematically studying these varied impacts through meta-analysis has the potential to provide valuable policy insight on what works in financial education, as well as to help identify where the research gaps lie. Yet the diversity of the research in this field thus far makes such comparison—and drawing conclusions on effectiveness—difficult, even if it is a logical response to the varied and constantly evolving needs in this area.<sup>4</sup> Variation in context, purpose and duration of training, target populations, and outcome measures is evident in the online

appendix 1, which presents brief information on each study, as well as in the descriptive statistics for the 188 papers, which are presented in main analysis of the paper. Nevertheless, our meta-analysis presents some key insights after controlling for observable differences across studies. Importantly, we find that financial education can affect financial outcomes such as savings and improved record keeping, but does less well in preventing negative outcomes such as loan defaults. These results suggest a role for financial education in improving behaviors where individuals have the ability to exert greater control. Arguably, loan default is imposed by external agencies (banks or other financial providers), and hence can only be avoided secondarily or over the long term if financial education leads to more prudent borrowing decisions. Savings and record-keeping, in contrast, are immediate and primary decisions that can be acted upon by targeted consumers.

The only other paper that uses meta-analysis to evaluate the literature on financial literacy and capability (Fernandes et al. 2014) discusses another potential source of variance in the results for financial education interventions—omitted variables related to psychological traits such as impulse control, delayed gratification, and self-efficacy. These authors perform meta-analysis on both financial literacy and capability interventions, which they term “manipulated financial literacy” and on observational literature that links levels of financial knowledge or literacy to outcomes (termed “measured financial literacy” by the authors). Their findings indicate that measured financial literacy has a greater impact on financial outcomes than does manipulated financial literacy. These authors posit that omitted variables are a source of the different results because people with certain psychometric profiles are more likely to engage in activities that increase their financial literacy levels and improve their financial outcomes, but these behaviors (self-control for example) are not the typical focus of financial education interventions that focus on imparting financial knowledge. Yet, while psychometric measures may indeed explain selection into desirable financial behaviors and choices, they are unlikely to be the only omitted category. Moreover, it is difficult to identify empirically whether such measures are the only (or even primary) omitted driver of financial choices.

Our paper does not take a stand on the source of statistical bias in observational studies. Instead, we carefully classify and separate observational studies from impact studies, and more than double the number of financial education impact studies that are available for meta-analysis from slightly more than 80 in the case of Fernandes et al. (2014), to 188 (all papers cited in Fernandes et al. (2014) are also included in this paper). Another key difference from Fernandes et al. (2014) lies in the choice of variables and statistical rigor in the meta-analysis. As indicated previously, there is great diversity in the sample of studies, which makes it impossible to calculate an effect size that is meaningful and comparable across the entire literature, yet Fernandes et al. (2014) estimate an effect size that includes interventions that are fundamentally different across many characteristics such as how outcomes

are measured (binary or continuous), targeted populations, and mode of delivery. We adopt a more conservative approach and carefully screen and compare studies with similar outcome measures and intervention characteristics. This greater precision comes at a cost, however, as we are only able to compare binary outcomes for a subset of studies that pass our comparability screening. Nevertheless, this careful analysis allows us to classify interventions among key topics such as savings, record keeping, and debt management, thus yielding more nuanced results in terms of the evidence of impact. Investigating the details of interventions and outcome measures in this way additionally allows us to present important stylized facts about financial literacy programs.

This paper proceeds as follows. Section II describes the systematic review process including a brief discussion of meta-analysis and the rationale for using this tool for such a diverse body of literature. In this context, we examine previous narrative reviews and the literature they cover to help us understand why their findings on the impact of financial education have not been consistent. Section II also discusses the search approach used to identify relevant studies in journals, working papers, and other publications, as well as the inclusion and exclusion criteria. Section III provides information about the data set, including both the program descriptions and outcome variables that were identified. Section IV presents the results of the meta-analysis, its potential unique contribution, and its limitations. Section V concludes. Appendices 1 and 2 provide supplemental materials on the meta-analysis, and appendix 3 summarizes ways to strengthen the research protocols of financial literacy studies.

## The Systematic Review Process, Including Meta-Analysis

This paper uses a systematic review process, including meta-analysis, to compare and contrast the findings of a large body of literature on the impact of financial literacy and capability interventions. The systematic review includes five steps:

- 1) Hypothesis
- 2) Search approach and inclusion/exclusion criteria
- 3) Collection and coding of data
- 4) Statistical analysis (meta-analysis)
- 5) Conclusions.

A systematic review of a diverse body of literature helps us to identify patterns in the data and develop insights on the nature and quality of divergent evidence. The descriptive statistics presented in the next section are based on the coded data from the 188 studies of financial education interventions, and provide valuable insights on what has been studied thus far, the research methods that have been used, and

initial insights on the evidence. However, there are limits to what can be gleaned from these types of rough comparisons.

Meta-analysis was developed to facilitate a statistically rigorous comparison of data across independent studies. By pooling data and statistical information across studies, papers that may individually point to inconclusive or contradictory results may together yield a statistically significant finding. If there are adequate data available on means and standard deviations in the individual research papers, it may also be possible to identify an effect size which indicates the magnitude of change that may be expected. From a policy standpoint, meta-analysis can help enhance the external validity and general application of policy interventions, such as financial literacy programs, and hence can serve as an important tool in developing and achieving specific development goals.

There are two general types of meta-analysis models: fixed effects and random effects. Fixed effects models assume that the studies are all roughly equivalent in terms of the intervention studied, and thus are estimating the same outcomes. This means that data can be pooled and that larger studies with more observations are more heavily weighted than smaller ones. Medical drug trials are common forms of fixed effects meta-analysis since the interventions are identical (provision of a drug or pill) and the outcomes are similar, observable, and uniformly measurable.

Random effects models estimate the mean of a distribution of true effects but assume that each study is measuring a different effect size as the interventions and/or populations are not equivalent. Weights in the random effects models are more balanced across studies and those with large sample sizes do not dominate the results as they would in a fixed effects model. There is only one source of error in a fixed effects model—random error—and as the sample size grows this tends toward zero. In the random effects model, however, there are two sources of error—random error within populations and error in estimations of the true effect size across studies. This means that a large number of observations in a study address only the first kind of error—within population—and not the estimation error across studies, which requires a robust number of studies to increase the precision of the estimate.

The diverse nature of the underlying studies on financial literacy and capability clearly leads to the use of a random effects model.<sup>5</sup> When looking at the available studies and data for this exercise, it is reasonable to assume that there are still substantial sources of error from both limited population sizes for specific interventions and inadequate data on the scope of interventions and studies that are available for analysis. The effect sizes that are estimated in the regression analysis presented in this paper, therefore, should not be taken as a true measure of the effect size for financial literacy and capability interventions. This is not to say that the measures of effect size contain no information. They do provide an aggregate measure of impact and are indicative of the state of evidence, but at the same time should not be seen as definitive proof for or against the null hypothesis (defined below) on financial education activities.

## Hypothesis

The null hypothesis for this study assumes that financial literacy and capability interventions do not affect the financial knowledge and/or financial outcomes of people who are subject to the treatment.

## Search Approach and Inclusion/Exclusion Criteria

For this paper we undertook a comprehensive search of a particular segment of the literature on financial literacy and capability—papers that evaluate the impact of interventions designed to strengthen financial knowledge and behaviors. A broad definition of “financial literacy and capability interventions” was used for this review, which included any kind of intervention (intentional or not) that would impact financial knowledge, attitudes and/or behaviors for individuals.

We identified papers meeting the criteria through several sources:

- 1) Search of peer-reviewed papers in Econlit under the broad terms “financial awareness”, “financial capability”, “financial competence”, “financial education”, “financial knowledge” and “financial literacy” between January 2000 and September 2013.
- 2) Search of papers included in previous literature reviews (starting with literature reviews published in 2007 – see table below).
- 3) Recent studies completed within the World Bank, many of which are listed on the website [finlitedu.org](http://finlitedu.org).
- 4) Websites that are likely to include relevant studies, including the OECD, World Bank, Global Partnership for Financial Inclusion, and Alliance for Financial Inclusion (AFI).

The process of evaluating studies for inclusion or exclusion was performed initially through a review of paper abstracts in the case of both papers identified through Econlit and those cited in previous literature reviews. For World Bank studies and research found on websites, the papers themselves were typically available and reviewed directly. All papers that reported on an intervention are included in the online appendix 1, even those which lacked sufficient rigor or statistical results for use in the meta-analysis portion of this paper. Descriptive information from these papers is included, where possible, in the descriptive statistics presented in the following section of the paper. In order to reduce the number of studies to review to a manageable size and to focus the evidence on research results that had been screened for quality, only articles from peer reviewed journals were included from Econlit, and only from January 2000 to September 2013.

One of the insights from the Econlit search on these key terms is that a relatively small percentage of the literature involves an evaluation of some kind of financial literacy or capability intervention or program. Even for the terms “financial education” and “financial literacy”, only about 10% of the studies in these categories evaluated the effectiveness of an intervention. Searches of “financial awareness” and “financial competence” yielded no impact evaluations, and even the widely used term “financial capability” produced only two papers for the database out of a total number of 77 citations. With the exception of the search for “financial literacy,” a vast majority of the papers listed under the searches conducted on Econlit are not about personal financial literacy or capability.

Many of the excluded papers analyzed the importance of financial literacy or knowledge on various financial and non-financial outcomes. Using the terminology in [Fernandes et al. \(2014\)](#), these are considered “measured financial literacy” papers; they were excluded because they did not test an intervention but they do provide valuable insights on the importance of financial literacy and knowledge on outcomes. Studies were included when they discussed any program, educational outreach, media intervention or other type of communication or training for consumers that could either strengthen knowledge (financial literacy) or modify attitudes and behaviors (financial capability). A detailed table presenting the reasons for exclusion for the various search terms in Econlit is provided in a supplementary appendix on the *WBRO* website, along with full references and a table describing the 188 included papers.

The review of nine previously published narrative reviews identified more than 500 unique references that included more than half of the 188 papers listed in the online appendix 1. The references cited by these nine narrative literature surveys, however, have relatively little overlap. This can be seen by calculating the Pearson correlation coefficients and associated  $R^2$  terms for reference lists across the literature survey papers.<sup>6</sup> In only two instances do the survey papers have enough common papers to result in a correlation coefficient above 0.2 ([Martin 2007](#) with [Hathaway and Khatiwada 2008](#), and [Collins and O’Rourke 2010](#) with [Agarwal et al. 2010](#)), which is a relatively low level of correlation. The  $R^2$  terms (which is simply the squared term of the correlation coefficient), are sometimes called the coefficient of determination and provide another indication of the strength of the relationship among the variables, or in this case, the overlap in articles surveyed. Approximately 55% of the  $R^2$  figures are below .01, indicating a very weak relationship and relatively little overlap across studies.

The limited overlap in terms of the literature being reviewed helps to explain the variety of findings in these narrative literature reviews. The [Hathaway and Khatiwada \(2008\)](#) summary of the findings is typical: “Unfortunately, we do not find conclusive evidence that, in general, financial education programs do lead to greater financial knowledge, and ultimately, to better financial behavior. However,

this is not the same as saying that they do not or could not – it is just that current studies, while at times illustrating some success, leave us with an unclear feeling about whether we can grant a blanket application of these results specifically, to financial education programs more generally.”<sup>7</sup> Lusardi and Mitchell (2013) provide the most comprehensive and recent of the narrative literature reviews with nearly 200 references. These authors offer a cautious endorsement of financial education activities but also refer to the issues of endogeneity and omitted variables: “Research on efforts to enhance financial literacy suggest that some interventions work well, but additional experimental work is needed to explore endogeneity and establish causality.”<sup>8</sup>

While the search on Econlit was limited to papers that had appeared in peer reviewed journals, this exclusion criteria was not used for the many articles identified through the survey papers or from other key sources (websites, World Bank research) in order to increase the coverage of available research on this topic. Many of the papers included in the analysis have been written in the past few years and thus many (about one-third, i.e., 34%) are still in working paper format, compared with 28% from peer-reviewed journals. Apart from universities, the *National Bureau of Economic Research* and the World Bank are the main sources of working papers cited here.

There are also numerous papers, briefs, and reports that are released by the many public, private, and non-profit organizations involved in this topic but which are not published through the academic press and are subject to peer review (38%). Known as “gray literature” these documents include research reports written by academics and researchers in think-tanks evaluating specific curricula using statistical methods, and are thus also included in this literature search. However, since the financial education provider may often also be the funder for the evaluation, these papers are coded separately from working papers published through academic institutions where such conflicts of interest are less likely to occur.

## Publication Bias

The first step in any systematic review involves identifying relevant research so that conclusions are based on a comprehensive body of evidence that is not biased in some important way. If researchers or journal editors have a tendency to publish studies with a certain type of result (e.g., studies showing that financial education programs are effective in changing behavior, rather than studies showing no impact), this can result in one form of publication bias. The fact that many studies in the financial education literature (and in social science research more generally) involve little-known research projects with small sample sizes further exacerbates this problem since the broader community of practice may not be aware of instances

where research results are not published or widely disseminated. By contrast, medical research trials involving large public grants and large sample sizes are under more scrutiny and pressure to share results. Including studies from the “gray literature” that have not been published in journals can help to reduce the impact of this type of publication bias.

In addition to including gray literature in the systematic review, this paper reviews all of the impact evaluations cited in previous narrative literature surveys as well as all interventions in the recently released meta-analysis by [Fernandes et al. \(2014\)](#). Further, papers were identified through searches of broad terms in Econlit, on websites, and through World Bank research. As such, this paper encompasses a broader and more comprehensive analysis of the literature than previous reviews, which reduces the likelihood of this type of publication bias. The online materials for this paper include evidence from an econometric test (metafunnel in Stata) for publication bias to help illustrate the extent to which the review may be affected by missing studies.

Failing to publish the results from research is perhaps the most well-known type of publication bias, but it is not the only one. According to [Rothstein, Sutton and Borenstein \(2005\)](#), other types of publication bias (or dissemination bias) that can negatively impact a systematic review include the following: language bias (including only research in a certain language); availability bias (limiting consideration to research that is readily available to the researcher); cost bias (including only research papers that are available for free or at a low cost); familiarity bias (limiting the research to papers in one’s own discipline); and outcome bias (reporting selectively on the empirical data in papers to highlight certain types of results). These various types of publication bias are not considered significant issues for this review. In terms of language bias, the vast majority of research on this topic internationally has been done in the United States (perhaps due to the greater level of consumer lending and less heavily regulated financial markets), and in the English language. Further, the search process did not use language as a criterion for inclusion and where non-English language research was identified, efforts were made to include these studies. In terms of availability, studies on financial literacy and capability are generally publicly available through online databases available to academic researchers or on websites of relevant NGOs, public agencies, or multilateral organizations. No study was eliminated due to cost consideration, and in some cases authors were contacted directly to request copies of articles not readily available online (in the few instances of older research articles). Also, this review extends beyond typical economics journals to include research published by academics in consumer and family sciences, education, sociology, and psychology. All empirical findings are reported where a financial intervention was an explanatory variable in a regression model explaining a financial outcome or behavior, including financial knowledge gains.

# A Systematic Review of Financial Literacy and Capability Interventions Using Meta-Analysis

The extensive literature search described in the previous section resulted in 188 journal articles, reports, and other publications that analyze the effectiveness of financial education interventions. The rigorous meta-analysis of this literature resulted in a unique database that enables us to more precisely describe the types of financial education programs or interventions that have been evaluated, as well as their reported impacts.

The main relationship that is tested through meta-analysis in this paper is whether financial education interventions have an impact on outcome variables of interest such as general savings levels, retirement savings, record keeping, and credit performance. If data were available, outcome variables could extend to other economic indicators of well-being such as total assets, consumption, or income; or on the other hand, to measures of vulnerability such as declaring bankruptcy or losing major assets such as a home or land.

The key characteristics of financial education interventions are also recorded. In the context of meta-analysis these data are referred to as moderator variables because they help to explain the strength of the relationship between the predictor variable (in this case financial education) and the outcome. Moderator variables that are collected for this paper include information on the financial topic that is addressed (i.e., savings, credit, etc.), the type of delivery channel used (classroom instruction, mass media, etc.), the country where the intervention occurred, the location of the intervention (school, workplace, etc.), the number of hours of instruction, whether teacher training was involved, and whether the intervention focused narrowly on the individual or extended to the family or broader social setting. Another important data point that was collected through this exercise concerned the evaluation methods used. In particular, the dataset distinguishes whether studies used a randomized controlled trial (RCT) design.

## The Dataset—Moderator Variables

The vast majority (98%) of studies on financial education interventions conducted prior to 2008 identified through this search focused on the United States. This started to change after 2008, when the financial crisis focused attention on the importance of this topic not only in the United States, but around the world. Indeed, only 54% of later studies (2009 forward) in the dataset focus on the United States. The World Bank also contributed to the growth of literature on the impact of financial education interventions in developing country markets, with the institution's researchers contributing to more than 20 papers on this topic since 2008. Table 1

**Table 1.** Descriptive Statistics for 188 Studies in Dataset (percentages of total)

|  | Africa                         | Asia                           | Europe            | Latin America          | United States        | Other           |           |       |  |
|--|--------------------------------|--------------------------------|-------------------|------------------------|----------------------|-----------------|-----------|-------|--|
| <b>Location of intervention</b>          | 6                              | 9                              | 2                 | 6                      | 75                   | 2               |           |       |  |
|  | Business Management            | Credit Counseling              | Mixed topics      | Mortgage               | Savings & Retirement | Other           |           |       |  |
| <b>Financial topic taught</b>            | 7                              | 9                              | 43                | 5                      | 30                   | 6               |           |       |  |
|  | Course taught in person        | Individual counseling          | Mass media        | Mixed methods          | Online               | Phone           | Print     | Other |  |
| <b>Delivery channel</b>                  | 54                             | 9                              | 5                 | 18                     | 3                    | 3               | 6         | 3     |  |
|  | Community / third party        | Financial institution          | High school       | Home-based             | Mixed                | University      | Workplace | Other |  |
| <b>Setting for instruction</b>           | 24                             | 11                             | 14                | 8                      | 14                   | 4               | 19        | 5     |  |
|  | Less than or equal to two      | Three to six                   | Seven to ten      | 11–20                  | 21–50                | More than fifty | Varied    |       |  |
| <b>Intensity of intervention (hours)</b> | 16                             | 11                             | 11                | 11                     | 6                    | 2               | 43        |       |  |
|  | Less than or equal to one week | Between one week and one month | One to six months | Six months to one year | More than one year   | Varied          |           |       |  |
| <b>Duration of intervention</b>          | 33                             | 5                              | 17                | 5                      | 7                    | 32              |           |       |  |

provides data on a number of characteristics of the studies, including region where the intervention took place. Africa, Asia, and Latin America are the regions outside the United States with the largest shares of studies in our sample.

A wide range of financial topics are covered by financial education interventions in the literature, which were grouped into six categories in this paper. Interventions that provide information on a variety of financial issues, coded as “mixed” interventions in the data, are the most common type and represent more than 40% of the total sample. Financial literacy programs in the United States are most likely to involve either multiple messages (mixed) or focus on savings and retirement. In developing countries, courses that include business management are among the most common in our sample, as are classes involving multiple messages, with each comprising about one-quarter of the sample; savings and retirement messages are a close third.

The majority of interventions in this sample involve direct contact with an instructor/advisor, typically in a classroom or seminar setting, with a significantly smaller share (9%) involving individualized counseling. In terms of the cost per person reached, these kinds of interventions are likely to be the most expensive. Most interventions studied in the literature also focus on programs using only one delivery channel (classroom, video, phone advice, etc.) although there is widespread awareness in the communications field that a more comprehensive approach using multiple types of media (often referred to as a transmedia or 360° strategy) is more effective. A relatively small number of interventions in the evaluation literature examine the use of mass media. These interventions might include using TV soap operas in Africa and in the United States, both of which show positive results in increasing awareness and shifting attitudes. While financial education interventions are often associated with youth and programs taught in schools, these represent only a relatively small share of the interventions that have been rigorously studied (18% including both high school and university programs).

Most programs that have been evaluated are provided through community organizations or in the workplace. Workplace programs almost always relate to a “teachable moment” when employees have an opportunity to immediately use the information they are gaining, such as signing up for benefits or to save part of their salary. Many community-based interventions also focus on teachable moments, sometimes related to helping people through challenging financial times (such as credit counseling for people finding themselves overwhelmed by debt, or mortgage counseling for prospective home buyers). Community interventions are almost exclusively focused on low income populations or other groups that are seen as financially vulnerable (e.g., battered women).

Most of the financial education interventions that have been evaluated are relatively short in terms of the number of hours of exposure (intensity of the intervention) and the period of time during which the exposure occurred (duration of the intervention). Slightly more than one-third of the interventions (38%) last

10 hours or less, and 16% last two hours or less. These shares are probably understated, as many of the interventions labeled as “varied” in terms of hours of exposure likely fit within the 10 hour or less categories.

More than one-third of financial capability interventions are delivered within one week or less, and more than one-half of interventions are delivered within six months or less. Just as with the classification of intensity, these shares are likely to be underestimates, as many of the interventions listed as “varied” are likely to be of relatively short duration (six months or less). Since repetition is a key element of learning, the limited amount of time typically devoted to interventions may work against stronger impact results.

Overall, there has been a noticeable evolution in the literature on financial education interventions over the past five years. The increase in research beyond the United States mentioned previously has been accompanied by an increase in more rigorous research methods such as randomized controlled trials (RCTs). These RCTs have gone from being relatively rare (through 2008 only 14% of studies in the dataset use RCTs), to frequently used, with 43% of papers from 2009 onward using these rigorous methods. In order to be as comprehensive as possible in reviewing the literature, studies were included that used a variety of research methodologies, not only RCTs.

## Results from Meta-Analysis

This section presents the results from applying meta-analysis statistical techniques on the data assembled on impact evaluations of financial education interventions. Before discussing the specific results it is important to place them in context. The diversity of the literature on financial education interventions means that even where there were common outcome variables (such as likelihood to save) the underlying interventions were each unique, making a direct comparison impossible. The limited number of studies available for evaluation in each of the categories (no more than ten, often closer to five) also reduces the strength of the statistical results. Despite these limitations, it is still useful to systematically and quantitatively evaluate the diverse body of evidence on financial education interventions to provide policy makers with an indication of what is working in financial education, and to provide researchers with insights on where knowledge gaps lie.

## Identifying the Issues That Could Be Tested Using Meta-Analysis

The majority of the 188 papers identified through the search as presenting results of financial literacy or capability interventions include potentially useful statistical data that could be used for meta-analysis. Many papers report on multiple regressions that

are of interest and have multiple outcome variables or results from empirical tests on population subsets based on criteria such as educational attainment, income level, or score on a financial literacy test. In some cases, there are several types of explanatory variables related to the intervention. There are a total of 839 observations from the 188 papers; however, not all contain usable statistical information.

For the meta-analysis of this paper, outcome (dependent) variables were coded among several major categories based on a review of the variable descriptions (savings, borrowing, financial literacy test scores, account opening, and record keeping). Within these categories there was further disaggregation to ensure comparability across studies for the meta-analysis. For example, category “S1” corresponds to the savings category and is a binary variable with a value of “1” if the individual reported having saved, while “S4” is a continuous variable indicating total reported savings during a particular period of time. No effort was made to compare these types of disparate data through meta-analysis. Rather, we used the coding of outcome variables to identify those instances where existing studies had similar impact measurements, and thus could be reasonably combined in a meta-analysis. The list of coded outcome variables is provided with other detailed background information in the supplementary online appendix.

Once the outcome variables were categorized, the data were analyzed to determine the number of studies using this variable, and to further identify those which reported adequate statistical information to allow them to be included in the meta-analysis. We selected five studies as a minimum number for the meta-analysis.<sup>9</sup> Further, each study had to provide the coefficient on the financial literacy/capability intervention and the standard error (or other statistical data from which to construct the standard error), and studies had to have comparable measurement criteria for the outcome variables. For example, studies that reported on a change in a financial literacy score were not used because the studies were based on potentially very different tests and scales for measuring financial literacy, and thus did not represent a true comparison across similar results. This rigorous screening exercise produced just four outcome variables that were used in five or more separate studies.

The four qualifying binary variables listed below were analyzed using meta-analysis:

- S1 = savings reported in past period (1 if positive)—binary
- S11 = contributes to retirement savings (1 if positive)—binary
- B6 = defaulted on a loan (1 if positive)—binary
- R1 = keeps financial records/budgets (1 if positive)—binary

In addition to the development of forest plots with the 4 outcome variables mentioned above, meta-regression analysis was used to determine if specific characteristics of the interventions (the explanatory variables) made significant contributions to results. Due to the small sample sizes, these explanatory variables were tested

individually on each outcome variable. The intensity of the intervention, measured in number of hours of instruction or exposure, was the only continuous explanatory variable that was also widely reported on (with only one or two exceptions) among the studies used in the meta-analysis. The results from the forest plots are presented in the next section and were produced using study-level summary data because individual observations from all studies are not available.

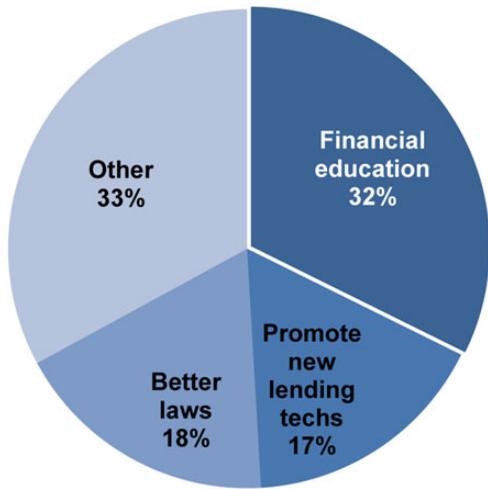
The meta-analysis performed is a two-stage process involving the estimation of a relevant summary statistic for each of a set of studies, followed by the calculation of a weighted average of these statistics across the studies (Deeks, Altman, and Bradburn 2001). In this case, pre-calculated effect estimates and their standard errors from each study are pooled. The meta-analysis includes a forest plot in which results from each study are displayed as a square and a horizontal line, representing the intervention effect estimate together with its confidence interval. The area of the square reflects the weight that the study contributes to the meta-analysis. The combined-effect estimate and its confidence interval are represented by a diamond.

## Meta-Analysis Results

The most common single-issue topic for financial education interventions was savings and retirement. The greatest number of comparable papers also addresses this issue. The forest plot from the research papers that address the impact of interventions on savings are shown below in figure 2. A forest plot graphically displays the treatment effects across multiple studies, with a solid line representing the null hypothesis of no effect from the intervention—in this case from exposure to financial education outreach/training. Intensity refers to the number of hours of exposure. Channel refers to the type of intervention/content delivery method.

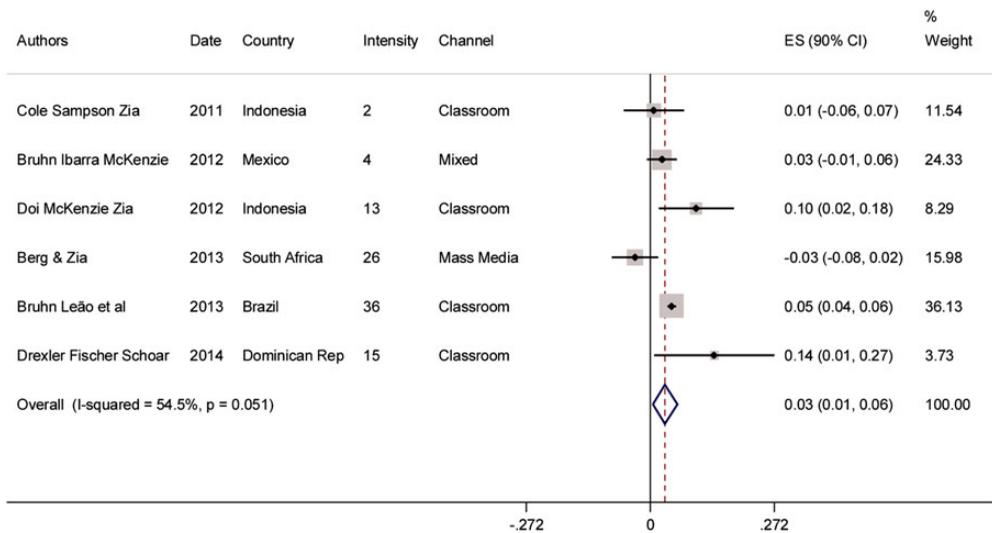
The results are presented with the statistical output from the meta-analysis, as well as with data on important characteristics of the interventions. The weight assigned to each of the six studies is provided in the far-right column and is based on the reported strength of the statistical result in the various studies. The size of the shaded squares for each study reflects their weight in the meta-analysis. The horizontal line passing through the shaded square is the confidence interval for the reported results. When this line intersects the vertical line, which represents the null hypothesis (no effect from financial education), then the null cannot be rejected. In this particular meta-analysis, only two of the six papers reject the null hypothesis and indicate a positive impact on savings from financial education, while four cannot reject the null hypothesis. Taken together, however, the meta-analysis finds that these papers do provide evidence of impact for financial education at the 90% confidence interval. The confidence interval for the pooled data across the

**Figure 1.** “What is the Most Effective Policy to Improve Access to Finance Among Low-Income Borrowers?”.



Responses from the 2012 Survey of the Financial Development Barometer.  
 Source: 2014 Global Financial Development Report.

**Figure 2.** Papers Testing Savings Behavior after Intervention.



Note: Weights are from random effects analysis.

six papers is represented by the diamond at the bottom of the graph and is on the right-hand side of the null hypothesis, rejecting a finding that financial education has no impact on savings behavior. We lack the data on control group means to determine the true effect size for this finding. The meta-analysis in figure 2 was based only on data from RCT studies to increase the quality of the data and thus to strengthen the cross-study analysis.

The I-squared statistic, which is also presented in the forest plots, describes the percentage of variation across studies, which is due to heterogeneity rather than chance. Thus, the I-squared is useful for determining the consistency of results between studies in a meta-analysis. A lower I-squared would indicate more consistency underlying the results of the sample studies, while a higher I-squared would indicate more heterogeneity in this regard. The p-value also provides a way to test for heterogeneity by examining the null hypothesis that all studies in the meta-analysis are evaluating the same effect. A p-value lower than 0.05 would reject this hypothesis at the 5% significance level, and indicate that the results of the studies are more heterogeneous.

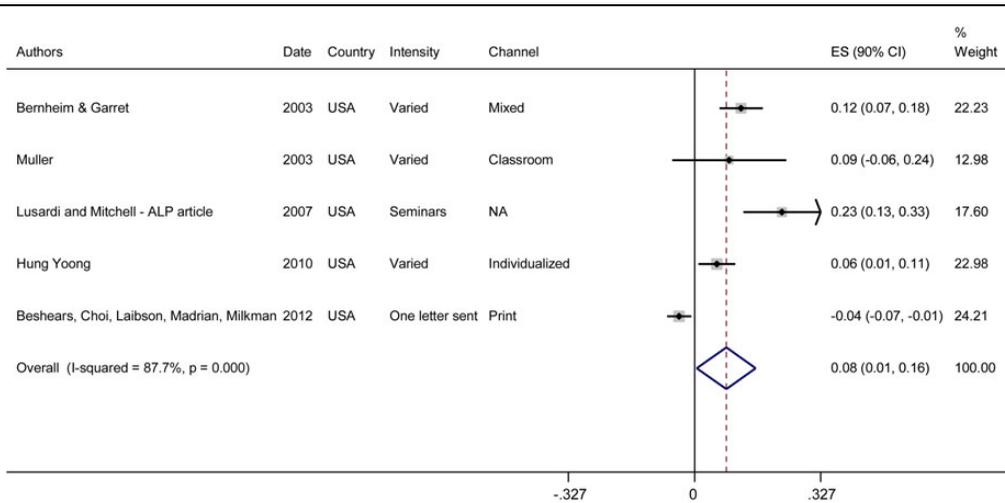
As seen in figure 2 (savings behavior), the I-squared was 54.5%, which is not generally considered a low number (indicating consistency), but which is lower than the I-squared terms for the other outcome variables, indicating *relatively* more consistency among the results for savings. The other meta-analysis results (figure 3—retirement savings behavior; figure 4—loan default behavior; and figure 5—record-keeping behavior) reveal higher I-squared statistics than figure 2, indicating more heterogeneity between the studies involved in their respective samples.

Meta-analysis evaluating the impact of financial education interventions on retirement savings produced similar results at the 90% confidence interval, as shown in figure 3. Five studies were included in this analysis, all based on programs in the United States, none using randomized controlled trials, and only two using exclusively classroom methods.

Care should be taken with the interpretation of these results—the sample diversity and small sample size in both the meta-analysis of general savings and retirement savings require that the results are seen as indicative rather than definitive in terms of the impact of financial education on savings. Still, they provide another piece of information to policy makers interested in the use of financial education for increasing saving, whether for general purposes or for retirement/old age.

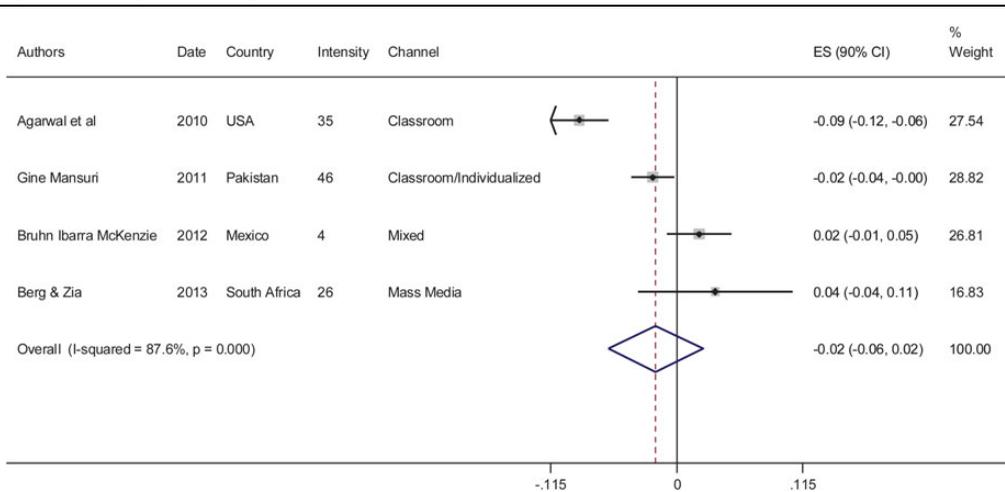
In addition to the topic of savings, numerous studies focused on credit and borrowing and used information on loan defaults after interventions as an outcome variable. The meta-analysis of these studies found the least evidence of impact from financial education interventions. Figure 4 presents this analysis in a forest plot. Even at the 90% confidence interval, the null hypothesis of no impact from the intervention cannot be discarded.

**Figure 3.** Papers Testing Retirement Savings Behavior after Intervention.



Note: Weights are from random effects analysis.

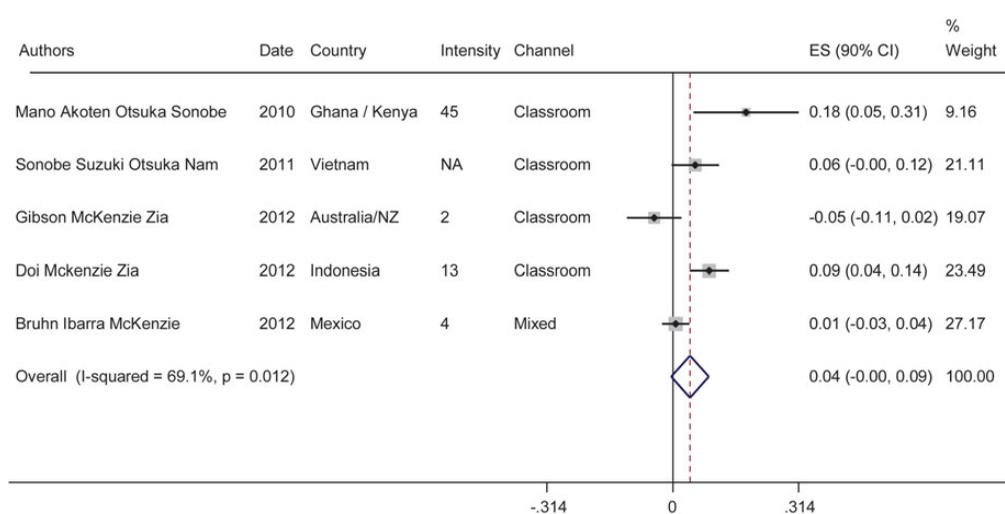
**Figure 4.** Papers Testing Loan Defaults after Intervention.



Note: Weights are from random effects analysis.

While the results from the meta-analysis in figure 4 are significantly heterogeneous and do not show a significant overall effect size, they nevertheless provide interesting insights. Two substantive points of difference between the studies that did and did not show impact lie in whether the education intervention was targeted

**Figure 5.** Papers Testing Record Keeping Behaviors after Intervention.



Note: Weights are from random effects analysis.

around a specific topic and whether there was an associated immediate opportunity to use the newly-acquired information.

The two studies that particularly showed positive impacts on loan behavior were [Agarwal et al. \(2010\)](#) and [Gine and Mansuri \(2011\)](#). The study population in [Agarwal et al. \(2010\)](#) consisted of low-income households with lower credit scores who voluntarily participated in a counseling program provided by a non-profit organization. In this sense, the participants in the financial education intervention gained targeted information (specific to home ownership) and had the immediate opportunity to apply their learning in a relevant context (purchase of a home). In this same light, the study participants in [Gine and Mansuri \(2011\)](#) were microfinance clients who could choose to participate in a business training course and loan lottery, and then apply their learning directly to their microenterprises and loan behavior. On the other hand, [Bruhn, Ibarra, and McKenzie \(2012\)](#) studied the effects of financial education programs that covered a broad range of financial topics in which the population did not experience an immediate circumstance like the purchase of a home or the financing of a business in which they could apply their learning. [Bruhn, Ibarra, and McKenzie \(2012\)](#) evaluated a broad-based financial education program in Mexico, and among other factors, the diverse variety of topics covered and lack of a “teachable moment” to apply the learning may have contributed to the lower reported effectiveness of their program on loan default behavior. Similarly, while loan default was an outcome measured in [Berg and Zia](#)

(2013), the topic was not central to their intervention, which focused on source of borrowing (formal vs. retail credit) and gambling behavior.

The final meta-analysis relates to the impact of financial education on record-keeping. Record keeping and tracking expenditures are often cited as critical elements of gaining control of one's finances, much the way that many fitness and diet programs focus on recording eating and exercise habits to control weight and improve health. This is a behavior that is fully under the control of the individual as compared to decisions to default or even to save money, which may be influenced by factors outside of one's control such as unexpected illness (and medical fees), loss of a job or other problems leading to financial distress.

The forest plot and regression results (figure 5) combine data for record keeping related to both personal finance and to microenterprise or business records. This is necessary due to the small sample size, but there are also reasons to believe that effects may be similar across these two types of interventions. Microenterprises frequently commingle finances between the business and individual owner, so record keeping for a business is likely to include some common elements with personal financial management facilitating comparisons between these two types of interventions.

The meta-analysis presented in figure 5 indicates that financial education may positively encourage record keeping behaviors, although the meta-analysis results are not quite significant at the 90% confidence interval ( $p = 0.134$ ). The effects are weighted fairly evenly across the studies, which involve an unusually diverse set of country cases (Ghana/Kenya, Vietnam, Australia/New Zealand, Indonesia, and Mexico) but which use, with one exception, classroom methods.

Utilizing the meta regression framework, we were also able to analyze the relationship between the intensity of the treatment (in hours of instruction/exposure to the intervention) and the outcome of financial behaviors for savings, loan default, and record-keeping.<sup>10</sup> The corresponding graphs for these exercises can be found online at the WBRO website. While the results were not statistically significant in part due to the small number of observations, they nevertheless provide a sense of the directional relationship between each outcome variable and the intensity of the associated treatment intervention. The overall trend line suggests no direct relationship between intensity of treatment exposure and impact on savings behavior. However, upon closer inspection of the individual data points, we can see that there is a positive relationship between hours of treatment exposure and impact on savings up to about 15 hours, whereafter impact declines. This result suggests that more instructional time may be important for increased positive impact, but there may also be a point at which diminishing returns set in. This relationship would be a good candidate for deeper investigation and further research.

Findings from the sample suggest a negative association between intensity of exposure and the loan default outcome. Increased exposure to the treatment intervention may reduce the likelihood of loan default, again providing an indication

that more instructional time can lead to greater treatment impacts. Finally, analysis suggests that the intensity of exposure to a financial capability intervention is associated with improved record-keeping behavior. While this finding does not rise to the level of causality, the data here seem to be the most supportive of a relationship between these two variables when compared with the previous regression results. It may be the case that additional instructional time is especially valuable for learning record keeping skills. Another possibility is that regardless of one's financial situation, record keeping can be implemented, whereas savings and loan repayment are more dependent on financial standing. Further study into these initial findings would help focus researchers' efforts to help people achieve financial literacy.

## Conclusions

The 188 papers that were identified for this meta-analysis represent an incredible level of diversity across numerous study characteristics including, importantly, outcome measures. The diversity in both general outcomes (savings, credit performance, record keeping, financial knowledge, etc.) and in how they are measured severely reduces the number of comparable studies for the meta-analysis and meta-regressions. Further, effect sizes are not comparable as typically data on control group means are not available for this estimation from the published works. Where randomized controlled trials have been done, the results of impact appear limited at best, indicating that perhaps omitted variables or publication bias may be present for studies not employing these rigorous methods. With these caveats, some policy insights do emerge.

Our meta-analysis suggests that financial education can impact some financial behaviors, including savings and record keeping. These are both considered fundamental to good personal financial management and are potentially behaviors where individuals can exert greater control than in the case of other outcomes such as loan defaults. From a policy perspective, these behaviors are also relatively simple to target since advocating for regular record keeping and household saving do not necessarily require institutional changes or the creation of new financial products, as would be the case for loans or insurance.

Meta-analysis was unable to provide insights regarding the importance of program characteristics on impact due to the nature of the sample and lack of direct comparability. For example, the intensity (number of hours of exposure) of the treatment was weakly correlated with improved financial outcomes in the case of record keeping, but was not significant in the other specifications of the model. Other characteristics that could reasonably be expected to influence the effectiveness of interventions (delivery mechanism, duration, or period of time during which subjects were exposed to the treatment, location of the intervention such as school,

community, workplace) were not shown to be significant, but the small sample size limits the power of the statistical analysis. These are important factors in creating financial education policy and more research is needed to increase the body of evidence on the types of intervention characteristics and their influence on financial education effectiveness.

Moreover, the difficulty in evaluating this literature for meta-analysis highlights the importance of strengthening and expanding the use of rigorous evaluation methods, not only for comparable research but also to understand policy implications. Researchers should take care to report more complete statistical information so that others can better understand the strength of the findings and the limitations of the results, as well as possibly use the findings in future applications of meta-analysis to this topic. There is also a potential value from defining outcome variables in common terms, including measuring and reporting dependent variables, to facilitate comparisons across studies. To increase the likelihood that these variables could be used in a large number of studies future research should employ simple and replicable definitions and measurement criteria. Using common questions and/or survey instruments such as those developed at the World Bank, DfiD, and OECD in recent years to measure financial literacy and capability in a target population is a step in the right direction and will help increase the availability of comparable data on what is effective in financial education. Finally, new and ongoing research should make use of social science impact evaluation registries undertaken by the American Economic Association and 3ie, to provide a common repository of research for future meta-analyses, as well as avoid issues related to publication bias. The supplementary online appendix 3 details some key steps that could strengthen research protocols in financial literacy studies going forward.

Finally, a surprising and yet common omission among virtually all studies is the analysis of costs and benefits of financial literacy interventions. Likewise, we did not find any discussion of potential alternative methods to achieve the desired outcomes across the 188 articles in this literature, which could help benchmark both costs and benefits. Such analyses could be simple to perform in individual studies, and certainly worthwhile to assess returns to development investments.

## Supplementary Data

The supplemental appendix to this article is available at (<http://wbro.oxfordjournals.org/>).

## Notes

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1. Finscope surveys are nationally representative surveys on financial outcomes and behaviors. The surveys are conducted by Finmark Trust and have thus far been done in 18 countries across Africa and Asia.

2. The 2014 World Bank *Global Financial Development Report* (GFDR) compares national survey data on responses to three common questions used to evaluate financial knowledge—calculation of compound interest, understanding inflation, and diversification of risk. Based on data from more than 30 countries, average response rates were 56% correct for the question on compound interest, 63% for the question on inflation, and 48% for the question on risk diversification. Lower-income countries scored significantly lower than high-income countries—when higher income OECD countries are evaluated separately from the rest of the sample, the difference between the percentage correct on compound interest is more than 20 points (OECD at 65.5%, lower income countries at 44.5%).

3. The Financial Development Barometer is an informal poll available online through the website for the Global Financial Development Report. In total, officials from 21 developed and 54 developing economies participated in the survey. From 265 polled, 161 responded, that is, a 61% response rate.

4. A number of different financial skills and behaviors are needed over the course of one's life. Further, innovation in financial markets can quickly create demand for new skills or make others irrelevant (such as writing checks), and new technologies create new delivery channels for training. Skills required by employed workers in high-income countries, such as investment abilities and pension planning, are irrelevant for low-income consumers in developing countries, further adding to the diversity of interventions present in a global review.

5. In this paper we chose to use a random effects model using the method of DerSimonian and Laird (1986), which is a variation on the inverse-variance method employed in order to incorporate the assumption that the different studies are estimating different yet related intervention effects. The Stata command used is *metan*. This produces a random-effects meta-analysis, and the simplest version is known as the DerSimonian and Laird method. To undertake a random-effects meta-analysis, the standard errors of the study-specific estimates are adjusted to incorporate a measure of the extent of variation, or heterogeneity, among the intervention effects observed in different studies. The amount of variation, and hence the adjustment, can be estimated from the intervention effects and standard errors of the studies included in the meta-analysis.

6. A matrix was created based upon the references in each of these papers, for a total of 536 unique citations. For each of the nine literature reviews, a “1” or “0” was entered to indicate whether the reference was cited in the review. This matrix was then used to calculate the Pearson correlation coefficients and  $r^2$  terms. The survey papers are all listed in the references and indicated with an asterisk (\*).

7. [Hathaway and Khatiwada \(2008\)](#), page 19.

8. [Lusardi and Mitchell \(2013\)](#), page 49.

9. In the case of one of the outcome variables—loan defaults—the number of eligible papers dropped to just four after further review due to the exclusion of a study ([Quercia and Spader 2008](#)), which used a logit model instead of one employing linear probability.

10. Sufficient data on intensity of intervention was not available for the retirement savings behavior variable.

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# Diet Quality, Child Health, and Food Policies in Developing Countries

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Alok Bhargava

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*Although the importance of diet quality for improving child health is widely recognized, the roles of environmental factors and the absorption of nutrients for children's physical growth and morbidity have not been adequately integrated into a policy framework. Moreover, nutrient intakes gradually affect child health, so it is helpful to use alternative tools to evaluate short-term interventions versus long-term food policies. This article emphasizes the role of diet quality reflected in the intake of nutrients such as protein, calcium, and iron for children's physical growth. Vitamins A and C are important for reducing morbidity. Children's growth and morbidity affect their cognitive development, which is critical for the future supply of skilled labor and economic growth. Evidence on these issues from countries such as Bangladesh, India, Kenya, the Philippines, and Tanzania is summarized. The supply of nutritious foods is appraised from the viewpoint of improving diet quality. Finally, the roles of educational campaigns and indirect taxes on unhealthy processed foods consumed by the affluent in developing countries are discussed. Economic development, food policies, diet quality, child health, morbidity, cognitive development, livestock production, educational campaigns, indirect taxation. JEL codes: O12, I15, I25, J10, Q01, Q18*

Analyzing the effects of food intake on health outcomes is a complex topic, partly because of the role of socioeconomic and behavioral factors and because of interdependence in the absorption of nutrients by the human body. Such issues require multi-disciplinary approaches, as recognized in the biomedical and social sciences. [Stigler \(1945\)](#), for example, noted that because “the optimum quantity of any nutrient depends upon the quantities of other nutrients available”, the “ultimate health function will doubtless be very complex”. The efficacy of food policies is likely to

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depend on nutritional knowledge incorporated into the design. For example, approximately 3 billion individuals in developing countries suffer from iron deficiencies (UNICEF/UNU/WHO/MI 1999). Iron intake from animal sources (“heme”) is low, whereas non-heme iron from grains is poorly absorbed due to the presence of phytates. It is essential to exploit interactions between nutrients such as vitamins A and C, which enhance non-heme iron absorption, to devise cost-effective food policies (Bhargava, Bouis, and Scrimshaw 2001).

There are at least four sets of issues that need to be addressed in developing food policy frameworks for analyzing the effects of diet quality on child health. First, although short-term interventions that provide nutritional supplements to children in the settings of randomized controlled trials are common in biomedical sciences, it is essential that such studies facilitate policy making over a longer time frame. Households’ food intakes are influenced by cultural, geographical, socioeconomic, and demographic factors. Thus, the formulation of long-term food policies entails integration of the evidence from short-term studies into a broader framework that recognizes the circumstances that prevail in countries (Bhargava 2008).

Second, the role of environmental factors, such as poor sanitation and hygiene, for children’s physical growth has not been adequately integrated into the policy literature. For example, children in developing countries are unlikely to achieve their full linear growth potential despite adequate food supplies because repeated episodes of diarrheal and other morbidities exacerbate nutrient loss. At the other extreme, height in the Netherlands has surpassed all countries since the Second World War, presumably due to the school milk programs that encouraged and rewarded children for drinking up to five glasses of milk daily by becoming “M-brigadiers” (Dutch School Milk Programs 2011). The programs were accompanied by improvements in public health infrastructure and were discontinued in the 1980s; a reversion to the mean in Dutch heights might be expected in the early 21<sup>st</sup> century (Schonbeck et al. 2013, figure 2). Policy makers need to underscore the absorption of nutrients, which depends not only on food intake but also on infection (Scrimshaw and San Giovanni 1997). Evidence from India indicates that timely vaccination can prevent childhood morbidity and enhance physical growth (Bhargava, Guntupalli, and Lokshin 2011; Bhargava et al. 2014).

Third, diet quality, reflected in the intake of protein and iron, is critical for children’s brain development (Monckeberg 1975). Evidence from developing countries indicates the importance of adequate energy and nutrient intakes for learning (Pollitt et al. 1993) and for physical and mental development, which are intertwined (Bhargava 2008). Moreover, in a globalized economy, children’s cognitive development is critical for the skilled labor force that determines productivity. For example, countries such as Japan, South Korea, and China have been successful in increasing economic growth by investing in children’s education. School infrastructure is important for learning, and school meal programs (Alderman and Bundy 2012)

can help improve diet quality. Although diet quality and school infrastructure are likely to have synergistic effects on cognitive development, cost-benefit analyses may be necessary for an equitable resource allocation in countries where a high proportion of children do not enroll in primary education and thus do not benefit from school programs.

The final set of issues is the availability of nutritious foods at affordable prices for poor households. In countries where stunting is prevalent due to low calcium intakes, for example, higher productivity in dairy farming and efficiency in food distribution systems can improve children's diet quality. The coordination of food production and distribution may be intricate because of conflicting interests (Pinstrup-Andersen 2013), but higher dairy production can increase the consumption of milk products and meats because these foods are appealing to poor households. In contrast, the introduction of new vegetables, such as orange flesh sweet potato containing higher quantities of  $\beta$ -carotene (Hotz et al. 2012), may need to be accompanied by nutrition education programs to increase awareness. Moreover, unhealthy food consumption, such as the consumption of processed foods high in fats and sugars by the affluent, should be discouraged via educational campaigns and indirect taxes because it imposes a negative externality; disproportionately higher medical resources are utilized for treating chronic diseases among the affluent (Bhargava 2001).

The structure of this paper is as follows. Next, the role of cultural, demographic and economic factors that affect diets is outlined, followed by a discussion of the fortification of foods and the sustainability of policies that enhance diet quality. Interventions in developing countries such as Guatemala, Colombia, India, the Philippines, and Uganda are also discussed in this section. Subsequently, methodological issues in the analyses of intake data from food expenditure surveys versus direct measurements are outlined, and the use of Food Frequency Questionnaires for assessing "diet diversity" is discussed (Arimond and Ruel 2004). Then, evidence is presented on children's energy and nutrient intakes using longitudinal data from India, the Philippines, and Kenya. The roles of environmental and nutritional factors that affect child morbidity are outlined, and studies showing the benefits of improvements in environmental conditions for child morbidity are discussed. Evidence on proximate determinants of child morbidity using longitudinal data from the Philippines, Kenya, and Bangladesh is then presented. Further, evidence is presented from a demographic survey in India on the effects of different foods consumed and their frequency on children and women's hemoglobin concentrations.

The importance of diet quality, morbidity, and school environment for children's cognitive development is next discussed. Evidence from Kenya and Tanzania is presented using longitudinal data. The role of livestock production and methods for improving the safety of dairy products are discussed, followed by a discussion concerning the role of educational campaigns for improving diet quality. Indirect taxes

on unhealthy processed foods that are consumed by affluent populations in developing countries for raising additional revenues are discussed, and the policy implications of the evidence presented are summarized.

## The Determinants of Diet Quality and Food Policy Formulation

Food consumption patterns of populations depend on cultural, socioeconomic, and demographic factors that are complex to simultaneously tackle in quantitative analyses. While biological factors such as energy and nutrient requirements influence food intakes, food prices and household incomes affect the intakes in developing countries. Even in developed countries, diet quality is affected by socioeconomic variables though individuals' nutritional knowledge is critical for selecting healthy diets.

### *Socioeconomic and Cultural Factors and Diets in Developing Countries*

Historically, shortages of staple foods such as wheat and rice were widely prevalent leading to hunger and starvation (Dreze and Sen 1990; Fogel 1994). Thus, selling staple foods at subsidized prices has been a popular strategy for governments in developing countries for reducing under-nutrition. The early economics literature on food policies focused on stabilizing prices of staple foods that are a large proportion of households' budgets (Timmer, Falcon, and Pearson 1983). Recent increases in food production have reduced shortages in developing countries, though deficiencies of protein and micronutrients reflecting poor diet quality remain widely prevalent.

In traditional societies, food consumption depends on local crops so that climate is an important factor. For example, rice, wheat, maize, and cassava have emerged as staple foods over the centuries and the choice is influenced by production constraints. An important contribution of economists has been to recognize that behavioral factors affect diets. For example, Gorman (1967) noted that "choices depend on tastes and tastes depend on past choices". Implicit in this phenomenon of 'habit persistence' is that changes in diets occur gradually. If, for example, the price of milk falls in a developing country, then poor parents may gradually increase children's milk intakes. From an econometric modeling standpoint, it is appealing to include previous levels of demand as explanatory variables in dynamic models; longitudinal data are necessary for estimating such models. Additionally, mineral and vitamin contents of foods are "characteristics" that can be incorporated in the models.

Though the effects of prices and incomes on food consumption may not be apparent in developed countries, demand for nutritious foods in developing countries is influenced by food prices and household incomes. Moreover, modeling the effects of food prices on consumption has typically relied on cross-sectional data covering

several geographical regions. In contrast, longitudinal studies, including randomized controlled trials, are often restricted to specific regions for logistical reasons. Thus, analyses of data from longitudinal dietary surveys are useful for estimating the short- and long-run income elasticities of energy and nutrient intakes. The magnitudes of income elasticities are helpful for formulating food policies, particularly when the models incorporate the knowledge from biomedical sciences and nutritional interventions.

### *Food Fortification, Nutritional Interventions, and Food Policies*

Various schemes have been devised for developing countries for fortification of foods with the deficient nutrients such as iodine, calcium, iron, and vitamins A and D (e.g., [Bauernfeind 1994](#)). Moreover, fortified gruels such as “Incaparina” in Guatemala, “Colombiharina” in Colombia, and “Bal-Ahar” in India have enabled increases in micronutrients intakes by children from poor households. Free or subsidized distribution of such foods via non-governmental organizations and/or schools especially in remote areas is likely to improve children’s nutritional intakes above that afforded by household incomes. However, the bioavailability of nutrients such as calcium and iron is often low from fortified foods due to the presence of phytates than from dairy products that are regularly consumed by well-off households in developing countries.

While school milk programs in the Netherlands led to increases in heights within two decades, one would expect smaller gains from interventions such as in Guatemala ([Martorell et al. 2005](#)) providing the fortified gruel due to lower nutrient absorption rates. Similarly, interventions providing iron-dense rice to Filipino nuns showed small effects on ferritin concentrations that are indicators of iron stores ([Haas et al. 2005](#)). Moreover, while introduction of orange flesh sweet potato containing higher  $\beta$ -carotene in Uganda led to significantly higher intakes ([Hotz et al. 2012](#)), the effects on serum retinol levels were insignificant. These findings may have been partly due to inflammations in developing countries that complicate interpretation of data from randomized controlled trials ([Bhargava et al. 2003b](#)). From a policy viewpoint, it would be helpful to exploit modern technologies for increasing micronutrient content of grains and vegetables (e.g., [Nestel et al. 2006](#); [Ruel and Alderman 2013](#)) and increase the supply of fortified foods and nutritious dairy products in developing countries.

From a methodological standpoint, primary studies in nutritional sciences often devise short-term interventions supplementing populations such as children, pregnant or lactating women, and adults with fortified foods or micronutrient in the form of tablets (e.g., [Bhutta et al. 2013](#)). Though assessing the efficacy of interventions via randomized controlled trials is appealing, the results should be useful for the formulation of long-term food policies. This is important because the outcomes

of many short-term studies can be predicted from the knowledge in biomedical sciences or from previous studies. For example, it is known that pregnant women require higher intakes of absorbable iron; iron supplementation during pregnancy is likely to be beneficial for intrauterine growth and birth outcomes (Ekstrom et al. 2002). In contrast, a more expensive alternative would be to provide nutritious foods to poor women that women from well-off backgrounds consume during pregnancy. Though the former policies entails monitoring women for avoiding unintended consequences of iron supplementation such as increased malarial morbidity and/or poor tolerance, the latter is appealing from a food policy standpoint since it entails no risks.

In the above example, it may be intricate to compare the benefits for women's iron status of iron tablets versus improvements in diet quality. From a short-term cost-benefit viewpoint, the former might seem an effective strategy though the costs of medical monitoring need to be taken into account. In contrast, improvements in women's iron status achieved via diets have the potential for improving dietary behavior and future pregnancy outcomes. Thus, randomized controlled trials are useful for identifying appropriate interventions for population groups (Bhargava 2008). From a food and health policy standpoint, the important issue is the degree to which such findings can be integrated into long-term policies.

Another example involving food supplementation for children in a longer time frame is the Institute of Nutrition of Central America and Panama (INCAP) study in Guatemala (Martorell and Scrimshaw 1995). Pre-school children in the intervention group received a nutritious supplement ("Atole") high in protein during 1969–77. Children in the control group received a drink fortified with micronutrients ("Fresco"). Partly because children receiving Atole were taller in follow-up studies (Martorell et al. 2005), interventions providing fortified gruels such as "Incaparina" became popular. Additionally, the next generations of children in the age group 0–12 years born to daughters of Atole-supplemented mothers were taller and had higher head circumferences (Behrman et al. 2009). Moreover, supplemented children had higher scores on certain cognitive tests administered when they were adults (Maluccio et al. 2009). Though the analyses of these data might have controlled for various explanatory variables at different time points in a longitudinal fashion, it is likely that nutrient content of foods consumed and environmental factors played an important role in children's physical growth and cognitive development.

Overall, the evaluation of benefits of food policies for population health entails a longer time frame and requires more complex analyses than comparisons of changes in means in Control and Intervention groups. Additionally, measurement issues in nutrition research are important for assessing the magnitudes of effects of socioeconomic variables on dietary intakes and are discussed next.

## *Dietary Assessment methods and the Interpretation of Empirical Evidence*

The energy and nutrient intakes data from developing countries in early economics research were primarily derived from food expenditure surveys (e.g., [Timmer, Falcon, and Pearson 1983](#)). Households' expenditures on food groups such as grains, meat, vegetables, and milk can be converted into energy and nutrients using food conversion tables. More recent research has measured food intakes via methods such as 24-hour recalls ([Binswanger and Jodha 1978](#); [Bouis and Haddad 1992](#); [Bouis et al. 1998](#)). Interviewers visit the households and ask members "what did you consume in the last 24 hours" and inquire about portion sizes. Food intakes can be converted into energy and nutrient intakes using a list of foods from several countries ([Calloway, Murphy, and Bunch 1994](#)).

From a food policy standpoint, it would be helpful to outline the relative merits of alternative methods for assessing intakes in developing countries. Data from household expenditure surveys are very aggregate and can provide insights since intra-household variation is reduced (e.g., [Mahal and Karan 2008](#)). However, the actual food intakes by individuals are difficult to assess; food consumed by "guests" and domestic help inflate the consumption ([Bouis and Haddad 1992](#)). Thus, without direct measurements on children's food intakes, it is difficult to assess the effects of diet quality on health outcomes. The 24-hour recall method affords detailed information on foods consumed by household members. Moreover, enumerators do not influence consumption behavior on the day of the visit as in the filling of "food records". However, the days on which 24-hour recall surveys are conducted may not be "typical" so that there may be high intra-individual variation in intakes. In the study in Kenya from which evidence will be presented below, the 24-hour recall method was augmented by measuring food intakes on the days of the visits ([Neumann, Bwibo, and Sigman 1992](#)).

Further, data on consumption of certain food groups by large number of women and children are compiled in demographic surveys in developing countries. This has led researchers such as [Arimond and Ruel \(2004\)](#) to explain child health outcomes using indices of "diet diversity", i.e., individuals consuming greater variety of foods in the previous few days might have better health outcomes. Such methods are based on Food Frequency Questionnaires used in epidemiological research (e.g., [Willett 1998](#), chapter 5). Information on frequency of foods consumed over a month or longer periods can also be utilized ([Stefanik and Trulson 1962](#)). Moreover, the reported quantities of foods consumed have been incorporated to create "diet diversity scores" ([Moursi et al. 2008](#)). Such methods are referred to as "Semi-quantitative Food Frequency Questionnaires" ([Block et al. 1986](#); [Sempos 1992](#); [Carroll, Freedman, and Hartman 1996](#)) and are generally less informative than 24-hour recalls, where actual food intakes are assessed by the enumerators.

Next, food frequency type methods are likely to require large sample sizes for investigating the effects of dietary intakes on health outcomes. In an analysis of the proximate determinants of children's stunting reflected in their height-for-age using data from demographic surveys in Bangladesh, Ethiopia, Haiti, India, Kenya, Uganda, Zambia, and Zimbabwe, [Jones et al. \(2014\)](#) reported a significant association of "minimum diet diversity" score only for India in their logistic models; this variable was significantly associated with height-for-age in regression models for Bangladesh, India, and Zambia. Though ante-natal care and socioeconomic variables were included in the models, post-natal care reflected in childhood immunizations was not accounted for. In fact, children's vaccinations against DPT, polio, and measles and anthelmintic treatment were significantly associated with heights in India using the National Family Health Survey-3 data ([Bhargava, Guntupalli, and Lokshin 2011](#)). The importance of large sample sizes when data from food frequency questionnaires are employed to explain the hemoglobin concentration of women and children in India is illustrated below.

Finally, it is useful to assess how diet quality changes with incomes, education, and nutritional knowledge in developing countries. Using individual food intakes data, one would expect income elasticities to be high for nutrients such as calcium, iron, and vitamins A and C that are regularly consumed by well-off households. Unless populations face chronic food shortages, one would expect income elasticity of energy intakes to be small in magnitude. This is because higher than necessary energy intakes by individuals engaged in light to moderate physical activity levels are likely to lead to weight gain. Another procedure for investigating diet quality in developing countries is by expressing the intakes of protein and micronutrients as ratios to total energy intake ([Bhargava 1991a](#)). Such ratios are useful because individuals' energy intakes are influenced by their energy expenditures that cannot be measured without laboratory methods.

### *Income Elasticities of Energy and Nutrient Intakes for India, the Philippines, and Kenya*

The income elasticities of energy and nutrient intakes can be estimated more robustly using longitudinal data because the effects of intra-individual variation are minimized. Moreover, the models should include explanatory variables such as maternal education, household size and composition, and total expenditures or incomes. Unobserved heterogeneity in intakes can be addressed by including "random" or "fixed" effects in the models. Because longitudinal data are available from India, the Philippines, and Kenya on large numbers of individuals for few time periods, the use of random effects models is appealing for the efficient estimation of model parameters. Additionally, one can estimate dynamic models that reflect habit persistence in diets. Static models are useful when very few time observations are available.

In previous research, [Behrman and Deolalikar \(1987\)](#) analyzed 24-hour recall data collected in four survey rounds in 1976–7 in south India by the International Crop Research Institute for Semi-arid Tropics (ICRISAT) ([Binswanger and Jodha 1978](#)). The intakes were aggregated for household members and were averaged over the four survey rounds; the model was estimated using Ordinary Least Squares. The main findings were that income elasticities of energy and nutrients such as protein, calcium, iron, and vitamins A and B (niacin, riboflavin, and thiamine) were not significantly different from zero. The authors concluded that individuals in rural India do not nourish themselves better despite increases in household incomes. However, these findings were due to model formulation and the choice of the estimation methods ([Bhargava 1991a,b](#)).

The income elasticities of energy and nutrient intakes in table 1 were estimated using similar models and data from India, the Philippines, and Kenya. Partly because of high intra-individual variation, the intake data from India were averaged over two survey rounds to create annual data for 1976 and 1977. Additionally, the long-run income elasticities were estimated by maximum likelihood in more complex dynamic random effects models that considered inter-dependence in energy and nutrient intakes ([Bhargava 1991a](#)). For the Bukidnon region of the Philippines, 24-hour recall data in four survey rounds separated by four-month intervals in 1984–5 were analyzed ([Bouis and Haddad 1992](#)). For the Embu region of Kenya, augmented 24-hour recall data from three survey rounds separated by

**Table 1.** Short- and Long-Run Income Elasticities of Energy and Nutrient Intakes Estimated using Random Effects Models and Data from India, the Philippines, and Kenya

| Country:<br>Intakes: | India (static model) <sup>1</sup> |                       | Philippines<br>(dynamic model) <sup>2</sup> |          | Kenya (dynamic model) <sup>3</sup> |          |
|----------------------|-----------------------------------|-----------------------|---|----------|------------------------------------|----------|
|                      | Short run                         | Long run <sup>4</sup> | Short run                                   | Long run | Short run                          | Long run |
| Energy               | 0.05                              | 0.13                  | 0.08  | 0.09     | 0.29                               | 0.29     |
| Protein              | 0.06                              | 0.18                  | 0.13  | 0.15     | 0.39                               | 0.39     |
| Calcium              | 0.10                              | 0.13                  | 0.23  | 0.26     | 0.42                               | 0.42     |
| Iron                 | 0.0                               | 0.13                  | 0.19  | 0.22     | 0.31                               | 0.31     |
| Vitamin A            | 0.10                              | 0.18                  | 0.21  | 0.21     | 0.26                               | 0.26     |
| Vitamin B            | 0.13                              | 0.32                  | 0.30  | 0.33     | 0.30                               | 0.30     |
| Vitamin C            | 0.10                              | 0.18                  | 0.02  | 0.02     | 0.37                               | 0.37     |

Notes:

<sup>1</sup>Efficient estimates from static random effects models using data on 364 individuals in two periods (source: [Bhargava 1991b](#)).

<sup>2</sup>Maximum likelihood estimates using data on 312 children in four periods (source: [Bhargava 1994](#)).

<sup>3</sup>MLE using data on 100 children in three periods (source: [Bhargava and Fox-Kean 2003](#)).

<sup>4</sup>MLE using a dynamic inter-dependent demand system for energy and nutrients (source: [Bhargava 1991a](#)).

three-month intervals in 1984–5 were analyzed (Bhargava and Fox-Kean 2003). The socioeconomic status of Kenyan households was approximated by summing the number of household possessions and via a categorical variable (1–5) for cash income.

In table 1, the short-run income elasticities of energy intake for India and the Philippines were 0.05 and 0.08, respectively. The long run elasticities were slightly higher. In contrast, the short- and long-run income elasticities of energy intake in Kenya were 0.29 and 0.34, respectively. The differences in magnitudes were not surprising because the Embu region is poorer than south Indian villages and the Bukidnon region of the Philippines. Moreover, there was a drought in the Embu region during the study, which led to food shortages. Note that the income elasticity of energy intakes estimated using food expenditures data from Bangladesh was 0.80 (Pitt 1983); such estimates are likely to be due to the high degree of aggregation.

The income elasticities of protein, calcium, iron, and vitamins A, B, and C can shed light on the effects of increases in household incomes on the quality of diets in developing countries. Using the static model for India, the short-run income elasticity of protein was 0.06, which seems low. However, in the more complex dynamic model, the corresponding long-run estimate was 0.18. Because there were only two time observations for the Indian data, it will be useful to focus on elasticities estimated from static models. Income elasticities of calcium, vitamins A, B, and C were in the interval [0.10, 0.13]. These were significantly larger than the income elasticity of energy intakes and reflected improvements in diet quality with increases in household incomes.

For the Philippines, nutrient intake data from four survey rounds showed lower intra-individual variation, in part because climatic variation is low due to proximity to the sea. Additionally, fresh and dried fish are available, facilitating higher intakes of protein and micronutrients. The long-run income elasticity of protein was 0.15, and the long-run income elasticities of vitamins A and B were 0.21 and 0.30, respectively. These elasticities indicate improvements in diet quality with increases in household incomes. However, the income elasticity of vitamin C intakes was not significantly different from zero, possibly because fresh fruit prices exhibit higher seasonal variation; vitamin C is concentrated in fruits and leafy vegetables.

The income elasticities of nutrient intakes in Kenya were larger in magnitudes. For example, the long-run income elasticities of protein, calcium, and iron were 0.39, 0.42, and 0.31, respectively. These estimates reflect the importance of household incomes and economic growth for diet quality in the Embu region. This was also true for energy intakes, where the long-run income elasticity was 0.34, which was higher than those for India (0.13) and the Philippines (0.29). Some implications of these findings are discussed below.

## Environmental Factors, Food Intake, and Child Health

Children in developing countries are often sick with diarrhea, respiratory infections, and other diseases. Although the inter-connections between children's nutritional status and infection are recognized in biomedical sciences, these issues merit greater attention in the formulation of food policies. For example, episodes of diarrhea reduce children's food intake and entail a loss of vital nutrients that can be replenished through a diet high in micronutrients. Because the income elasticities of micronutrients are generally small and the foods consumed are often contaminated, repeated infections manifest in the form of physical growth retardation. Immunization programs can help reduce morbidity and nutrient loss, and iron loss among children infected with intestinal parasites can be prevented via anthelmintic treatment. For long-term improvements in child growth, it is important to improve diet quality via food policies.

Further, poor sanitation is ubiquitous in many developing countries due to the high costs of sewage treatment (e.g., [Bhargava et al. 2003a](#); [Humphrey 2009](#); [Spears 2013](#)). Small-scale programs can improve water quality ([Esrey et al. 1988](#)). Demographic factors, such as high population density and a large number of children in households, can exacerbate the effects of environmental conditions ([Arrow et al. 2012](#)). Food policies are likely to have their intended effects if conditions facilitate the absorption of nutrients.

### *Evidence on the Determinants of Child Morbidity in Developing Countries*

Gastrointestinal diseases, such as diarrhea, dysentery, cholera, and typhoid, are common in developing countries due to exposure to pathogens. Moreover, child morbidity often increases as young infants are weaned. In a study of 400 infants aged 4–8 months in the slums of New Delhi, 87 infants supplemented with a milk-based cereal experienced significantly greater episodes of fever and dysentery ([Bhandari et al. 2001](#)). Although the mothers were shown how to prepare the supplement and advised to wash their hands, the supplements were apparently contaminated in the preparation process. Additionally, at the time of the first supplementation, the children were younger than 6 months, which is the recommended age for weaning.

Further, interventions such as washing hands with soap have been found to reduce child morbidity. In a randomized controlled trial in Karachi, 25 neighborhoods were assigned to a program promoting hand washing using soap, and 11 neighborhoods served as controls ([Luby et al. 2005](#)). Approximately 300 households were in each group. The morbidity outcomes included the incidence of pneumonia, impetigo, and diarrhea. Children under five years of age in households that received soap had a 50 percent lower incidence of pneumonia than did the control group. Moreover, children under 15 years had a 53 percent lower incidence of

diarrhea and a 34% percent lower incidence of impetigo compared with the control group. All differences were statistically significant.

Episodes of diarrhea and other sicknesses can hamper children's physical growth. For example, a study by [Checkley et al. \(2003\)](#) found that among 225 Peruvian children followed from birth to 35 months, children who had diarrhea 10 percent of the time during the first 24 months were 1.5 cm shorter than their counterparts without diarrhea. Moreover, the adverse effects of diarrhea differed by age; diarrhea in the first 6 months appeared to result in long-term height deficits. However, food intakes were not measured in this study. It is plausible that the deficits in heights were not permanent and that food supplementation programs might have facilitated growth.

Overall, the formulation of food policies needs to incorporate environmental aspects, such as improvements in sanitation, to prevent nutrient loss. Moreover, it is often the case that well-nourished children have greater immunity to infections. If policy makers can improve child health in the early years, then these children may show greater resilience in the future.

### *Evidence from Models of the Morbidity of Filipino, Kenyan, and Bangladeshi Children*

Although several studies have investigated the determinants of child morbidity in developing countries, few have modeled morbidity indices that capture the duration and intensity of sicknesses ([Rand Corporation 1983](#); [Bhargava 1994](#)). This approach is important because children are often sick with multiple symptoms. For example, probit models for the likelihood of contracting diarrhea in the week preceding the survey partially reflect health status. Moreover, explanatory variables in these models should include intakes of micronutrients, such as vitamins A and C, which enhance immunity systems ([Sommer 1986](#); [Scrimshaw and San Giovanni 1997](#)). In contrast, including children's energy intakes will not capture the benefits of nutritional status because sicknesses reduce energy intake (cf. [Cebu Study Team 1991](#)).

Further, it is important to investigate whether children's nutritional status as reflected in anthropometric measures such as height and weight and environmental variables such as access to sanitation and safe water are potential predictors of child morbidity. Biomarkers such as hemoglobin concentration are better indicators of iron status than intake because iron absorption rates are low. Although ferritin concentrations are indicators of body iron stores, they are elevated by inflammations and may not be reliable indicators in developing countries ([Bhargava et al. 2003b](#)). Moreover, empirical models should account for unobserved between-children differences and allow for the possible endogeneity of explanatory variables such as body weight, especially due to the presence of random effects ([Bhargava, 1991b](#)).

The results from models explaining morbidity indices for children in the Philippines, Kenya, and Bangladesh by socioeconomic, dietary, and environmental variables are shown in table 2. The morbidity index for Filipino children was based on the duration of five symptoms (cold, cough, fever, diarrhea, and headache) in the previous fortnight. The morbidity index for Bangladeshi children was based on episodes of three of seven symptoms (diarrhea, dysentery, vomiting, stomachache, acidity, typhoid, and cholera) recorded for the previous month. The morbidity index for Kenyan children was quite detailed and covered more than 20 symptoms recorded on a weekly basis. The explanatory variables in Kenya and Bangladesh included children's hemoglobin concentration. The emphasis in the Bangladesh study was on the effects of water contamination; fecal and total coliforms in the water at the source and stored in the house were explanatory variables.

**Table 2.** Results from Estimating Random Effects Models for Child Morbidity Indices Explained by Household, Anthropometrics, Dietary Intakes, and Environmental Variables for the Philippines, Kenya, and Bangladesh

| Country:<br>Explanatory variables:                | Philippines <sup>1</sup> |      | Kenya <sup>2</sup> |      | Bangladesh <sup>3</sup> |      |
|---|--------------------------|------|--------------------|------|-------------------------|------|
|   | Coefficient              | SE   | Coefficient        | SE   | Coefficient             | SE   |
| Constant  | -16.56                   | 3.88 | 21.55              | 0.18 | 38.69                   | 0.31 |
| Age (months)                                      | -0.53*                   | 0.17 | -                  | -    | -12.44*                 | 0.16 |
| Open pit toilet                                   | 0.18*                    | 0.09 | -                  | -    | -                       | -    |
| Medical facility distance                         | 0.06*                    | 0.02 | -                  | -    | -                       | -    |
| Maternal housework                                | 0.05                     | 0.04 | -                  | -    | -                       | -    |
| Height (meters)                                   | 4.37*                    | 1.14 | -                  | -    | -4.55*                  | 1.00 |
| Weight (Kg)                                       | -2.02*                   | 0.47 | -                  | -    | -2.35*                  | 0.11 |
| β-carotene (int. units)                           | -0.04*                   | 0.02 | -                  | -    | -                       | -    |
| Hemoglobin (grams/liter)                          | -                        | -    | -0.59*             | 0.03 | -10.58*                 | 0.14 |
| Maternal age (years)                              | -                        | -    | -0.92*             | 0.06 | -                       | -    |
| Paternal cognitive score                          | -                        | -    | -0.22*             | 0.04 | -                       | -    |
| Maternal cognitive score                          | -                        | -    | -0.84*             | 0.04 | -                       | -    |
| No latrine  | -                        | -    | 1.60               | 0.94 | -                       | -    |
| Vitamin A intake (μg RE)                          | -                        | -    | -0.24*             | 0.03 | -                       | -    |
| Body Mass Index                                   | -                        | -    | -2.67*             | 0.06 | -                       | -    |
| Age-squared (months)                              | -                        | -    | -                  | -    | 4.67*                   | 0.08 |
| Total coliforms in water source (colonies/100 ml) | -                        | -    | -                  | -    | 0.02                    | 0.11 |
| Total coliforms in water stored (colonies/100 ml) | -                        | -    | -                  | -    | 0.39*                   | 0.12 |
| Lagged dependent variable                         | 0.05                     | 0.04 | 0.08               | 0.08 | -0.42*                  | 0.07 |

Notes:

<sup>1</sup>Maximum likelihood estimates using data on 312 children in four periods (source: Bhargava 1994).

<sup>2</sup>MLE using data on 102 children in three periods (source: Bhargava 1999).

<sup>3</sup>MLE using data on 99 children in three periods (source: Bhargava et al. 2003a).

\*P < 0.05.

First, starting with the common features of the models for the three countries, children's morbidity declined with age, except in Kenya, where the age variable was not significant. Moreover, the coefficients of the lagged dependent variables were not significantly different from zero for Filipino and Kenyan children. In contrast, the estimated coefficient was negative and significant for Bangladeshi children. Although seasonal factors are important for child morbidity, the negative coefficient indicates that children are likely to acquire immunity to infections with time.

Second, children with better nutritional status as reflected in height, weight and hemoglobin concentration faced lower morbidity in the three countries. The opposite signs of the estimated coefficients of height and weight for Filipino children and a likelihood ratio test indicated that height and weight can be combined as the Body Mass Index (BMI; weight/height-squared). BMI was negatively associated with Kenyan children's morbidity index. In contrast, both coefficients of height and weight were estimated with negative signs for Bangladeshi children, indicating that height and weight should not be combined into the BMI. Alternative models were estimated for Kenyan children using lagged heights and weights to assess the robustness of the results. Additionally, previous morbidity levels were included in the models for heights and weights, although the coefficients were generally small and insignificant.

Third, children's  $\beta$ -carotene intakes in the Philippines and vitamin A intakes in Kenya were negatively and significantly associated with morbidity levels. This was also true for hemoglobin concentration, which was negatively associated with child morbidity in Kenya and Bangladesh. These findings support the view that children with better micronutrient status exhibit greater resilience to infections. Finally, the large and significant coefficients of maternal and paternal scores on cognitive tests in Kenya underscored parental inputs. The coefficient of maternal scores was four times as large in absolute terms, reflecting the benefits of maternal knowledge. The coefficients of parental years of schooling were insignificant, presumably because few parents had attended school

### *Evidence from India on the Frequency of Foods Consumed and Hemoglobin Concentrations*

Tables 3 and 4 present some new results for Indian children and women's hemoglobin concentration, respectively, using data from the National Family Health Survey-3, which covered more than 40,000 women and 23,000 children. The consumption of 23 foods by children in the previous 24 hours was coded as 0–1 variables (Bhargava, Guntupalli, and Lokshin 2011). The foods were juice, tea or coffee, fresh or tinned milk, baby formula, baby cereals, porridge or gruel, chicken, meat, foods made from lentils, nuts, bread or noodles, potatoes or tubers, eggs, pumpkin or squash, dark green leafy vegetables, mangoes or papayas, other fruits and vegetables, liver, fresh or

dried fish, foods made from nuts, cheese or milk products, oil or fat products, and other semi-solid foods. Children's food consumption index ranged from 0–23. In addition, mothers were asked how frequently they consumed seven food groups (milk or curd, pulses or beans, dark green leafy vegetables, fruits, eggs, fish, and meat): daily, once a week, once a month, or never. The maternal food consumption index ranged from 0–210. Because large sample sizes are often necessary to analyze the effects of foods consumed and their frequency on hemoglobin concentration, the results in tables 3 and 4 are presented for all women and children, with the data disaggregated for the states of Kerala and Uttar Pradesh. Kerala is a small state with very high literacy levels, whereas Uttar Pradesh is the largest Indian state with poor access to healthcare.

The empirical model for children's hemoglobin concentration included several variables, such as household composition, index of household possessions, maternal education, access to healthcare and utilization, and treatment against intestinal

**Table 3.** Estimated Model Parameters for Indian Children's Hemoglobin Concentration from Pooled National Family Health Survey-3 Data and for Kerala and Uttar Pradesh to Investigate the Effects of Children's Consumption of 23 Foods in the past 24 Hours<sup>1</sup>

| Explanatory variables:                        | All states  |       | Kerala      |       | Uttar Pradesh |       |
|---|-------------|-------|-------------|-------|---------------|-------|
|   | Coefficient | SE    | Coefficient | SE    | Coefficient   | SE    |
| Constant                                      | 65.954      | 0.951 | 70.252      | 7.130 | 73.457        | 2.757 |
| Dummy variable for girl                       | 0.920*      | 0.187 | 1.154       | 1.194 | 0.416         | 0.535 |
| Child's age                                   | 0.250*      | 0.007 | 0.327*      | 0.045 | 0.271*        | 0.019 |
| Maternal education                            | 0.282*      | 0.027 | 0.474*      | 0.219 | 0.280*        | 0.076 |
| Number of older brothers                      | -0.243*     | 0.111 | -0.616      | 0.982 | -0.851*       | 0.267 |
| Number of older sisters                       | -0.043      | 0.096 | 1.323       | 0.971 | 0.425         | 0.246 |
| Household possessions index                   | 0.366*      | 0.092 | -0.304      | 0.739 | 0.229         | 0.277 |
| (Household possessions index)-squared         | -0.018*     | 0.006 | 0.023       | 0.046 | -0.019        | 0.019 |
| Child's DPT vaccinations                      | 0.261*      | 0.083 | 1.013       | 0.867 | -0.048        | 0.222 |
| Child's food consumption index <sup>2</sup>   | 0.130*      | 0.031 | 0.074       | 0.157 | -0.032        | 0.111 |
| Child received drugs for intestinal parasites | 1.527*      | 0.283 | 1.016       | 1.266 | -3.005*       | 1.014 |
| Not utilizing government facilities index     | -1.065*     | 0.101 | 0.211       | 0.683 | -0.785*       | 0.344 |
| Preceding birth interval                      | 0.015*      | 0.005 | 0.009       | 0.025 | 0.033*        | 0.014 |
| No. children at first use of contraceptives   | 0.008       | 0.057 | -0.576      | 0.388 | 0.017         | 0.163 |
| Maternal Body Mass Index                      | 0.246*      | 0.031 | 0.257       | 0.170 | 0.072         | 0.087 |
| Maternal hemoglobin concentration             | 0.174*      | 0.006 | 0.117*      | 0.045 | 0.127*        | 0.016 |
| R <sup>2</sup>                                | 0.130*      |       | 0.154*      |       | 0.094*        |       |

Notes:

<sup>1</sup>There were 23,437 children in all Indian states (Bhargava, Guntupalli, and Lokshin 2011), 480 children in Kerala, and 3,013 children in Uttar Pradesh in the samples.

<sup>2</sup>Food consumption index was based on 23 foods consumed over the previous 24 hours.

\*P < 0.05.

**Table 4.** Estimated Parameters from Models for Indian Women's Hemoglobin Concentration using Pooled National Family Health Survey-3 Data and for Kerala and Uttar Pradesh to Investigate the Effects of Women's Consumption of Seven Food Groups in the past Month<sup>1</sup>

| Explanatory variables:                       | All states  |       | Kerala      |        | Uttar Pradesh |       |
|--|-------------|-------|-------------|--------|---------------|-------|
|  | Coefficient | SE    | Coefficient | SE     | Coefficient   | SE    |
| Constant                                     | 100.438     | 1.728 | 105.738     | 14.086 | 103.034       | 5.052 |
| Maternal age                                 | 0.869*      | 0.120 | 1.036       | 0.994  | 0.900*        | 0.344 |
| (Maternal age)-squared                       | -0.011*     | 0.002 | -0.014      | 0.017  | -0.012*       | 0.006 |
| Maternal education                           | 0.177*      | 0.023 | 0.543*      | 0.178  | 0.113         | 0.066 |
| Number of children ever born                 | -0.400*     | 0.065 | -2.375*     | 0.583  | -0.360*       | 0.178 |
| Currently pregnant                           | -9.335*     | 0.294 | -10.749*    | 2.258  | -9.730*       | 0.778 |
| Difficulties in getting medical help index   | -0.046*     | 0.020 | 0.001       | 0.176  | 0.061         | 0.064 |
| Household possessions index                  | 0.386*      | 0.079 | -0.005      | 0.571  | -0.441        | 0.239 |
| (Household possessions index)-squared        | -0.008      | 0.005 | 0.002       | 0.035  | 0.029         | 0.017 |
| Maternal food consumption index <sup>2</sup> | 0.007*      | 0.003 | 0.007       | 0.013  | 0.013         | 0.009 |
| Received drugs for intestinal parasites      | 1.352*      | 0.495 | -0.681      | 1.711  | 3.530         | 1.944 |
| Not utilizing government facilities index    | -0.494*     | 0.088 | -0.978      | 0.541  | -0.128        | 0.294 |
| Preceding birth interval                     | -0.017*     | 0.004 | -0.009      | 0.019  | -0.014        | 0.013 |
| No. children at first use of contraceptives  | -0.377*     | 0.050 | -0.294      | 0.308  | -0.457*       | 0.145 |
| R <sup>2</sup>                               | 0.057*      |       | 0.075*      |        | 0.039*        |       |

*Notes:*

<sup>1</sup>There were 42,365 women in all Indian states, 845 women in Kerala, and 5,699 women in Uttar Pradesh samples.

<sup>2</sup>Food consumption index was based on consumption of seven food groups and their frequencies over the previous 30 days.

\*P < 0.05.

parasites. The primary objective of these results was to assess the effects of children's food consumption patterns on their hemoglobin concentration. In table 3, the children's food consumption index was estimated with a positive and significant coefficient of 0.13 when the data on all children were pooled and the models were estimated using Ordinary Least Squares. Thus, children who consumed greater numbers of the 23 foods had significantly higher hemoglobin concentrations. However, when the models were estimated separately for 480 children in Kerala and 3013 children in Uttar Pradesh, this coefficient was no longer statistically significant. These findings are presumably due to the nature of data from food frequency questionnaires. In any case, the results showed that the coefficients of variables such as children's DPT vaccinations, drugs received against intestinal parasites, utilization of government health facilities, and maternal education and hemoglobin concentration were significant predictors of children's hemoglobin concentration. Some of the variables remained significant in the models estimated for Kerala and Uttar Pradesh.

Finally, the maternal food consumption index was a positive and significant predictor of hemoglobin concentration for the pooled sample in table 4. However, this variable was no longer significant when the models were estimated for Kerala and Uttar Pradesh. Because the frequency of seven food groups consumed was incorporated in the index, this variable might have been expected to perform better than the children's index based on questions about foods consumed over the previous 24 hours. Nevertheless, the lack of statistical significance is not surprising because the seven food groups were broad categories and there was no information about portion sizes. In contrast, 24-hour recall data analyzed for India, the Philippines and Kenya recorded the intakes of approximately 200 foods along with portion sizes. The results in table 4 also indicate that high fertility levels and pregnancy status were associated with lower hemoglobin concentration.

## Diet Quality, School Infrastructure, and Children's Cognitive Development

Economic development depends on the availability of a skilled labor force that is necessary for the production of goods and services (e.g., [Schultz 1961](#); [Bhargava et al. 2001](#)). Developing countries, where a majority of children are undernourished and lack school education, are unlikely to be competitive in the age of globalization. Moreover, goods and services demanded by developed countries typically entail high value-added. Although the productivity of unskilled labor can be enhanced by improving their nutritional status, it is not feasible to train illiterate workers for tasks requiring scientific skills; learning is a cumulative process, and skill acquisition requires training. From a food policy viewpoint, it is important that children's cognitive development is not compromised by nutrient deficiencies in their diets.

Further, factors that affect children's physical growth and cognitive development in developing countries are interrelated. For example, higher intakes of protein and iron facilitate not only linear growth but also growth in brain mass ([Dobbings and Sands 1978](#)). However, cognitive development is complex and depends on the home environment and school infrastructure, which are often inadequate. To understand the effects of diet quality on child development, it would be helpful to outline certain methodological aspects and present evidence on these issues.

First, there has been an emphasis in the nutrition literature on children's iron intake for cognitive development (e.g., [Lozoff 1988](#); [Pollitt 1993](#)). The food policies outlined above to facilitate iron absorption and improve diet quality are likely to have beneficial effects for cognitive development. There may be critical periods during childhood, when micronutrient deficiencies may be highly detrimental and

specific interventions are necessary. However, evidence on these issues may be difficult to interpret, partly because of the “plasticity” or flexibility of the human brain (Purves 1989) and because the assessment of cognitive development is complex. For example, it is difficult to relate newborn infants’ performance on the Brazelton (1984) scale to indicators of under-nutrition (Bhargava 2008). For pre-school children, performance on psychological tests such as Bayley’s (1969) developmental scales can be difficult to model due to high within-child variation. Thus, the effects of diet quality on measures of cognitive development are likely to be apparent for school-aged and older children.

The second set of issues is the selection of measures of cognitive development for children and the quantification of the effects of diet quality, anthropometric measures, socioeconomic factors, and school infrastructure on the scores. For example, it is common in psychological research to give a battery of tests to children to assess their cognitive development (e.g., Neumann, Bwibo, and Sigman 1992; Pollitt et al. 1993). This approach is useful in part because the reliability of tests can be poor and because aggregate test scores are better indicators of child development. Moreover, children’s scores on school examinations can be compiled from school registers. Although school examination scores are good indicators of learning in developed countries (Goldstein and Thomas 1996), this may not be the case in developing countries, where the educational infrastructure is poor and teachers may assign grades based on participation rather than learning.

Tests developed in education and psychological research and administered by external enumerators can provide a useful assessment of children’s learning in developing countries. It is important to focus on “higher order mental functions” (Binet and Simon 1916) because verbal skills are a prerequisite for learning (Vygotsky 1987). Psychologists administer tests such as the “digit span”, in which the child repeats numbers in forward and backward orders. Items from Raven’s Progressive Matrices (Raven 1965) entail identifying the correct box and are neutral with respect to language. In addition, tests in spelling, reading and arithmetic, referred to as “educational achievement tests”, are useful because they are closer to material taught in the classroom. It would be useful to summarize some evidence on Kenyan and Tanzanian school children’s test scores.

### *Child Health, School Infrastructure, and Cognitive Development in Kenya and Tanzania*

The proximate determinants of Kenyan and Tanzanian school children’s scores on cognitive and educational achievement tests are presented in table 5. The Kenyan data were from three survey rounds in the Embu region (Neumann, Bwibo, and Sigman 1992; Bhargava 1998). Tanzanian children were enrolled in 10 schools in the control group of a randomized controlled trial in 1997–8 investigating the

**Table 5.** Results from Estimating Random Effects Models for Kenyan and Tanzanian Children's Scores on Cognitive and Educational Achievement Tests Explained by Household, Anthropometric, Intake, and Morbidity Variables

| Country:                     | Kenya <sup>1</sup> |       |                              |      | Tanzania <sup>2</sup> |      |            |       |          |      |
|------------------------------|--------------------|-------|------------------------------|------|-----------------------|------|------------|-------|----------|------|
|                              | Total scores       |       | Digit+Ravens<br>+ Arithmetic |      | Sentence reading      |      | Arithmetic |       | Spelling |      |
| Explanatory variables:       | Coeff.             | SE    | Coeff.                       | SE   | Coeff.                | SE   | Coeff.     | SE    | Coeff.   | SE   |
| Constant                     | -1.07              | 0.67  | -6.52                        | 3.05 | -24.14                | 4.04 | -0.98      | 1.22  | -15.22   | 3.19 |
| Parents' test scores         | 0.11*              | 0.06  | 0.15*                        | 0.07 | -                     |      | -          |       | -        |      |
| Grade level                  | 0.17*              | 0.04  | 0.28*                        | 0.06 | 0.20*                 | 0.03 | 0.11*      | 0.01  | 0.13*    | 0.03 |
| Socioeconomic status         | 0.08*              | 0.04  | 0.06                         | 0.08 | 0.27                  | 0.37 | 0.09       | 0.11  | 0.74*    | 0.34 |
| Height (meters)              | -                  |       | -                            |      | 4.72*                 | 0.74 | 0.51*      | 0.23  | 2.79*    | 0.58 |
| Head circumference (cm)      | 0.65*              | 0.04  | 1.66*                        | 0.85 | -                     |      | -          |       | -        |      |
| Body Mass Index              | 0.35*              | 0.17  | 0.41*                        | 0.23 | -                     |      | -          |       | -        |      |
| Hemoglobin (g/L)             | 0.09               | 0.10  | 0.23*                        | 0.11 | 0.42*                 | 0.20 | 0.15*      | 0.06  | 0.26     | 0.15 |
| Morbidity index <sup>3</sup> | -0.014*            | 0.006 | -0.02*                       | 0.01 | 0.02                  | 0.02 | 0.01       | 0.01  | 0.01     | 0.01 |
| Teacher experience           | -                  |       | -                            |      | 0.026                 | 0.02 | 0.013*     | 0.005 | 0.01     | 0.01 |
| Work assignments             | -                  |       | -                            |      | 0.21*                 | 0.10 | -0.04      | 0.03  | 0.04     | 0.08 |
| Hookworm (eggs/g)            | -                  |       | -                            |      | -0.01                 | 0.01 | -0.001     | 0.002 | -0.01    | 0.01 |
| Schistosomiasis (eggs/ml)    | -                  |       | -                            |      | 0.01                  | 0.01 | -0.001     | 0.003 | 0.01     | 0.01 |
| Prop. school attendance      | -                  |       | -                            |      | 0.03*                 | 0.01 | 0.02*      | 0.01  | 0.03*    | 0.01 |
| Lagged dependent variable    | 0.19*              | 0.11  | 0.08                         | 0.11 | -                     |      | -          |       | -        |      |

*Notes:*<sup>1</sup>Maximum likelihood estimates using data on 104 children in three periods (source: Bhargava 1998).<sup>2</sup>Efficient estimates from static random effects models using data on 507 children in two periods (source: Bhargava et al. 2005).<sup>3</sup>Morbidity index was replaced by the C-reactive protein levels in the model for Tanzanian children.

\*P &lt; 0.05.

effects of de-worming. Educational achievement tests were given in two survey rounds ([Bhargava et al. 2005](#)). The models included explanatory variables such as children's nutritional status, morbidity, grade levels, school infrastructure, and socio-economic variables.

The main findings in table 5 for Kenya are that children's BMI and head circumference were positively and significantly associated with total scores, whereas morbidity was negatively associated. Although hemoglobin concentration was not a significant predictor of overall test scores, it was significant in the model for scores on digit span, Raven's matrices, and arithmetic. These results indicate the importance of children's diet quality and iron status for test scores reflecting higher order mental functions. Second, in the model for scores on digit span, Raven's matrices, and arithmetic, the coefficient of head circumference was significant. Children's BMI was also significant, whereas morbidity was significantly negatively associated.

For Tanzanian school children, hemoglobin concentration and height were significant predictors of scores on sentence reading, arithmetic, and spelling. An emphasis in the Tanzanian study was on school infrastructure, which can be approximated to some degree using information on textbooks, number of chairs, class size, years of teacher experience, and number of homework assignments. The numbers of work assignments and years of teacher experience were significant predictors of scores on sentence reading and arithmetic, respectively. Moreover, children's school attendance was positively and significantly associated with test scores.

## Food Policies, Supply of Nutritious Foods, and Diet Quality in Developing Countries

Sustainable improvements in diet quality in developing countries entail the availability of nutritious foods at affordable prices especially for the poor. Although the income elasticities of nutrients noted above indicated higher intakes of micronutrients with rises in incomes, from a general equilibrium standpoint, the prices of nutritious foods such as animal products are likely to increase with economic development due to higher demand. To ensure adequate micronutrient intakes by the poor, it is important to increase the supply of nutritious foods, which may require educational campaigns and additional earmarked revenues ([Buchanan 1963](#)).

### *Livestock Production and Diet Quality*

The importance of animal products such as milk and meat for diet quality and nutritional status is widely recognized (e.g., [Food and Agriculture Organization 2010](#); [de Beer 2012](#)). Such foods are good sources of protein, calcium, and heme iron, and

they are important for children's physical development. There are differences in the patterns of demand for milk and meat products in developing countries. In countries such as India, milk products are consumed by many households, whereas meat products are popular in East Asian, sub-Saharan, and Latin American countries. In the absence of refrigeration and other technologies, milk is easily contaminated, which is also true for meat products. Because livestock production plays an essential role in improving population health, it will be useful to discuss strategies for improving the availability and safety of animal products.

First, productivity in the dairy sector is often low in developing countries due to the small numbers of animals that poor households can afford. Cooperatives can facilitate advanced technology for milk processing and obtain higher prices for producers without raising the prices consumers pay (e.g., [Alderman 1986](#)). In addition, recent developments such as access to mobile phones can shorten the time that milk is kept without refrigeration via faster communication between small buyers and sellers using text messages. However, it may be difficult to implement computer algorithms requiring "smart phone" technology ([Gichamba and Lukandu 2012](#)) without significantly increasing computer literacy among uneducated farmers in developing countries.

Second, fermentation technologies using starter cultures ([Holzapfel 2002](#)) can facilitate the preservation of milk products. This is important because contaminated milk products are unhelpful from the standpoint of nutrient absorption and can increase nutrient loss via bacterial infections. Moreover, different types of cheese and meat products with longer shelf lives can be produced using lactic acid bacteria ([Leroy and de Vuyst 2004](#)). Finally, increasing fish output from ponds in Bangladesh has been found to increase children's protein, calcium and iron intake ([Bouis et al. 1998](#)). Such interventions circumvent some of the storage aspects.

### *Educational and Media Campaigns for Improving Diet Quality*

Improvements in diet quality in developing countries can be facilitated via different policies for the poor and affluent population subgroups. For example, although reductions in under-nutrition in Thailand have been impressive, there has been slow progress in obesity reduction among the affluent ([Chavasit, Kasemsup, and Tontisirin 2013](#)). Because the poor are likely to be less educated, educational and media campaigns to improve maternal and child health outcomes can be implemented via public programs. The Integrated Child Development Services programs in India, for example, encourage locally manufactured, fortified foods for young children to provide dietary energy and essential nutrients ([Avula et al. 2011](#)). In contrast, the diets and lifestyles of affluent populations in developing countries might be influenced by educational campaigns such as those designed for reductions in salt and fat intakes in developed countries ([Prentice et al. 2006](#)). For

example, a six-month health education program in Ghana significantly reduced the salt intake and blood pressure of the participants (Cappuccio et al. 2006).

The implementation and evaluation of the effects of educational campaigns, such as campaigns to reduce coronary heart disease in South Africa (Steyn et al. 1997), can be intricate. Although the “low-intensity” mass media campaign, which involved fewer resources, and “high-intensity” interventions over a four-year period produced similar reductions in individuals’ risk factors such as blood pressure and low-density lipoprotein (“bad”) cholesterol, the follow-up after 12 years showed that communities that received the high-intensity interventions fared poorly compared to those that received the low-intensity campaigns. The greater impact of low-intensity campaign was attributed to “very active” physicians assigned to the communities. Moreover, other health initiatives were undertaken in the communities during the 12-year period. It is often difficult to relate long-term outcomes to initial interventions, especially in population settings that cover large and diverse communities.

The 1987 government campaign in Mauritius to change from palm cooking oil that is high in saturated fat to the healthy soya bean oil lowered individuals’ serum cholesterol levels by approximately 15 percent (Uusitalo et al. 1996). Although such campaigns can improve population health, they may be difficult to implement in developing countries, where the population is accustomed to consuming certain ingredients. Media campaigns, such as those for lowering coronary heart disease in sub-Saharan Africa (Sampson, Amuyunzu-Nyamongo, and Mensah 2013), have helped consumers make healthier food and lifestyle choices. However, due to the ubiquitous availability of processed foods (Monteiro et al. 2013) in developing countries, indirect taxes discouraging consumption may also be useful and are discussed next.

### *Indirect Taxes on Unhealthy Processed Foods to Improve Population Health*

The coexistence of under-nutrition among the poor and over-weight among affluent populations in developing countries complicates the task of food policy formulation. It is important to reduce fat, sugar, and salt intakes by overweight individuals and to promote physical activity to reduce the risks of chronic diseases. Furthermore, the treatment of chronic diseases is lucrative for medical professionals, whereas infectious diseases associated with poverty are treated with minimal resources (Bhargava 2001). The quality of healthcare that is available to well-off individuals in developing countries is often much higher than the quality of healthcare available to others (Das, Hammer, and Leonard 2008). Thus, the prevalence of obesity in developing countries entails a repugnant redistribution of medical resources from the poor to the affluent, amounting to a negative externality that could be addressed via indirect taxes (Pigou 1932) and other interventions.

First, there has been an emphasis in developed countries on discouraging the consumption of processed, unhealthy foods containing “added sugars”, such as in desserts and soft drinks (Institute of Medicine 2005; Mytton, Clarke, and Rayner 2012). Recent evidence from China suggests that the consumption of processed snacks is increasing, especially among children from affluent households (Wang et al. 2012). Moreover, added sugars have been found to displace the intake of vital nutrients, such as protein, iron, and vitamins A, B, and C among low-income populations in the United States (Bhargava and Amialchuk 2007). Thus, soft drinks and desserts are good candidates for higher indirect taxes to reduce their consumption. In contrast with developed countries, such foods are consumed mainly by the affluent in developing countries, so taxes will be progressive.

Second, there is a paucity of evidence on the magnitudes of price elasticities of demand for unhealthy foods, even from developed countries. Researchers often invoke unrealistic assumptions, such as “price elasticities for food items do not vary across income quintiles” (Nnoaham et al. 2009). Despite the limited information, higher taxes on foods containing added sugars and fats are likely to be beneficial for population health. If, for example, the demand for unhealthy processed foods is elastic and taxes reduce consumption, then higher taxes will help lower the prevalence of diabetes and cardiovascular disease. In contrast, if the demand is inelastic, then greater revenues can be raised due to small reductions in consumption.

Third, the sugar, fat, and salt contents of processed foods can be considered in the design of indirect taxes. Moreover, the labeling of processed foods in developing countries will benefit from labeling systems in developed countries (e.g., Young and Swinburn 2002). For example, even among low-income households in the United States, reading nutrition labels was positively associated with the ratios of carbohydrate,  $\beta$ -carotene, and fiber intakes to energy intake and was negatively associated with fat intake (Bhargava 2004).

Fourth, countries such as Australia, Canada, Denmark, and Mexico are experimenting with differential taxes depending on the nutrient composition of foods. Although the “fat” tax on saturated fats imposed in Denmark in October 2011 was abruptly rescinded in November 2012 (partly due to opposition from food manufacturers and retailers), there were redistributive issues regarding the burden of the tax on the poor and price increases of butter by discount stores (Jensen and Smed 2013). The long-term effects of this tax on population health outcomes will be difficult to assess. In contrast, the effects of the tax enacted in Mexico in 2010 on the consumption of sugar-sweetened beverages (Barquera, Campos, and Rivera 2013) will provide useful information for developing countries considering tax schemes.

Fifth, earmarked revenues can help achieve policy goals in certain situations (McCleary 1991; Jimenez and Paqueo 1996). This is particularly true in cases where it may be difficult to raise additional revenues without specifying redistribution objectives and individuals’ willingness-to-pay may be difficult to ascertain.

Finally, public and private health insurance programs should encourage greater utilization of preventive services to reduce the consumption of processed unhealthy foods and to reduce chronic diseases through greater physical activity. Although such strategies have been investigated in randomized controlled trials in developed countries, it is important to integrate nutrition counseling and physical exercise in healthcare services in developing countries.

## Conclusion

This paper considered several factors that affect diet quality in developing countries and the effects of nutrient absorption on child health from the viewpoint of food policy formulation. Moreover, factors underlying the supply of nutritious foods were examined. In this section, we summarize the main findings. First, the estimated income elasticities of energy and nutrient intakes using data from India, the Philippines, and Kenya underscored the roles of household incomes for improving diet quality. For micronutrients such as iron, absorption rates are low, so it is important to focus on bioavailable iron intakes to reduce deficiencies. For example, it would be helpful to design policies to improve the iron content of staple foods such as rice and beans while increasing the intakes of vegetables such as orange flesh sweet potato that contain higher quantities of  $\beta$ -carotene. Such policies will gradually benefit large numbers of individuals, although the evaluation of the benefits would require an extended time frame.

Second, the magnitudes of income elasticities of calcium intakes showed increases with household incomes in India, the Philippines, and Kenya. Dairy products are good sources of calcium and increase the intake of heme iron that is readily absorbed. Thus, the promotion of dairy farming is likely to have beneficial effects for child health. Such interventions have been successful in increasing children's physical growth in developed countries so that less emphasis needs to be placed on short-term evaluations in developing countries.

Third, the effects of environmental factors such as poor sanitation and water quality on children's morbidity were emphasized because they hinder nutrient absorption. The evidence on Filipino, Kenyan, and Bangladeshi children showed the importance of good nutritional status assessed via intake of vitamin A and height, weight and hemoglobin concentration to reduce morbidity. The results for Indian children's hemoglobin concentration indicated the importance of the utilization of healthcare services.

Fourth, for pre-school and school-aged children, food and health policies should improve the nutritional status of younger children, especially when resources are limited. Morbidity levels typically decline with age as immunity systems develop. Previous analyses of Filipino and Kenyan data also showed beneficial effects of diet

quality for children's age-adjusted height and weight (Bhargava 1994, 1999). Thus, food policies such as maternal supplementation programs during pregnancy to improve birth outcomes, supplementation of lactating mothers to support infant growth, and supplementation programs for preschool children are likely to improve children's growth. In addition, family planning programs that enable birth spacing reduce demands on the low maternal nutrient stores in developing countries.

Fifth, encouraging livestock production will be helpful for child growth because dairy products increase calcium and heme iron intakes. In addition, the cultivation of fruits and vegetables, even on a small scale, can increase vitamin A and C intakes, which enhance non-heme iron absorption. Although the resources available for dairy farming and vegetable cultivation are often limited, additional revenues from taxing unhealthy processed foods can support higher intakes of animal products by the poor. Sixth, children's cognitive development is critical for the future supply of skilled labor and for economic development. Improving diet quality in terms of protein and micronutrient intakes will be beneficial for children's physical and cognitive development. Future gains in economic productivity from education are likely to be substantial, as demonstrated by impressive economic growth in countries such as Japan, South Korea, and China.

Finally, it is important to design educational programs and indirect taxes on unhealthy processed foods to improve diet quality. A lower burden of chronic disease will, in turn, enable greater healthcare resources for the poor. More elaborate food labeling systems, educational campaigns, and taxes on processed foods that depend on fat, sugar, and salt content can improve population health and economic productivity in developing countries.

## Note

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# Drivers of Entrepreneurship and Post-entry Performance of Newborn Firms in Developing Countries

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Francesco Quatraro and Marco Vivarelli

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*The aim of this paper is to provide an updated survey of the “state of the art” in entrepreneurial studies with a particular focus on developing countries (DCs). In particular, the concept of “entrepreneurship” is critically discussed, followed by a discussion of the institutional, macroeconomic, and microeconomic conditions that affect the entry of new firms and the post-entry performance of newborn firms. The reviewed literature bears some policy implications for the support of the creation new firms, such as the targeting of policy measures to prospective entrepreneurs who possess high education levels, long previous job experience, and innovative skills. Specifically, for DCs, tailored subsidies and support should be coupled with framework and infrastructural policies that are able to improve the business environment such that new ventures can start and grow. JEL Codes: L26, O12*

According to [Schumpeter \(1934\)](#), entrepreneurship is a driving force of innovation and, more generally, an engine for economic development ([Audretsch, Keilbach and Lehmann 2006](#); [Koellinger and Thurik 2012](#); for a comprehensive survey, see [Van Praag and Versloot 2007](#)). As detailed by [Wennekers and Thurik \(1999\)](#) and [Dejardin \(2011\)](#), new firm formation may play a crucial role in fostering competition, inducing innovation and supporting the emergence of new sectors. Ultimately, new firms may substantially contribute to job creation provided that the net effect of new entrants brings about overall market growth ([Malchow-Møller, Schjerning, and Sørensen 2011](#)).

The relationship between the rate of new firm creation and economic development is, however, heterogeneous across countries. The distinction between advanced and

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developing countries (DCs) is particularly important in this respect. [Wennekers et al. \(2005\)](#) showed that the link between entrepreneurial dynamics and economic performance is not monotonic. On the contrary, they found evidence of a U-shaped relationship between the level of development and the rate of entrepreneurship (see also [Ligthelm 2011](#), 163). This finding suggests that entrepreneurship does not yield the same effects in every place. Based on this contribution, [Amoròs and Cristi \(2008\)](#) analyzed the Latin American evidence by adopting an interpretative framework based on [Porter's \(1990\)](#) scheme of country economic development, which identifies three stages: factor-driven, efficiency-driven and innovative-driven. These authors provided further support for the U-shaped hypothesis. In particular, they showed that Latin American countries are clustered in the downward part of the curve.

Such heterogeneous evidence at the aggregate level can be better understood when the focus is shifted to the micro foundations of entrepreneurship. Since the seminal contribution by [Baumol \(1990\)](#), we have known that “Schumpeterian” innovative entrepreneurs coexist with “defensive and necessity entrepreneurs.” The latter are those who enter a new business because of market opportunities and innovative ideas but merely because they need income to survive.<sup>1</sup> For obvious reasons, this type of “survival-driven” self-employment is particularly diffused in DCs ([Naudé 2009, 2010](#); [Desai 2009](#)), where poverty and a lack of formal opportunities in the wage sector often push a large number of people into “entrepreneurial” activities ranging from street vending to traditional and personal services (in most cases, within the informal sector of the economy; see [Ihrig and Moe 2004](#); [Maloney 2004](#); [Sonobe, Akoten, and Otsuka 2011](#)). The prevalence of survival-driven entrepreneurs in DCs is often associated with the choice to stay small and informal rather than participating in the formal sector of the economy ([Desai 2009](#); [Klapper, Amit, and Guillén 2010](#)). This is one of the reasons why the effects of entrepreneurship on the economic performance of DCs appear to be problematic. However, [Amoròs and Cristi \(2011\)](#) study the relationship between entrepreneurship and human development indicators and provide empirical evidence for the hypothesis that although this type of entrepreneurship is rarely able to trigger the economic performance of DCs, it nonetheless contributes to the reduction of inequalities by affecting the wealth distribution in the society. On similar grounds, [Naudé, Amoros, and Cristi \(2011\)](#) posit that the effects of entrepreneurship in DCs should be analyzed by looking at broader and more non-material and subjective measures of human well-being. Their findings suggest that entrepreneurship in DCs may matter for individual and societal development beyond the mere increase of GDP.

The emphasis on the development stage of countries calls for a special attention to the evolution of their industrial structure. Since the seminal contributions by [Marshall \(1919\)](#) and [Kuznets \(1930\)](#), we have known that a country's economic performance is related to the main sectors in which it shows a comparative

advantage. The fortunes of countries as well as the dynamics of entry, exit, and growth are therefore closely related to the relative stage of the lifecycle of their industries (Klepper 1997).

In this respect, the empirical evidence concerning industrial dynamics casts doubt on the progressive potentialities of business start-ups. First, the survival rates of new firms are strikingly low: the available econometric evidence shows that more than 50 percent of new firms exit the market within the first five years of activity (Dunne, Roberts, and Samuelson 1989; Reid 1991; Geroski 1995; Mata, Portugal, and Guimaraes 1995; Audretsch and Mahmood 1995; Audretsch, Santarelli, and Vivarelli 1999a; Johnson 2005).

Second, entry and exit rates are significantly correlated (called “turbulence”; Beesley and Hamilton 1984). This is one of the uncontroversial “stylized facts” of the entry process according to Geroski (1995, 424), who noted that the “mechanism of displacement, which seems to be the most palpable consequence of entry, affects young, new firms more severely” (see also Baldwin and Gorecki 1987, 1991). Indeed, entry and exit rates have been found to be positively correlated across industries in OECD countries (Bartelsman, Scarpetta, and Schivardi 2005) and in DCs (Bartelsman, Haltinwanger, and Scarpetta 2004<sup>2</sup>).

This evidence opens the way to considerations regarding the alleged role of entry as a vehicle for technological upgrading, productivity growth and employment generation. One should be very cautious in seeing entrepreneurship measured as new firm formation as the main driver of development for a DC. If entry were indeed driven mainly by technological opportunities, growing sales, and profit expectations, a negative cross-sectional correlation would be observed between entry and exit rates, particularly over short time intervals.

By the same token, new firm formation may be more or less conducive to technological upgrading and industry growth according to the different sectors in which it occurs. For instance, new technology-based firms (NTBFs; see Acs and Audretsch 1990; Colombo, Delmastro, and Grilli 2004) in advanced manufacturing and ICT services play a different role than small-sized start-ups play in traditional sectors. These considerations concerning the role of the industrial structure are particularly relevant for DCs, where the dominant role of traditional and low-tech sectors renders turbulence more likely and the presence of progressive/innovative entrepreneurs an exception.

Within this context, the rest of the paper is organized as follows. The next section is devoted to the institutional context (which is often the main deterrent to entrepreneurship in the DCs). Subsequently, we move to the microeconomic and personal drivers of entrepreneurship. Then, we discuss the link between ex ante characteristics and post-entry performance of newborn firms, and finally, we briefly conclude.

## Contextual Factors and Institutional Constraints

Together with industrial characteristics, as noted above, the growth of a newborn firm is affected by a larger set of variables that involve the general macroeconomic business climate and with a wide range of institutional factors ([Acs and Audretsch 1990](#); [Geroski and Schwalbach 1991](#); [Audretsch 1995](#)). Overall, previous research has proven that market failures, the infrastructure endowment, and regulatory and legal conditions are important determinants of the post-entry performance of newborn firms. Although this is true even for the developed countries, a fortiori, these institutional constraints may play a crucial role in developing countries, with a larger impact moving from the middle-income to the low-income DCs.

At a general level, the growth of small entrepreneurial firms is obviously constrained by the overall state of the economy, and the economic cycle is important for the availability of exploitable business opportunities ([Nichter and Goldmark 2009](#)). However, the various entrepreneurial dynamics introduced in the previous section engender a composite response to business cycles. Indeed, in recession phases, the reduction of opportunity-driven Schumpeterian entrepreneurs may well be accompanied by the expansion of necessity-driven ones ([Pisani and Pagan 2004](#)).

DCs are also characterized by several market failures that severely hamper the post-entry growth potentialities of entrepreneurial activities. As extensively discussed by [Tybout \(2000\)](#), [Aterido, Hallward-Driemeier, and Pagés \(2009\)](#), and [Vivarelli \(2012\)](#), imperfections in the credit and financial markets, a non-transparent regulatory environment, the lack of infrastructure and the high incidence of bribing are important factors that hinder firms' growth in DCs.

Starting with capital markets, [Rajan and Zingales \(1998\)](#) and [Beck et al. \(2008\)](#) clearly show that firms in financially dependent industries grow much faster in financially developed countries. In contrast, new small firms in DCs are credit and equity rationed in the vast majority of cases because their financial markets are underdeveloped ([Ayyagari, Demirgüç-Kunt, and Maksimovic 2008](#); [Lian, Sepehri, and Foley 2011](#); and below). In fact, capital markets in DCs are characterized by 1) a lower depth (measured, for instance, by a low ratio of bank deposits to GDP; see [Paravisini \(2008\)](#) for the case of Argentina and [Banerjee and Duflo \(2004\)](#) for the case of India); 2) a lower level of competition between financial intermediaries, generating the misallocation of funds (see [Banerjee, Duflo, and Munshi \(2003\)](#), studying the misallocation of capital in India, and [Cole \(2009\)](#), discussing agricultural credit in India); and 3) higher information asymmetries due to institutional and infrastructural underdevelopment (see [Klapper and Love \(2011\)](#) for a general discussion; [Canales and Nanda \(2008\)](#) discuss lending to small businesses in Mexico).

Similarly, a non-transparent regulatory environment with regard to labor market rules, taxation, red tape procedures, property rights and bankruptcy laws is particularly harmful to firms' growth in DCs and may be fatal for young entrepreneurial

activities (Goedhuys and Sleuwaegen 1999; Sleuwaegen and Goedhuys 2002; Beck, Demirgüç-Kunt, and Maksimovic 2005; Lee et al. 2011). For instance, in a recent study, Ardagna and Lusardi (2010) worked with GEM microdata from 37 countries, including eight DCs, and showed that stringent entry regulation, soft contract enforcement rules, and labor market rigidities play an important role in hindering entrepreneurship and strengthening the adverse impact of risk aversion. Moreover, inefficient regulation may hinder the growth of small firms in DCs because they may fear the effects of red tape and higher taxes (De Soto 1989). The regulatory framework often involves counterproductive policy measures that were originally intended to support small firms but actually prevent firms' growth. Indeed, the presence of subsidies addressed to SMEs may push entrepreneurs to keep the size of the firm unchanged - or at least below a given threshold - to maintain eligibility for government funding (Little, Mazumdar, and Page 1987; Mitra and Pingali 1999).

In a developing country context, a prominent role is played by the wide diffusion of bribing, which may abort any chance of growth of a fragile new entrepreneurial activity<sup>3</sup>. For instance, Fisman and Svensson (2007), using data collected from 126 Ugandan firms, show that a 1 percent increase in the bribery rate implies a reduction of 3 percent in firm sales growth. Obviously, corruption may amplify the hampering role of credit constraints (see above) when it involves bank officials who are responsible for screening the entrepreneurial initiatives (Beck, Demirgüç-Kunt, and Maksimovic 2005).<sup>4</sup>

Finally, the lack of an adequate infrastructural endowment including roads and railways, basic utilities such as electricity and water supply, and ICT networks is singled out by the literature as a significant shortcoming that prevents young and small firms in DCs from growing (Aterido, Hallward-Driemeier, and Pagés 2009; Goedhuys and Sleuwaegen 2010<sup>5</sup>; Ghani, Kerr, and O'Connell 2011).

Having discussed the role of the macroeconomic and institutional conditions, we now move the focus of this study to the microeconomic and personal characteristics that may play a role in determining the entry and post-entry performance of new firms in DCs.

## The Microeconomic Determinants of Entry

In the traditional microeconomic textbook narrative, the creation of new firms is driven by profit expectations, economic growth, and technological opportunities (Mansfield 1962; Acs and Audretsch 1989a,b; Geroski 1995), and it is deterred by both exogenous and endogenous entry barriers (Geroski and Schwalbach 1991; Sutton 1991; Arauzo-Carod and Segarra-Blasco 2005). However, the main limitation of the textbook approach is that it focuses on market mechanisms ("pull factors") and

may obscure the decision-making process at the level of the individual,<sup>6</sup> thus underestimating the factors behind an entrepreneur's motivation to start a new business. Indeed, some 20<sup>th</sup>-century authors such as Knight (1921), Schumpeter (1934, 1939), and Oxenfeldt (1943) drew attention to the characteristics of the founder of a new firm. Following their contributions, we are aware that important individual determinants may act as push factors and may be related both to environmental circumstances and to the potential founder's personal characteristics.

For instance, the specific local/sectoral labor market plays an important role given that the vast majority of new founders (approximately two-thirds of them) were previously employed or located in the same geographical area and the same sector. The rest were young people starting their first job experience, ex-entrepreneurs, or founders moving in from an outside region (Vivarelli 1991; Storey 1994; Cressy 1996; Arrighetti and Vivarelli 1999; Shane 2000; Stam 2007). Therefore, entrepreneurship is strongly characterized by sectoral and locational inertia, and this phenomenon is affected by significant persistence (Fritsch and Mueller 2007).

Within this framework, new firm formation can be modeled as an income choice based on a comparison between the wage earned in the previous job and the expected profit as an entrepreneur starting a new business in the same sector and in the same geographical area (Creedy and Johnson 1983; Vivarelli 1991; Foti and Vivarelli 1994; Audretsch 1995; Geroski 1995; Vivarelli 2004; for DCs, see Lévesque and Shepherd 2004). This means that entry may have a counter-cyclical component and may be induced by industrial restructuring and decreasing real wages rather than by buoyant demand expectations and an appropriate endowment of entrepreneurial capabilities (Highfield and Smiley 1987; Hamilton 1989). Pushing this argument further, founding a new firm may be an alternative to uncertain future career prospects or may even represent an "escape from unemployment" (Oxenfeldt 1943; Evans and Leighton 1990; Storey 1991, 1994; Premand et al. 2012).

Thus, entry may be determined by a set of different environmental factors, including some "progressive" determinants, such as profitability and promising technological opportunities, and "regressive" determinants, such as low wages and the actual condition of being (or the fear of becoming) unemployed (the latter conditions are particularly likely in a DC context). Moreover, in determining new firm formation, these environmental drivers interact with the potential entrepreneur's personal traits.

Indeed, new firm founders differ with regard to characteristics such as previous work experience, family tradition, financial status, and personal motivation. The founder of a new firm is heavily influenced by his/her own background, with particular reference to his/her previous job experience (Evans and Leighton 1989; Reynolds et al. 2001; Chlosta et al. 2012). The role of the family background in fostering entrepreneurship has been demonstrated in DCs as well. For instance, Djankov et al. (2006a,b, 2007) have shown that entrepreneurs in China, Russia, and Brazil are

much more likely to have family members who are entrepreneurs as well as childhood friends who became entrepreneurs, suggesting that the family and the social environment play an important role in entrepreneurship.

Another important stream of literature has investigated the impact of financial constraints on business start-ups, mostly following the work of [Fazzari, Hubbard, and Petersen \(1988\)](#). The fact that wealth, inheritance, and windfall gains spur entrepreneurship suggests that business start-ups are often underfinanced ([Parker 2004](#)). Because most new companies need external capital, differences in the ability of capital markets to select and finance the most promising entrepreneurial projects may lead to important differences in the level and quality of entrepreneurship across countries, with DCs obviously suffering a disadvantage in this respect ([Kerr and Nanda 2011](#); [Klapper, Amit, and Guillén 2010](#)).

Other studies show that non-economic personal factors may be even more important than environmental variables. For instance, potential entrepreneurs seem to be strongly influenced by specific psychological attitudes, such as a desire to be independent, a search for autonomy in the workplace, an aspiration to fully exploit previous job experience and acquired ability, and a desire to be socially useful and to acquire improved social status ([Creedy and Johnson 1983](#); [Evans and Leighton 1990](#); [Vivarelli 1991, 2004](#); [Zacharakis, Bygrave, and Shepherd 2000](#)).

If one considers the (often dominant) psychological attitudes discussed above, entry mistakes and excess entry can be further justified. In fact, the observed occurrence of these entry mistakes suggests an attitude that can be defined as a “try and see” bet. Accordingly, market churning, turbulence, and early failure observed at a more aggregate level of analysis emerge as normal and expected features of industrial dynamics.

These findings lead to the conclusion that several heterogeneous entry processes are simultaneously at play in the economy and that opportunity entrepreneurs, who bring about innovation and economic growth, should be distinguished from “revolving door” start-ups, which are doomed to early failure and generate only precarious and temporary jobs ([Baumol 1990, 2010](#)).

Obviously, this distinction is a fortiori crucial when we focus on DCs, where entrepreneurship and self-employment often generate informal and transient activities that are not very different from “disguised unemployment.”

## Drivers of the Post-entry Performance of Newborn Firms

Because entrepreneurs are embedded in different institutional contexts and are driven by both progressive and regressive determinants, the post-entry performance of newborn firms and their eventual contribution to economic development may also be diverse. From an empirical perspective, a relatively recent stream of literature has

focused on the drivers of survival (or early exit) and growth of newborn firms (among the early studies, see [Reid 1991](#); [Boeri and Cramer 1992](#); [Baldwin and Rafiquzzaman 1995](#)). Within this field of research, it is possible to analyze the relationship between the ex ante features of entry, on the one hand, and both survival and (conditional on survival) the post-entry performance of newborn firms, on the other hand. The following subsections are devoted to investigating what have been found to be the most important ex ante characteristics that affect the post-entry performance of new businesses.

## Size and Age

Many studies have identified a positive relationship between start-up size and survival ([Audretsch and Mahmood 1995](#); [Mata, Portugal, and Guimaraes 1995](#); [Agarwal and Audretsch 2001](#); for more controversial results, see [Audretsch, Santarelli, and Vivarelli 1999a,b<sup>7</sup>](#)). Because entry implies sunk costs ([Sutton 1991](#)) and generally occurs at a scale that is lower than the minimum efficient scale (MES), a larger entry size is a signal of commitment and self-confidence and makes both the occurrence of wrong entry decisions and the risk of failure due to diseconomies of scale less likely.

Moreover, a larger start-up size is positively correlated with other factors, such as lower credit constraints and a higher technological capability, which are predictors of a higher likelihood of survival and better post-entry performance. Therefore, a larger start-up size can be considered a reliable indicator of better chances of survival of a newborn firm.

In contrast, a vast number of papers have found (conditional on survival) a negative relationship between start-up size and post-entry growth, thus rejecting Gibrat's Law<sup>8</sup> ([Gibrat 1931](#); [Hall 1987](#); [Hart and Oulton 1996](#); [Sutton 1997](#); [Lotti, Santarelli, and Vivarelli 2003, 2009](#)). This evidence means that smaller entrants with a sub-optimal entry size and with a higher risk of early failure (see above) must grow to survive and reach the MES as soon as possible. However, it is worth emphasizing that the (negative) relationship between size and growth has been found to be significant within the sub-sample of new entrants that struggle to survive ([Lotti, Santarelli, Vivarelli 2003](#)). Once market selection is accounted for, long run analyses have shown that a convergence towards Gibrat-like behavior can be detected among the surviving most efficient firms ([Lotti, Santarelli, and Vivarelli 2006, 2009](#); [Daunfeldt and Elert 2013](#)). In other words, once small entrants have succeeded in approaching an efficient scale of production, their growth dynamics increasingly resemble a stochastic process in which size and growth are independent.

A firm's age consistently turns out to be positively correlated with survival (that is, the hazard rate is decreasing with age; see [Fackler, Schnabel, and Wagner 2013](#)) and negatively with growth ([Evans 1987](#); [Dunne and Hughes 1994](#); [Calvo 2006](#); [Coad,](#)

Segarra, and Teurel 2013). Experienced, mature firms are more able to address market dynamics and thus are more likely to stay in the market. However, once they have reached (or are very close to) the MES, they do not need to grow very fast.<sup>9</sup>

Although all of the studies cited so far concern developed countries, the evidence from DCs is similar. For instance, Das (1995), examining the Indian computer industry, found a significant negative relationship between firm growth and initial firm size. McPherson's (1996) study of five southern African countries detected a significant negative link between firm growth and both the firm's size and age. Goedhuys and Sleuwaegen (2000) and Sleuwaegen and Goedhuys (2002) analyzed 141 and 129 manufacturing firms in Côte d'Ivoire, respectively, and found negative correlations between firm growth and both firm size and age. Finally, Bigsten and Gebreeyesus (2007) ran GMM-SYS panel estimates covering census-based Ethiopian manufacturing firms over the 1996–2003 period and showed that the negative relationship between size and age, on the one hand, and firms' employment growth, on the other, is significant and robust to sample selection and unobserved firm heterogeneity.<sup>10</sup>

In summary, a larger start-up size is reassuring in terms of the likelihood of survival and ensuring that job creation linked to the newborn firm is not transitory. In contrast, to survive, smaller new entrants must grow rapidly so they can contribute to employment growth. However, in the latter case, the job creation effect related to the surviving and fast-growing small entrants must be compared with the massive job losses due to the early failure of most small newborn firms.

### *Entrepreneurial Learning*

From a theoretical point of view, Lucas (1978) was the first to propose a theory of the size distribution of firms based on the relative endowment of entrepreneurial talents. However, the first author to represent the post-entry evolution of newborn firms formally was Jovanovic (1982), who proposed a Bayesian model of noisy selection in which efficient firms grow and survive, whereas inefficient ones decline and fail. Jovanovic's model of entrepreneurial learning is perfectly consistent with a world in which founders are quite heterogeneous in terms of both general and specific characteristics, entry mistakes can easily occur, entry can be originated by a "try and see" bet and early failures are rather common (see previous sections; Hopenhayn 1992; Ericson and Pakes 1995).

If entrepreneurial learning is crucial and entry is often tentative, both spinoffs (entrepreneurs leaving a mother firm to found a new business) and "serial entrepreneurs" (founders who have previously run other businesses) may have an advantage compared with "de novo" entrepreneurs.<sup>11</sup> For example, Hirakawa, Muendler, and Rauch (2010), using microdata from Brazil over the 1995–2001 period, found that spinoffs are characterized by larger entry sizes and lower exit rates than are

new firms that are not generated by a parent company. Similarly, the role of past experience and path-dependence is confirmed by the fact that serial entrepreneurs are more likely to replicate the success of their past companies than single venture entrepreneurs or serial entrepreneurs who failed in their prior business (Gompers et al. 2006).

Empirical studies on DCs provide support for the importance of entrepreneurial learning for the post-entry performances of newborn firms either by observing the direct effect between experience and survival (Parker 1997) or by showing that in contexts characterized by a substantial absence of learning opportunities, the average survival is quite short (Barr 1998). McPherson (1996) found a positive relationship between annual employment growth and the previous experience of the founder in similar economic activities for entrepreneurial firms in Swaziland and Botswana, whereas Vijverberg (1991) and Goedhuys and Sleuwaegen (2000), in studies of Côte d'Ivoire, found that job experience previously acquired in the same industry both increases the likelihood of founding a new business and contributes to a firm's better performance.

Nichter and Goldmark (2009) noted an additional channel by which learning on the job may positively affect the survival rate of newborn firms: previous work experience may expand entrepreneurs' social network, which, in turn, can positively affect post-entry performance (see also Barr 1998; Kantis, Angelli, and Koenig 2004). However, the authors stress the differences between DCs and advanced countries with regard to this link, and the evidence about DCs is quite controversial.<sup>12</sup>

Finally, turning our attention to a managerial and organizational perspective, new founders who had previously been employed as top managers in the same sector and who have better access to relevant information are expected to exhibit better post-entry business performance due to their better ability to run and organize complex activities (for an empirical validation of these relationships, see Cooper, Gimeno-Gascon, and Woo 1994; Cressy 1996; Arrighetti and Vivarelli 1999; Shane 2001; Vivarelli 2004).

### *Financial Constraints*

Credit constraints and a lack of financial capital in general should limit the rate of entry of new businesses as well as their likelihood of survival and rate of growth (Becchetti and Trovato 2002; Carpenter and Petersen 2002; Aghion, Fally, and Scarpetta 2007). However, some recent microeconomic studies have shown that the role of credit rationing has been somewhat over-emphasized and that entrepreneurial saving plans may be able to overcome borrowing constraints (Cressy 1996, 2000; Parker 2000; Hurst and Lusardi 2004).<sup>13</sup>

At any rate, new entrepreneurial initiatives in DCs are credit-rationed in the vast majority of cases due to a lack of collateral, informational asymmetries, and largely

imperfect local capital markets. For this reason, micro and small firms in DCs rarely apply for and receive formal bank loans. Instead, they rely on other sources of credit, such as trade credit, overdrafts, and informal loans (Bigsten et al. 2003). Indeed, the lack of credit represents a severe impediment to the growth of small firms in the early years of activity. For instance, Goedhuys and Sleuwaegen (2010), in a study investigating 947 small and medium entrepreneurial firms in several manufacturing industries in 11 Sub-Saharan African countries,<sup>14</sup> report that financial constraints are singled out as the major obstacle (from 11 alternatives) to a firm's growth in five of 11 countries. In the previously cited paper on Côte d'Ivoire, the authors consistently find that a lack of collateral significantly hampers firms' growth (Goedhuys and Sleuwaegen 2000, 139). In this framework, the successful diffusion of microfinance in DCs can be seen as a way of reducing information and transaction costs in screening and financing small and new businesses (Yunus 1999; Fogel, Lee, and McCumber 2011).

A somewhat more skeptical position is proposed by Akoten, Sawada, and Otsuka (2006), who conducted an econometric test of the effects of credit rationing on the growth of 225 micro and small garment firms in Nairobi. Their results show that credit access does not affect significantly firms' growth and that the factors that affect credit access are clearly different from those that affect firms' growth.

### *Education*

Not surprisingly, it has been demonstrated that education and human capital have an important role in increasing the likelihood of survival of new firms and in improving their post-entry economic performance (Bates 1990; Gimeno et al. 1997; Acs, Armington, and Zhang 2007). In particular, human capital aspects are particularly important in fostering entrepreneurship in the high-tech sectors. For instance, Baptista and Mendonça (2010) show that local access to knowledge and human capital significantly affect entry by knowledge-based firms, whereas Colombo and Grilli (2010) note that the founder's human capital is a key driver of post-entry growth of high-tech start-ups.

Turning our attention to DCs and taking into account that entrepreneurship and self-employment are often carried out within the informal sector of the economy in this context, the impact of education is controversial. In fact, higher education augments the managerial capabilities necessary to run a business enterprise, but it also increases the outside option for salaried employment in the formal sector of the economy. This is most likely the reason why van der Sluis, van Praag, and Vijverberg (2005), in their comprehensive survey, found that in the majority of DCs, education reduces the likelihood of entering self-employment as contrasted with wage-earning employment.

In contrast, [Goedhuys and Sleuwaegen \(2000\)](#) ran logit estimations on data concerning the owners of 141 manufacturing firms in Côte d'Ivoire and found that the probability of being an entrepreneur is strongly stimulated by both apprenticeship and formal education, with the positive effect of education steadily increasing from lower to higher levels of education. Similarly, [Ghani, Kerr, and O'Connell \(2011\)](#), using cross-sectional establishment-level surveys of manufacturing and services companies in Indian districts, conclude that higher education in a local area significantly increases the supply of entrepreneurs. However, this relationship becomes non-significant when the informal manufacturing sector is taken into account. This is an interesting outcome that confirms that education may render the choice of being a wage earner preferable to entering self-employment in the informal sector (often characterized by “defensive entrepreneurship”).<sup>15</sup>

The evidence concerning the relationship between education and the post-entry performance of new businesses in DCs may also appear controversial on the surface. For example, [Kantis, Angelli, and Koenig \(2004\)](#) show that secondary school attainment yields no discernible impact on firm growth in Latin America. On the contrary, other studies, such as [van der Sluis, van Praag, and Vijverberg \(2005\)](#), conclude that an additional year of schooling raises entrepreneurial income by an average of 5.5 percent. Similarly, [McPherson \(1996\)](#) found that in Botswana and Zimbabwe, business owners who have completed secondary school run faster-growing firms than do those proprietors with no schooling. Finally, [Goedhuys and Sleuwaegen \(2000, 2010\)](#), using data from Côte d'Ivoire and from 11 Sub-Saharan African countries, respectively, found unequivocal evidence that formal education of an entrepreneur positively affects a firm's growth performance, measured in terms of the growth rates of sales and employment, respectively (in both studies, the greatest effect on growth is found for entrepreneurs who hold a university degree).<sup>16</sup>

[Nichter and Goldmark \(2009\)](#) maintain that such apparent contradictions disappear if one takes into account a sort of “threshold effect” of education. Small firms with more educated owners are more likely to experience faster growth rates, but a country-specific threshold should be reached for this effect to take place. For example, whereas the threshold enabling faster growth appears to be secondary school in African countries, in Latin America, one can observe a higher threshold at the university level. Finally, it is worth noting the potential harmful effects of higher education, which may divert the attention of firms' owners to other business opportunities, leading these owners to pay little attention to the workings of their actual business ([Alvarez and Crespi 2003](#)).

### *Technological Change*

If the underlying motivation to start a new firm is linked to innovative projects, then better post-entry performance should be expected.<sup>17</sup> Empirically, this seems to

be the case. In fact, a propensity for innovation emerges generally as a firm's growth driver (see, for instance, [Coad and Rao 2008](#); [Altindag, Zehir, and Acar 2011](#); [Colombelli, Krafft, and Quatraro 2014](#)) and specifically as a positive predictor of survival and an above-average post-entry performance of newborn firms ([Esteve-Pérez, Sanchis, and Sanchis 2004](#); [Raspe and Van Oort 2008](#); [Colombelli, Krafft, and Quatraro 2013](#)).<sup>18</sup>

Consistent with the discussion above, [Cefis and Marsili \(2006\)](#) found convincing evidence of an “innovation premium” in survival time. Using [Pavitt's \(1984\)](#) taxonomy, they showed that young firms (less than four years old) in the “science-based” and “specialized supplier” sectors were characterized by significantly higher chances of survival than firms in other sectors. More specifically, [Cefis and Marsili \(2005\)](#) showed that being an innovator enhanced the expected time of survival by 11 percent compared with non-innovator counterparts.

However, the impact of innovation on the post-entry performance of newborn firms is strictly related to sectoral differences and ultimately to the differential patterns of specialization of countries discussed above. In fact, entrepreneurial dynamics in DCs are more likely to occur in sectors that are far from the technological frontier. Therefore, the prevalence of traditional and mature sectors makes these contexts less fertile for innovation-driven entrepreneurship. According to [Siqueira and Bruton \(2010\)](#), high-technology entrepreneurship in emerging economies is subject to greater resource constraints and higher levels of informality than in advanced countries. These two factors are likely to mitigate any possible positive effect of technology investments on firm performance.

Moreover, as far as technological change is concerned, a distinction must be made between low-income and middle-income DCs. Middle-income DCs primarily import innovation produced elsewhere in the global economy, whereas low-income DCs are often completely excluded from any innovative process (see [Robbins and Gindling 1999](#); [Robbins 2003](#); [Lall 2004](#); [Lee and Vivarelli 2006](#); [Srholec 2011](#)).

Finally, the international diffusion of technologies is likely to be grounded in creative rather than passive adoption ([Antonelli 2006](#)). Technological congruence, institutional setting and governmental arrangements shape a country's capacity to absorb knowledge and technologies produced elsewhere ([Dosi and Nelson 2013](#)). Social capabilities represent the set of cultural, political, commercial, industrial and financial institutions that create the conditions for catching-up countries to absorb and exploit the technologies developed elsewhere ([Abramovitz 1986](#)). For example, a study conducted on Brazil, Russia, India, and China (the so-called BRIC) confirmed that their institutional specificities play a major role in shaping their rapidly growing economies ([da Rocha, Ferreira da Silva, and Carneiro 2012](#); [Kim, Park, and Lee 2013](#); [Gupta et al. 2014](#)). Nevertheless, in most DCs and even in BRIC, the role of R&D-driven new firms and domestic NTBFs<sup>19</sup> is extremely limited. Therefore,

it is not surprising that very few studies attempt to link innovation with entrepreneurship within a DC context.

[Santarelli and Tran \(2011\)](#) studied entrepreneurship in Vietnam using a panel of regional-level data for 61 provinces over the 2000–8 period. Among other outcomes, the authors found that an innovative climate (proxied by the share of technical/R&D personnel in the province) significantly and positively affects the regional net entry rate. As for post-entry performance, in the previously cited study by [Goedhuys and Sleuwaegen \(2010\)](#) on Africa, the innovative capability (proxied by a dummy for the introduction of new products) was found to increase a firm's annual employment growth by 2 percent on average.

### *Unemployment*

Regarding unemployment (or the fear of becoming unemployed), the literature notes two stylized facts: 1) those who start a new business as an escape from unemployment exit to a higher extent than those who enter from paid employment (see [Carrasco 1999](#); [Pfeiffer and Reize 2000](#); for slightly more optimistic evidence, [Caliendo and Kritikos 2010](#)); 2) new founders who were formerly unemployed have, on average, lower economic outcomes and a lower propensity to contribute positively to job creation.

For instance, [Arrighetti and Vivarelli \(1999, 936\)](#) found that defensive motivations, such as concern about future career developments and the fear of becoming unemployed, were predictors of below-average post-entry evolution. Similarly, [Andersson and Wadensjö \(2007\)](#), using a large sample of Swedish-born men who were self-employed in the 1999–2002 period and who were wage-earners, unemployed or inactive in 1998, showed that those who were previously unemployed had systematically lower incomes compared to those who were previously wage earners. Moreover, they found that income from self-employment declined with the number of days spent in unemployment and that previously unemployed entrepreneurs were significantly more likely to be “solo” entrepreneurs (i.e., to have no employees).

With regard to DCs, the literature is extremely scarce.<sup>20</sup> However, [Wang \(2006\)](#) found convincing evidence that unemployment fostered start-ups in Taiwan (China) over the 1986–2001 period. In contrast, in the previously cited work by [Santarelli and Tran \(2011\)](#), no significant impact of the unemployment rate on new firm formation in Vietnam was found.

### *Alien Minorities*

A particular driver of new firm formation in DCs is the role played by ethnic minorities in generating above-average rates of entry and better post-entry performance among newborn firms. The basic hypothesis is that alien minorities may have an

entrepreneurial advantage based on their opportunity to exploit their minority community networks to overcome important hindrances to entrepreneurship, such as regulatory drawbacks, credit constraints, and difficulties accessing available inputs and technologies (Kilby 1983; Biggs and Shah 2006). In addition, from a sociological point of view, an ethnic minority, which is characterized by common traits such as language, culture, and religion, generates trust, social cohesion, and emulation, which are all factors that favor entrepreneurial behavior (Greif 1993; Hobday 1995; Iyer and Schoar 2010). Finally, a minority group may be affected by a feeling of insecurity and frustration (in comparison with a dominant group), which encourages members to seek economic success and better social status (Elkan 1988).<sup>21</sup>

Empirical evidence is generally consistent with the hypotheses just discussed. For instance, Ramachandran and Shah (1999), using firm-level data from Kenya, Tanzania, Zambia, and Zimbabwe and after controlling for firm size and age, various personal characteristics of the entrepreneurs, and sector and country differences, found that Asian and European firms start larger and grow faster than do indigenously owned African firms. Similarly, Hewitt and Wield (1997) show that Asian businesses in the Tanzanian manufacturing sector have better access to sources of technology than do indigenous companies. In the previously cited study by Goedhuys and Sleuwaegen (2000), the consistent finding is that the dummy variable “non-African” significantly and positively affects the likelihood of becoming an entrepreneur in Côte d’Ivoire. When analyzing a randomly selected sample of 296 Ethiopian SMEs, Mengistae (2001) finds that companies owned by the indigenous minority group of the Gurage perform better than average in the country; in particular, new businesses start larger and then grow faster. More recently, Goedhuys and Sleuwaegen (2010) show that the Asian dummy (equal to 1 for entrepreneurs of Lebanese, Indian, Middle Eastern, or other Asian origin) turns out to be positive and significant in affecting firms’ growth in Sub-Saharan Africa.

## Main Findings and Some Policy Suggestions

If one conclusion can be drawn from this study, it is that “entrepreneurship” is performed by very different “animals”. From a macroeconomic point of view, progressive new firm formation can generate permanent economic growth, whereas defensive and regressive start-ups generate only temporary positive effects and, ultimately, market turbulence. From a microeconomic point of view, far from solely being the result of the entrepreneurial “creative destruction” process proposed by Schumpeterian advocates (Schumpeter 1943), any set of entrepreneurial ventures can be seen as a rather heterogeneous aggregate where real and innovative entrepreneurs are found together with passive followers, over-optimistic gamblers and

even escapees from unemployment. Therefore, both scholars and policy makers should bear some important caveats in mind.

First, because founders are heterogeneous and may make entry mistakes, most new firms are doomed to early failure. This type of entry is not conducive to technological renewal and economic growth but simply to an excess of entries, market churning and turbulence. In both developed and developing countries, policy makers should discourage this type of venture.

Second, *ex ante* features may be predictors of survival chances and post-entry business performance. For instance, larger size, previous experience, the absence of credit constraints, higher education, and innovation can be considered positive predictors of a higher likelihood of survival, whereas infrastructural and institutional drawbacks, the absence of an adequate incubator background and a previous state of unemployment can be seen as predictors of early failure.

The implementation of policy measures supporting the creation of new firms should consider these factors. Policy makers could, for example, target potentially successful entrepreneurs by shaping eligibility criteria to gain access to specific funds or tax credits. Although this process cannot ensure the success of new ventures, it would help minimize the risk of wasting public resources by supporting entrepreneurs who have low *ex ante* probabilities of survival (see [Santarelli and Vivarelli 2002, 2007](#); [Mason and Brown 2013](#)). In the specific case of DCs, in addition to having a larger start-up size, higher education, longer previous job experience, and innovative capabilities, belonging to an entrepreneurial ethnic minority can be seen as a preferential trait when deciding how to target a policy addressed at sustaining progressive new firm formation.

However, on average, DCs appear to be strongly affected by regressive factors that induce “defensive” and “necessity” start-ups, which are often concentrated in the informal sectors and doomed to early failure. In this context, the widespread diffusion of general, “*erga-omnes*” entry subsidies as policy instruments in developing countries is unfortunate<sup>22</sup> because they are very likely affected by standard policy failures, such as deadweight and substitution effects ([Vivarelli 2012, 2013](#)). Indeed, umbrella subsidies should be discarded in favor of selective and targeted measures addressed at more promising potential entrepreneurs, such as those characterized by superior human capital or by interesting and feasible innovative ideas.

Examples of targeted policy measures may include 1) public financial aid to innovative projects that are otherwise neglected by a conservative and short-run-oriented capital market (for instance, the Korean government credit guarantee offered to technology-based SMEs suffering from funding problems; see [Sohn and Kim 2013](#)); 2) the already mentioned microcredit support, which is intended to be a way of reducing the information and transaction costs that are so common in DCs and that affect both the screening and the financing of new promising businesses

(Yunus 1999); and 3) public support for innovative start-ups generated by university spin-offs (for recent analyses of this perspective, see Bonaccorsi et al. 2013).

In DCs, more general market failures and regulatory constraints are obvious and severe, ranging from extreme financial rationing to a lack of property rights and bribing. In this context, any entrepreneurial policy should consider it a priority to remove the market, institutional and informational constraints that prevent potential entrepreneurs from starting a new business (Acs and Virgill 2009). In this respect, tailored subsidies and supports, such as those briefly discussed above, should be coupled with framework and infrastructural policies that are able to improve the business climate where new ventures can find a proper environment to start and grow.

In summary, a proper entrepreneurial policy in the DCs should be able to combine a comprehensive macroeconomic approach to release the major institutional constraints to entrepreneurship with selective microeconomic support for the most promising potential entrepreneurs.

## Notes

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1. The identification of necessity entrepreneurs is a non-trivial task. In the recent literature, the distinction between necessity- and opportunity-driven entrepreneurs is established by using the Global Entrepreneurship Monitor (GEM) data. The GEM measures 'necessity-driven' entrepreneurship by including the question 'Are you involved in this start-up [this firm] to take advantage of a business opportunity or because you have no better choices of work?' (Naudé, Amoros, and Cristi 2011). In more general terms, empirical studies single out 'necessity entrepreneurs' either as those who come from unemployment status or as those who answer ad-hoc questionnaires revealing that they are pushed into 'entrepreneurship' by a concern about future career developments or by the fear of becoming unemployed (see also Section 4.6).

2. The authors used a sample of 22 countries (14 European, six Latin American, the US and Canada) and found that the correlation between entry and exit rates across industries in 1990 was positive and significant in the vast majority of cases (Bartelsman, Haltinwanger, and Scarpetta 2004, 21, Table 6).

3. Aterido, Hallward-Driemeier, and Pagés (2009, 10), using evidence from the World Bank Enterprise Surveys, show that 42 percent of firms declare that they have paid bribes, with an average amount paid of 1.5 percent of sales.

4. Aterido, Hallward-Driemeier, and Pagés (2009) provide a slightly different picture, showing that the effect of corruption on growth is different across different size classes. In particular, corruption seems to have no effect on medium-sized firms and some negative effects on small firms, whereas it may help micro firms grow. This phenomenon can be explained by the fact that often, very small firms in DCs do not comply with all prescriptions of business regulation, and they stay persistently in the

informal sector. Paying bribes may therefore be less costly than compliance (see also [Vial and Hanoteau 2010](#)).

5. The authors, using data from the World Bank Investment Climate Survey covering 947 manufacturing SMEs in 11 Sub-Saharan countries, show that firms with their own transport facilities and their own websites exhibit higher growth rates, measured in terms of employment creation.

6. In the conventional approach, entrepreneurship is generally measured as the number of new firms relative to the size of the existing population of businesses in a given industry. In contrast, if the individual 'push factors' are fully considered, new firms must be related to the labor force (for further discussion, see [Santarelli, Carree, and Verheul 2009](#); [Vivarelli 2007](#)).

7. However, as clarified by the authors, these results, in contrast to previous studies, may be due to the peculiarities of the Italian manufacturing sample used, which is dominated by micro-firms well below the minimum efficient scale. In this context, which is characterized by a limited size variability, the positive impact of a larger scale might have been underestimated.

8. [Gibrat \(1931\)](#), proposed that firm growth is predominantly a random process. This amounts to say that firm growth is independent of firm size.

9. Moreover, recent literature has shown that firms' age may play a crucial role in shaping the relationship between size and firms' growth. In particular, [Haltiwanger, Jarmin, and Miranda \(2013\)](#), using data from the Census Bureau's Business Dynamics Statistics and Longitudinal Business Database, show that once one controls for firm age, the negative relationship between size and growth either disappears or reverses the sign due to the large share of exit among the smallest firms. As far as age is concerned, young firms are found to grow more rapidly than mature ones. From this perspective, start-ups are likely to play a key role in the job creation process. However, [Haltiwanger, Jarmin, and Miranda \(2013\)](#) do not focus on start-ups; most of their firms are established incumbents (for an analysis of the link between age and firm's performance, see [Coad, Segarra, and Teruel 2013](#)).

10. Consistent econometric outcomes in studies devoted to DCs can also be found in the studies by [Mead and Liedholm \(1998\)](#), [Gunning and Mengistae \(2001\)](#), [Bigsten and Söderbom \(2006\)](#), and [Coad and Tamvada \(2012\)](#).

11. For instance, [Sørensen and Phillips \(2011\)](#) argue that work experience in the prior firm shapes both the entrepreneur's competence and his/her commitment to the entrepreneurial role. However, although the competence and information inherited from the mother firm provide an initial advantage, parental influence may generate inertia and resistance to change unless the new company is able to create a unique competitive identity (see [Ferriani, Garnsey, and Lorenzoni 2012](#)).

12. A recent article by [Frankish et al. \(2013\)](#) questions the idea that previous work experience affects firms' performances. They propose that there are good reasons to expect no significant effects of work experience, such as the importance of chance, entrepreneurs' propensity toward optimism, and the unlikely event that two business situations are identical. They use UK data to show that there is no significant evidence about entrepreneurial learning. It must be noted, however, that such results could, to some extent, be due to the peculiarity of the sample they use due to institutional specificities of the UK business environment.

13. The risk of overstating the hindering role of credit constraints is particularly high in questionnaire analyses where nascent or newborn entrepreneurs are asked to list their main difficulties in starting and/or running a new firm. In fact, they have the self-indulgent tendency to indicate a lack of external financial support as the main cause of their problems, whereas in most cases, this is only a symptom of more fundamental deficiencies that are internal to the firm.

14. The authors extracted their firm-level data from the World Bank Investment Climate Survey.

15. [Nafziger and Terrell \(1996\)](#), using evidence from India, found that higher education of the founding entrepreneur reduces firm survival, indicating the importance of outside opportunities in paid wage employment within the formal sector.

16. [Ligthelm \(2011\)](#) found that business management skills are one of the strongest predictors of survival among small informal firms in South Africa.

17. For an updated survey on the vast available micro-evidence on the link between innovation and productivity, see [Mohnen and Hall \(2013\)](#). For a discussion of the key role of innovation and R&D

in young firms and SMEs in general, see [Ortega-Argilés, Vivarelli, and Voigt \(2009\)](#) and [Voigt and Moncada-Paternò-Castello \(2012\)](#).

18. For instance, [Arrighetti and Vivarelli \(1999\)](#), after applying a factor analysis to a sample of 147 Italian spinoffs, found that innovative factors (related both to the innovative motivations of the founder and to his/her previous innovative experience in the mother firm) were significantly correlated with post-entry performance. Their subsequent cluster analysis also revealed that the innovative group was more likely to have better post-entry performance (see also [Vivarelli and Audretsch 1998](#)).

19. Rather, R&D-based initiatives in DCs are often the outcome of the outsourcing by US, European, and Japanese multinationals; see [Moncada-Paternò-Castello, Vivarelli, and Voigt 2011](#).

20. This is unfortunate because, as discussed above, “defensive and necessity entrepreneurs” appear to make up the bulk of self-employment in DCs, with activities ranging from street vending and small retailing to traditional personal services.

21. This mechanism can work up to a given threshold. Belonging to a socioeconomically excluded group may decrease the likelihood of successfully founding a new firm (this is the case, for instance, for the caste system in India; see [Monsen, Mahagaonkar, and Dienes 2012](#)).

22. As correctly noted by [Shane \(2009, 41\)](#), “Policy makers believe a dangerous myth. They think that start-up companies are a magic bullet that will transform depressed economic regions, generate innovation, create jobs. This belief is flawed because the typical start-up is not innovative, creates few jobs, and generates little wealth”.

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