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Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

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Local Government Conditional Grants: The Seal of Good Local Governance and the Performance Challenge Fund

Charlotte Justine Diokno-Sicat, Maria Alma P. Mariano, Angel Faye G. Castillo, and Ricxie B. Maddawin[1]

ABSTRACT

The Philippine government provides various intergovernmental fiscal transfers to local government units (LGUs). Mandated by the Local Government Code (LGC) of 1991, the unconditional grant known as internal revenue allotment (IRA) is given to help LGUs bridge the fiscal gap between their capacity to raise revenues and perform devolved services. LGUs can receive conditional grants for certain priorities, such as budgetary allocations from national government programs. Other conditional grants depend on the LGUs' (1) matching counterpart spending and (2) requirements or characteristics. An example of the latter is the Performance Challenge Fund (PCF).

In the past decade, the intergovernmental conditional grant program has become an incentive to elicit an improved level of governance among LGUs. Eligibility to the PCF grant depends on the level of governance defined by the Seal of Good Local Governance (SGLG). LGUs need to satisfy a list of criteria in key areas of governance to get the seal. However, on top of the eligibility requirements, the PCF mandates that it must be spent for identified national government priorities.

This study examines the views of municipal development planning officials on the conditional grant program based on a survey of 1,373 municipalities.

[1] The authors are research fellow, former supervising research specialist, former research analyst, and research analyst, respectively, at PIDS. This article is a condensed and revised version of the PIDS discussion paper titled "Assessment of the Performance Challenge Fund and the Seal of Good Local Governance: Perceptions from Municipalities" written by the same authors. Email for correspondence: csicat@pids.gov.ph.

It aims to guide policymakers in the implementation of the SGLG Act of 2019. The results show that the majority of planning officials recognize the importance of improving governance in municipalities and appreciate the incentives of the program. However, some expressed that the cost of receiving the seal outweighed its benefits. Poorer LGUs are also left behind in governance and face difficulty in complying with the program's requirements.

INTRODUCTION

The Performance Challenge Fund (PCF) is a program of the Department of the Interior and Local Government (DILG) that provides incentives to qualified local government units (LGUs) in the implementation of their development projects. It rationalizes the national government's intergovernmental transfers to LGUs and encourages the convergence of local development initiatives with the national government's strategic thrusts and goals (DILG 2013). An LGU qualifies for the PCF grant if it receives the Seal of Good Local Governance (SGLG), a performance assessment tool that evolved from the Seal of Good Housekeeping (SGH). The program has evolved with continuous revisions in its eligibility criteria to progress in local governance.

Republic Act (RA) 11292, known as the SGLG Act of 2019, institutionalizes the "award, incentive, honor, and recognition-based program for all LGUs to continually progress and improve their performance" in varied areas of governance (RA 11292, Section 3). This law established the Intragovernmental Council of Good Local Governance and introduced the SGLG fund, which replaced the PCF.

In the local public sector literature, the SGLG-PCF is a conditional grant program of which the condition is receiving the seal itself. This study focuses on how the SGLG-PCF program fares in its objective to elicit improved local governance and how it is appreciated by local government officials. This paper gives insights to improve the program under the SGLG law.

A nationwide survey with 1,373 municipal development planning teams was conducted to assess the PCF as an incentive program for effective local governance. While the results show that more LGUs have been awarded the seal, some LGUs that are mostly poorer have been left behind. Furthermore, although the majority of LGU officials appreciate the PCF-SGLG program as a way to improve governance and as an additional source of income, a small proportion believes that the SGLG criteria are too stringent to be worth the PCF grant. The results aim to help policymakers enhance the SGLG and the fund program, moving forward with the SGLG law.

CONCEPTUAL FRAMEWORK

In decentralized or federal forms of government, it is common to give different forms of transfers to LGUs. These "have often been viewed as part of a system of cooperative federalism under which the national and subnational governments together attempt to solve problems affecting their joint constituencies" (Volden 2007, p. 209). There are other aspects of intergovernmental grant system, such as when the Philippine government efficiently collects revenues and LGUs are better equipped to implement policies. In some cases, the national government imposes restrictions and mandates to grants that seem undesirable for subnational governments.

Volden's (2007) theoretic model of intergovernmental fiscal transfers have four main decision points, namely, "(1) national policymakers decide whether or not to offer a grant, (2) national policymakers decide if and what conditions would be attached to the grant, (3) recipient subnational

government decides whether or not to seek or accept the grants, and (4) the subnational government decides on how to set policy and spend grants".

The literature on decentralization and federalism offers varied reasons for central governments to offer different forms of transfers (Table 1). These transfers intend to address vertical fiscal imbalance, close the fiscal gap, or create horizontal fiscal equalization by reducing regional disparities (Shah 2004). Grants may also be unconditional or conditional and matching or nonmatching. The internal revenue allotment (IRA) mandated by the Local Government Code (LGC) of 1991 is an example of unconditional[2] transfer that primarily addresses vertical fiscal imbalance among LGUs.

Table 1. Principles of fiscal grants

	Grant objective	Examples of grant design
1.	Bridge fiscal gap	Unconditional fiscal grants for LGUs
		Reassign responsibilities
2.	Reduce regional disparities	General nonmatching fiscal capacity equalization transfers
3.	Compensate for benefit spillovers	Open-ended matching transfers with matching rate consistent with spillover of benefits
4.	Set national minimum standards	Conditional nonmatching block transfers with conditions on standards of service and access
5.	Influence local priorities in areas of high national but low local priority	Open-ended matching transfers (with preferably matching rate to vary inversely with fiscal capacity)
6.	Stabilize	Capital grants provided maintenance

LGUs = local government units

Source: Shah (2004, p. 23–28)

Another reason for offering fiscal grants is to compensate for benefit spillovers like in the case of residents of a neighboring LGU who benefit from the superior health services of another LGU. The national government may offer a matching grant equivalent to the benefits that nonresidents get from accessing health services from their neighboring LGU.

The SGLG-PCF addresses both the fourth and fifth possible objectives of a fiscal grant. The first condition of the PCF grant is to attain a standard of governance defined by the national government and varies across different LGU levels (e.g., provinces, cities, and municipalities) and income classes. The conditional PCF grant received by the LGU must also be used for identified national priorities. The SGLG-PCF program is a nonmatching conditional grant in its present form, which means that the LGU does not have to match the grant with its own budgetary funding.[3]

How have conditional fiscal grants in other countries performed? Empirical data on the incentives or benefits of conditional grants to local governments vary by country. The success or failure of conditional programs depends primarily on how they are implemented.

Brun and El Khdari (2016) found that conditional transfers were inclined to political manipulation and local bargaining. It paved the way for LGUs to be reliant on grants to finance their projects. In an African context, Mogues and Benin (2012) concluded that conditional transfers

[2] The only condition in the LGC 1991 is that 20 percent of the IRA must be appropriated to development projects in the annual budget (RA 7160, Section 287).

[3] This was not the case when the earlier version of the program was introduced in 2010. The SGH was a conditional matching grant for poorer LGUs. The matching requirement was removed because of the low uptake of LGUs.

generally discouraged the collection of funds and tax revenues. Boadway and Shah (2007) argued that conditional grants could help LGUs increase their financial resources, but also tend to limit their choices in terms of public investments. Other studies found that conditional grants had led to flypaper effect and stuck where they hit, or for purposes they were intended for, instead of being spread across budgets (Hines and Thaler 1995; Deller and Maher 2006).

The PCF-SGLG conditional grant

Launched in 2014, the SGLG expanded the assessment criteria, compared with its predecessor, the SGH, which was subsumed as one of the program's criteria (DILG 2015). Similar to the SGH, LGUs that passed the SGLG were eligible to avail of the PCF grant. The Bureau of Local Government Supervision (BLGS), particularly the Local Governance Performance Management System team, supervises the identification and conferment of the seal. All projects proposed by recipient LGUs should be used for identified purposes and implemented or completed in one year.

Established by the DILG in 2010, the PCF is a performance-based incentive program that gives financial subsidies to LGUs awarded with the SGLG (DILG 2017b). It may be used for projects that are aligned with national government priorities, such as the Millennium Development Goals (MDGs), solid waste management, disaster risk reduction and management (DRRM), and tourism and local economic development (DILG 2017b).

The SGLG raised the bar for qualified LGUs demonstrating "integrity and good performance through continuing governance reform and sustained local development" (DILG 2017b, p. 1). As an emerging assessment system, it gives distinction to remarkable local government performance. Aside from financial transparency, other governance conditions, such as disaster preparedness, social protection, peace and order, business friendliness and competitiveness, and environmental management, were identified as assessment areas (DILG 2016).

In its first year of implementation in 2015, LGUs needed to pass the 3+1 principle under three core components and one essential component to qualify for the SGLG (DILG 2014). The mandatory components are categorized based on the LGUs' service delivery functions (Table 2).

Table 2. Assessment criteria for core and essential components

Core components	Good financial housekeeping
	Disaster preparedness
	Social protection
Essential components	Business friendliness and competitiveness
	Peace and order
	Environment management
	Tourism, culture, and arts

Note: In 2017, peace and order was regarded as a core component while tourism, culture, and arts were added as an essential component (DILG 2017a).
Source: DILG (2014)

The detailed assessment criteria are differentiated based on the LGU level and income class range, i.e., provinces, highly urbanized cities, independent component cities (ICCs), component cities, 1st to 3rd class municipalities, and 4th to 6th class municipalities.[4] Examples of the criteria indicators are shown in Table 3.

Table 3. Criteria for the SGLG

Criteria	Definition	Latest indicators (data source)
Financial administration	Adherence of LGUs to accounting and auditing standards and compliance with full disclosure policy (good financial housekeeping), sound management of resources (financial performance), and optimal utilization of available mechanisms and resources to support local development (financing development)	• Audit opinion and percentage of audit recommendations from previous years acted upon (COA) • Average local revenue for three consecutive years, e-SRE online posting compliance, and utilization rate of 20 percent component of the IRA (BLGF) • Compliance with full disclosure policy (BLGS-DILG) • Utilization and physical accomplishment of assistance to the municipalities fund (DILG-BUB-AM PMO) • Utilization and physical accomplishment of the PCF (DILG ROs)
Disaster preparedness	Proactive LGU disaster preparedness actions through mobilization of the local DRRM systems; development and/or implementation of the appropriate programs and plans and use of provided funds; building of personnel competency; and operational readiness and availability of equipage, supplies, and other resources for early warning and/or response	• *Gawad KALASAG* awardees for best LDRRMC and Hall of Fame awardees (OCD) • Comprehensive land use plan (HLURB) reports on casualties and damages during disasters (DILG CODIX)

[4]The SGLG assessment process starts with data collection from both secondary and primary sources by the regional assessment team of the respective DILG regional offices (ROs). The team organizes cross-posting assignments in provinces, cities, and municipalities. Civil society organization (CSO) representatives are present during the regional validation process. Initial feedback is presented to the LGU being assessed. The national assessment team (NAT) conducts validation through spot checks on selected LGUs and finalizes the list of passers for submission to the DILG secretary. Chaired by the undersecretary for local government, the NAT includes representatives from the DILG-BLGS; leagues of provinces, cities, and municipalities; Union of Local Authorities of the Philippines (ULAP); nongovernment agencies; the academe; private sector; and CSOs.

Table 3. (continuation)

Criteria	Definition	Latest indicators (data source)
Social protection	Respond to the needs of disadvantaged sectors (e.g., children, senior citizens, indigenous peoples, PWDs, and urban poor) by providing and managing facilities and services that cater to their needs, such as residential care facilities, basic education support and accessibility in government buildings, enhancement of social welfare services, provision of housing, and participation of the sectors in the local special bodies and the *Sanggunian*	• Accredited LGU-managed hospitals and RHUs (PhilHealth) • Accredited LGU-managed residential care facilities (DSWD) • List of LGU-managed hospitals and main health facilities (DOH) • Mandatory representation of indigenous peoples (NCIP) • Seal of Child-friendly Local Governance Award (DILG NBOO) • Utilization and physical accomplishment for the *SALINTUBIG* project fund (OPDS)
Peace and order	Maintain peace and order through activities and support mechanisms that protect constituents from threats to life and security and ensure drug-free communities	• Drug-free cities, municipalities, and *barangays* (villages) (PDEA)
Business friendliness and competitiveness (attract businesses and employment)	Bring about business and employment opportunities through systems, structures, and/or legislations that support local economic development	• Competitiveness index (NCC) • Most business-friendly LGU awardees (PCCI)
Environmental management (uphold the integrity of the environment)	Safeguard the integrity of the environment; focus on compliance with the Ecological Solid Waste Management Act of 2000	• Open or controlled dumpsite (DENR) • Sanitary landfill and solid waste management plan (DENR-NSWMC)
Tourism, culture, and the arts (optimize tourism and enrich communities' cultural heritage)	Develop and promote the local tourism industry and preserve and enrich cultural heritage and creativity through local government support	

SGLG = Seal of Good Local Governance; LGU = local government unit; COA = Commission on Audit; IRA = internal revenue allotment; BLGF = Bureau of Local Government Finance; DILG = Department of the Interior and Local Government; e-SRE = electronic statement of receipts and expenditures; BUB = Bottom-up Budgeting; AM = assistance to municipalities; PMO = project management office; ROs = Regional Offices; PCF = Performance Challenge Fund; DRRM = disaster risk reduction and management; *Kalasag* = *Kalamidad at Sakuna Labanan, Sariling Galing ang Kaligtasan*; LDRRMC = Local Disaster Risk Reduction and

Management Council; OCD = Office of Civil Defense; HLURB = Housing and Land Use Regulatory Board; CODIX = Central Office Disaster Information Coordinating Center; PWDs = persons with disability; RHUs = rural health units; PhilHealth = Philippine Health Insurance Corporation; DSWD = Department of Social Welfare and Development; DOH = Department of Health; NCIP = National Commission on Indigenous Peoples; NBOO = National Barangay Operations Office; *SALINTUBIG = Sagana at Ligtas na Tubig Para sa Lahat*; OPDS = Office of Project Development Services; PDEA = Philippine Drug Enforcement Agency; NCC = National Competitiveness Commission; PCCI = Philippine Chamber of Commerce and Industry; DENR = Department of Environment and Natural Resources; NSWMC = National Solid Waste Management Commission
Note: Latest indicators were based on 2018 DILG Memorandum Circular 2018-49, dated April 6, 2018.
Source: DILG (2017b, 2018)

Table 4 shows the progression of the SGLG assessment criteria for LGUs. The 3+1 principle was used from 2015 to 2016, which means that LGUs must satisfy the three core components and the essential component. In 2017, the DILG raised its assessment criteria from 3+1 to 4+1. Peace and order was reclassified as a core component in the same year, while tourism, culture, and the arts were added in the essential area. Subsequently, the all-in principle was applied from 2018 to 2019, which means that LGUs must pass all seven governance areas.

Table 4. SGLG assessment criteria, 2015–2019

Year	2015–2016	2017	2018–2019
Assessment criteria	3+1	4+1	all-in

SGLG = Seal of Good Local Governance
Source: DILG (2015, 2017b, 2018)

A total of 3,256 LGUs have been given the PCF grant amounting to PHP 6.8 billion. Since the program's pilot implementation in 2010, the number of LGUs availing of the grant has increased continuously from only 30 LGUs belonging to the 4th to 6th class municipalities. Among the reasons are the expansion of the LGU income class coverage and the removal of the counterpart LGU sharing scheme. The number of recipients dropped with the introduction of the SGLG in 2014 and the implementation of more stringent criteria. There was an increased trend of LGUs that received the PCF grant in 2017. The number of LGU passers went down with the stricter all-in criteria in 2018.

Empirical evidence on the SGLG-PCF program

In 2012, the World Bank and the Australian Agency for International Development (AusAID), with assistance from the La Salle Institute of Governance (LSIG), conducted a rapid assessment of the 2011 SGH and PCF program. They found that while LGUs appreciated the financial assistance, which incentivized them to adopt good practices, the potential benefits from the PCF were likely weakened by ineffective communication and information dissemination on their assessment of the seal. Some LGUs claimed that being awarded the SGH was an incentive itself and served as a stronger motivating factor than the PCF grant in 2011 (World Bank 2012). The results showed the lack of time, human resources, and technical capacity on the part of the DILG ROs as the perceived reasons for the program's inconsistent and hasty implementation. For early grantees, such accommodations were made to allow the DILG to meet the national deadlines.

The SGLG launched in 2014 was part of the Philippine Open Government Partnership Commitment in the 2nd National Action Plan (Medina-Guce 2016a). The DILG, along with the

ULAP, upscaled the performance measurements to include financial transparency and citizen engagement for LGUs. The aim was to increase the number of passers through the years. Although the SGLG was perceived as an indicator for nonperforming LGUs, the program should have served as a guide to improve governance, such that LGUs were compelled to level up their disaster preparedness plans and their standards for access ramps for PWDs, and engage representatives from other sectors in local development planning councils (Medina-Guce 2016b). The increasing difficulty in getting the seal resulted in a low passing rate, prompting the DILG, ULAP, and SGLG partners to pursue information dissemination and capacity building support for LGUs.

In 2017, the DILG published *Kwentong* PCF-Heartwarming Stories of Change Through Good Local Governance. It compiles the struggles of LGUs in their quest for passing the seal and their triumphs in reaping the fruits of the PCF. The PCF empowered some LGUs to administer projects by themselves and challenged them to do well. Due to insufficient financing, the PCF helped other LGUs prioritize projects to improve the lives of their constituents while instilling in them the values of transparency and good governance. There were testimonies from LGUs on improvements in health, education, and the living conditions of citizens brought about by the construction of health centers, school buildings, and economic enterprises and tourist centers. A city director from Mindanao maintained that what mattered most was not only the amount of award but also the status that LGUs had attained.

A study of the SGLG by the United Nations Development Programme found that with respect to the qualifying criteria, the LGUs' overall performance improved from 2014 to 2016 when they were given a post-compliance period and assessed with relatively the same set of criteria. It affirmed the downward trend of LGU performance for provinces, municipalities, and highly urbanized cities but upward for component cities and independent component cities (Medina-Guce 2019). The downward trend can be attributed to various factors, such as the differences in the level of difficulty of the assessment criteria per LGU type and their general learning retention ability. More municipalities were intent on qualifying for the SGLG due to the incentives tied to the seal and the financial support from the national government (Medina-Guce 2019).

There was also evidence of inconsistent LGU performance. Some LGUs received the SGLG in one year but not in the succeeding year, given the stricter criteria carried out every year. Moreover, Medina-Guce (2019) reported that LGUs had a two-year learning curve. Hence, it would be difficult for them to comply with the additional SGLG criteria every year. On the other hand, evidence of consistent performance includes (1) 35 consistent SGLG passers, (2) two 5th class municipalities from Region II (Cagayan Valley) that passed seven times, (3) all municipalities in Regions I and XI (Ilocos Region and Davao Region, respectively) that passed the SGH or the SGLG at least once, and (4) provinces that consistently qualified (e.g., Ilocos Sur, La Union, Pangasinan, Isabela, and Bataan), with at least 20 percent of the component LGUs also qualifying for the seal per year. Challenges in the grant usage were also noted. Annual reports by the Commission on Audit (COA) on the DILG found that (1) the frequent guideline modification in 2011 contributed to the delays in the processing of requirements by LGUs (COA 2011), (2) releases for the PCF were made even without complete documentation (COA 2012), and (3) reports were received by the ROs and no project monitoring was made to determine the project's actual progress (COA 2012).

Similarly, COA noted irregularities in the implementation of the PCF funds for select LGUs in its audit report. For instance, the PCF was not deposited at a separate trust fund in the province of Pampanga (COA 2016a). The municipality of Paete, Laguna, was instructed to return excess project funds (COA 2014). The construction of an evacuation center in Corella, Bohol, was not part of the annual investment plan (COA 2016b).

The results show continuous efforts to improve the program based on the LGUs' experiences. However, there is no sufficient explanation as to why the LGUs consistently, inconsistently, or never received the SGLG and the PCF.

METHODOLOGY

This study adopts a descriptive research design that involves desk review. It uses secondary and primary data from the Local Government Support Fund Assistance to Municipalities (LGSF-AM) baseline study survey and the PCF portal (Diokno-Sicat et al. 2020a). Primary data collection was done through a survey to elicit the PCF and SGLG experiences of respondent municipalities and the perceptions of LGU officials. The questions are aligned with the main objective of the survey to understand local development planning practices. Key informant interviews with members of oversight government agencies who were involved in the design, implementation, and monitoring of the PCF were conducted to validate the findings. As a result, the discussion of the PCF survey is structured on the program's development planning process.

The discussion includes the profiling of SGH or SGLG passers and nonpassers and the PCF recipients and nonrecipients. By looking at the characteristics of municipalities, patterns were determined to help policymakers enhance efforts for LGUs that were left behind. The initial plan was to use the survey data in the profiling. However, slight differences were noted when it was compared against the official PCF portal figures. The municipal profiling of the PCF and the SGLG recipients was based on the PCF portal data, but official municipal survey responses were used for their perceptions of the programs.

RESULTS

This study uses the results of a nationwide survey of all municipalities in the Philippines[5] to answer the questions: Has the PCF succeeded in eliciting a minimum governance standard for LGUs? How do LGUs appreciate the PCF grant and the conditions that come with it? The survey primarily focused on municipal development planning practices, but included questions on the perceptions of municipal planning team members on the PCF's importance and usefulness.

The results show that the majority of LGU respondents appreciate the PCF and recognize its importance. About 20 percent of municipalities have never been eligible to receive the PCF grant. Most of them are from the 5th and 6th income classes and concentrated in Regions V, VII, and VIII (Bicol Region, Central Visayas, and Eastern Visayas, respectively). Municipalities were also asked whether the standards defined in the SGLG-PCF program had affected them in identifying their LGUs' visions and goals. Seventy-four percent or 1,010 out of the 1,373 municipalities affirmed that the SGLG criteria affected how they identified their visions, policy options, goals, objectives, and priorities in their comprehensive development plans (CDPs). Of this number, about 46 percent stated that the "SGLG criteria serve as a basis/guide for the goal, vision, and in programs, projects, and activities (PPAs) identification and plan formulation," while 16 percent claimed that "the LGU complies with the SGLG criteria and meets the standards." Some 12 percent said that the SGLG criteria "motivate the LGU and its partners to perform and achieve the program goals". Meanwhile, 8 percent acknowledged the SGLG as a good source of funds (Table 5).

[5] The 116 municipalities of the Bangsamoro Autonomous Region of Muslim Mindanao were excluded from the survey because of the ongoing preparations for a plebiscite at the time.

Table 5. How the SGLG criteria affect the visions, policy options, goals, objectives, and priorities of municipalities

Category	Number of responses	Percentage of respondents
The SGLG criteria serve as a basis/guide for the LGU's goal and vision and in the PPA identification and plan formulation; the SGLG is a good funding source.	460	46%
The LGU complies with the SGLG criteria and meets the standards set by the program.	166	16%
The SGLG motivates the LGU and its partners to perform better and achieve the program's goals.	119	12%
The SGLG is a good funding source.	85	8%
Ensures accountability and good governance	39	4%
Aligns plans with the NGA guidelines and provincial targets	23	2%
Adopted in the institutional mechanism and policy implementation	16	2%
LGUs have limited choices and face constraints in complying with the standards.	11	1%
Others	91	9%

N = 1,010; SGLG = Seal of Good Local Governance; PPA = projects, programs, and activities; LGU = local government unit; NGA = national government agencies
Source: Diokno-Sicat et al. (2020b)

On the other hand, 26 percent or 360 municipalities stated that the SGLG criteria did not affect the way they identified their visions, policy options, goals, objectives, and priorities in the CDP. Of this number, 32 percent of the respondents claimed that the "criteria were already aligned with their priorities and plans and were consistent with their vision." Meanwhile, 21 percent said that the "LGUs set their own standards and/or follow other criteria and guidelines" (Table 6). About 12 percent said that they "could not comply with the requirements and they were not recipients of the grant". Some 8 percent said that the "LGU responds to the needs of its constituents/communities and [could] provide the funds," while 7 percent maintained that the program was "more on compliance and the SGLG was just for guidance".

Table 6. Reasons that LGUs are not affected by the SGLG criteria

Category	Number of responses	Percentage of responses
The criteria are already aligned with the priorities and plans and/or are consistent with the LGU's vision, mission, and PPAs.	115	32%
The LGUs set their own standards and/or follow other criteria and guidelines.	74	21%
Cannot comply with the requirements; nonrecipient of the award/grant	43	12%
The LGU responds to the needs of its constituents/communities and provides the required funds.	30	8%
More on compliance; the SGLG is just for guidance	24	7%
The criteria are not relevant; the LGU is not interested.	15	4%
The criteria keep on changing and are too strict and/or structured.	9	2%
No comment/not aware or have limited knowledge about the SGLG	7	2%
Others	25	7%
No comprehensive development plan and/or comprehensive land use plan	18	5%

N = 360; LGU = local government unit; SGLG = Seal of Good Local Governance; PPAs = programs, projects, and activities

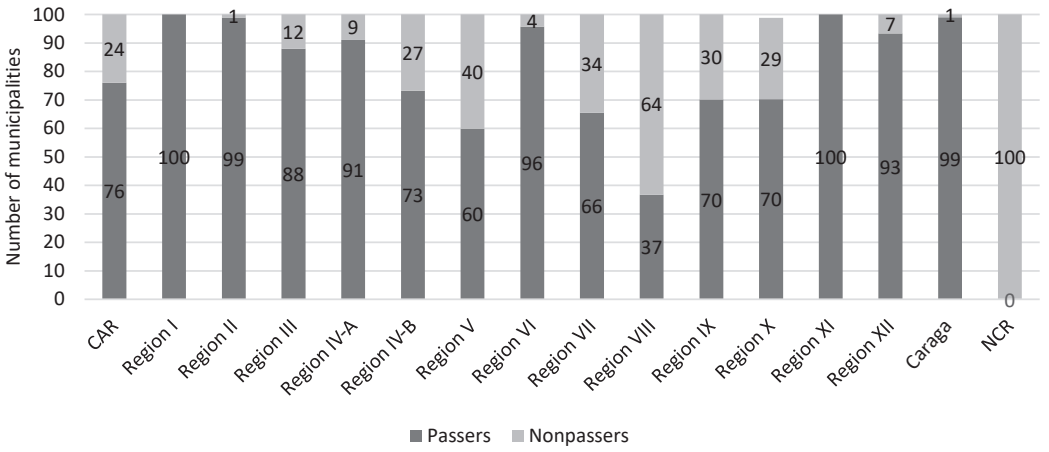
Source: Diokno-Sicat et al. (2020b)

Who made the SGLG-PCF cut?

Figure 1 presents the regional breakdown of the SGH or SGLG passers from 2010 to 2018. All municipalities in Regions I and XI qualified for the seal at one point. The majority of municipalities in other regions are SGH or SGLG passers, except for Regions V and VIII. Pateros, the lone municipality in the National Capital Region (NCR), has not received the SGH nor the SGLG.

In terms of income classes, there is a declining trend in the proportion of LGUs that passed the seal (Figure 2). More financially able municipalities qualified for the SGLG compared with poorer municipalities. Table 7 shows the regional breakdown of the percentage share of municipalities that have been PCF grant recipients. All municipalities in Regions I and XI availed of the PCF grant at one point. All municipalities in 12 provinces (i.e., Batanes, Cagayan, Apayao, Ifugao, Antique, Capiz, Guimaras, South Cotabato, Agusan del Norte, Agusan del Sur, Surigao del Norte, and Dinagat Islands) are recipients of the grant. The bulk of PCF recipients are from Regions I, III, IV-A, and VI, while the bottom three regions in terms of the PCF recipient municipalities are Regions V, VII, and VIII (Figure 3).

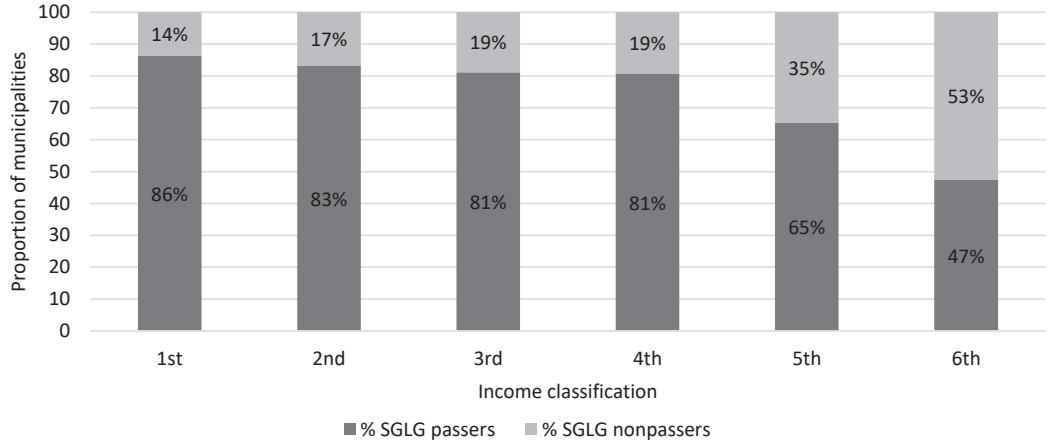
Figure 1. Proportion of municipal SGLG passers and nonpassers by region, 2010–2018



SGLG = Seal of Good Local Governance; CAR = Cordillera Administrative Region; NCR = National Capital Region

Source: DILG (n.d.)

Figure 2. Proportion of municipal SGLG passers and nonpassers by income class, 2010–2018



SGLG = Seal of Good Local Governance

Source: DILG (n.d.)

Table 7. Profile of PCF grant recipient municipalities by region, 2010–2018

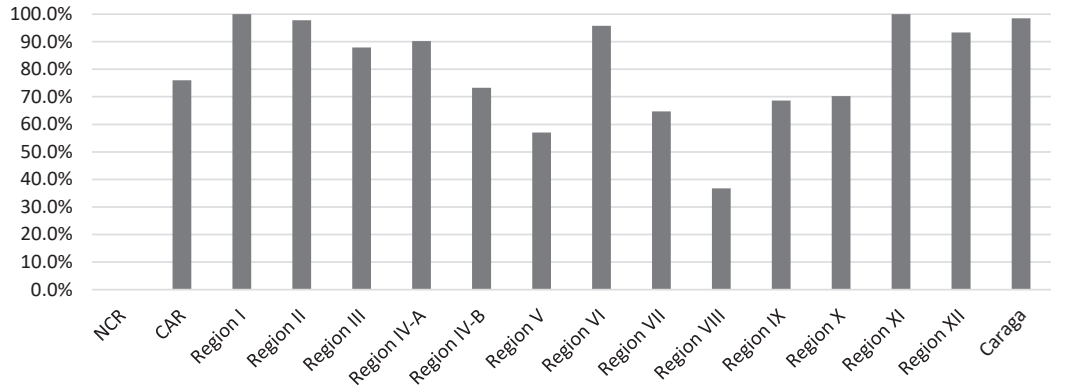
Region	Number of PCF recipients	% of total PCF recipients	Total municipalities	% of total municipalities
NCR	0	0	1	0
CAR	57	5.3	75	76.0
Region I	116	10.8	116	100
Region II	87	8.1	89	97.8
Region III	102	9.5	116	87.9
Region IV-A	111	10.3	123	90.2
Region IV-B	52	4.8	71	73.2

Table 7. (continuation)

Region	Number of PCF recipients	% of total PCF recipients	Total municipalities	% of total municipalities
Region V	61	5.7	107	57.0
Region VI	112	10.4	117	95.7
Region VII	75	7.0	116	64.7
Region VIII	50	4.6	136	36.8
Region IX	46	4.3	67	68.7
Region X	59	5.5	84	70.2
Region XI	43	4.0	43	100
Region XII	42	3.9	45	93.3
Caraga	66	6.1	67	98.5
Total	1,079	100	1,373	78.6

PCF = Performance Challenge Fund; NCR = National Capital Region; CAR = Cordillera Administrative Region
Source: DILG (n.d.)

Figure 3. PCF grant recipient municipalities by region, 2010–2018



NCR = National Capital Region; CAR = Cordillera Administrative Region
Source: DILG (n.d.)

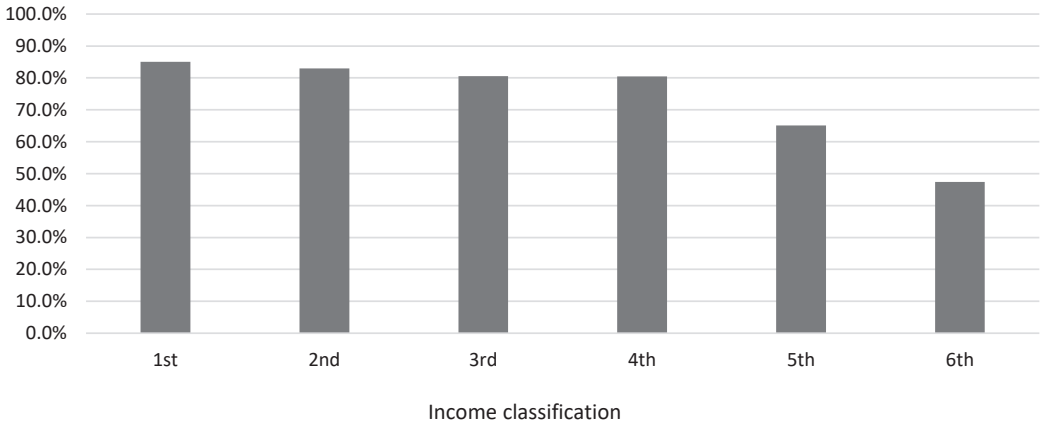
With regards to the proportion of municipalities per income class, most LGUs that availed of the PCF grant belong to the 1st to 4th income classes (Table 8). This is consistent with the result that a larger proportion of the SGH or SGLG passers are from the 1st to 4th LGU income classes. Meanwhile, fewer municipalities from the 5th to 6th income classes have benefitted from the PCF grant. Thus, compared with a poorer municipality, it is more likely for a rich municipality to be a recipient of the PCF grant (Figure 4). Looking at the repeated recipients of the SGLG, also known as Hall of Famers, the most frequent number of repeated awardees come from the 1st and 4th income classes (Figure 5). Two 5th income class municipalities from Region II received the SGH/SGLG seven times. Meanwhile, 10 municipalities received the seal six times, 63 municipalities received the seal five times, 117 municipalities received the seal four times, 174 municipalities received the seal thrice, and 409 municipalities received the seal twice.

Table 8. Profile of PCF grant municipal recipients by income class, 2010–2018

Income class	Number of PCF recipients	% share of the total PCF recipients	Total municipalities	% of total municipalities
1st	273	25.3	321	85.0
2nd	141	13.1	170	82.9
3rd	203	18.8	252	80.6
4th	289	26.8	359	80.5
5th	164	15.2	252	65.1
6th	9	0.8	19	47.4
Total	1,079	100	1,373	78.6

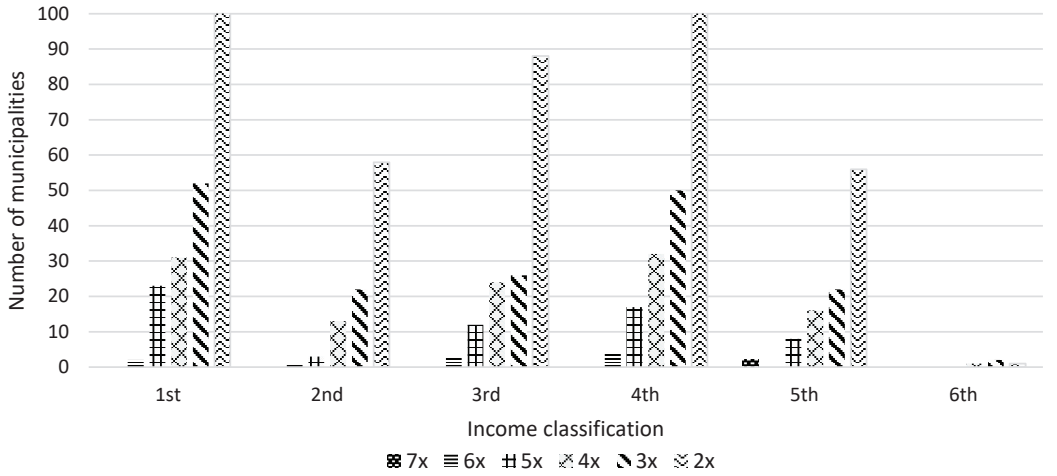
PCF = Performance Challenge Fund
Source: DILG (n.d.)

Figure 4. PCF grant recipient municipalities by income class, 2010–2018



PCF = Performance Challenge Fund
Source: DILG (n.d.)

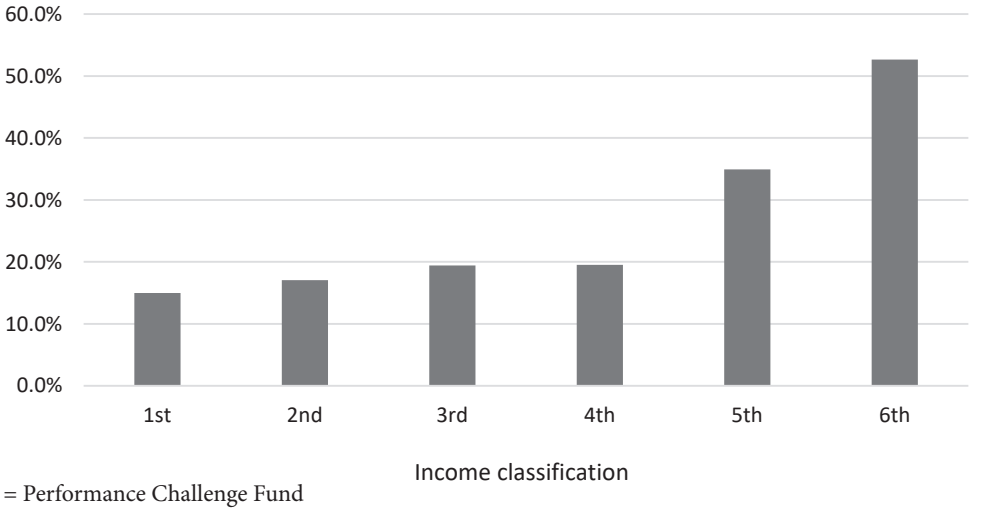
Figure 5. Repeated recipients of the SGLG by income class, 2010–2018



N = 775; SGLG = Seal of Good Local Governance
Source: DILG (n.d.)

There are 294 municipalities that have never received the PCF grant since its implementation. Most LGUs that did not avail of the PCF grant belong to the 3rd to 6th income classes (Figure 6). Some of these municipalities lack funding or the capacity to improve their services and pass the DILG criteria. Surprisingly, one-third of the 44 1st class municipalities, coming from Regions III, IV-A, IV-B, and NCR, have also not received the seal. In terms of the distribution of nonrecipient municipalities, it seems that the lower the income class, the higher the proportion of nonrecipients of the PCF to total municipalities.

Figure 6. Nonrecipient municipalities of the PCF by income class, 2010–2018



PCF = Performance Challenge Fund
Source: DILG (n.d.)

The primary reason given by 599 respondents who did not avail of the PCF was that they did not pass the requirements because the criteria were difficult to meet. The reasons can be grouped by (1) financial administration (low fund utilization or adverse COA opinion, financial constraint, little or no financial growth, failure to pay loan, and presence of unfilled mandatory positions), (2) disaster preparedness (no comprehensive land use plan/hazard maps or climate and disaster risk assessment and DRRM Office), (3) social protection (limited or no access for PWDs), (4) environmental management (no landfill), and (5) peace and order (allegations against local chief executives). Other reasons fall under administration (i.e., busy with other projects) and the need for improved information dissemination (claim to be unaware or have little knowledge of the PCF). These reasons provide insights on how to improve the program.

The PCF conditional grant as a source of LGU financing

Overall, the PCF grant is considered as a significant source of funds for projects contained in the annual investment plans of LGUs. This was according to about 80 percent or 1,095 of the 1,373 municipalities surveyed. Meanwhile, 13 percent or 175 municipalities asserted that it was not an important source of financing, while 8 percent or 103 municipalities did not give an answer.

Other reasons for 175 municipalities that did not consider the PCF as an important source of financing are (1) the stringent eligibility requirements, (2) the small amount of the PCF grant, (3) the PCF is just an incentive and not a regular source of funds, and (4) the priority projects funded from the PCF are limited and do not match the LGU's needs.

These reasons can account for municipalities that have never received the PCF grant. Some municipalities did not even try to qualify for the PCF because they thought the grant was not an important financing source. However, those who answered that the PCF was an important source of financing believed that the PCF achieved its purpose. Among the reasons given are (1) most projects in the LGU are implemented using the PCF grant, (2) the grant is regarded as an additional budget or source of funds for LGUs, and (3) the grant motivates LGUs to perform better and ensure improved governance, thereby benefitting the people and their constituents.

POLICY RECOMMENDATIONS

To avail of the intergovernmental PCF grant, LGUs must satisfy a minimum level of governance embodied in the SGLG. In addition, the PCF grant must be used for national government priority areas. For the first condition, evidence has thus far shown that the PCF program elicited improved governance with the increasing number of LGUs through time. However, the increase does not mean that the LGUs also consistently received the seal. More importantly, there is evidence of poorer LGUs being left behind.

For the condition that the grant must be used for national priorities, from one perspective, the PCF has successfully increased the amount spent on national priorities because of the growing number of LGUs receiving the seal. However, from the survey results, although the majority of municipalities found the PCF to be an important source of local funding, a smaller proportion regarded this condition as the reason why the PCF grant was not deemed as an important source of financing and nor was the SGLG relevant to their LGUs.

Clarity is crucial to the success of any policy. It is critical not only in the program's objectives, but also in identifying intended beneficiaries and how the intervention will be implemented and monitored. In the case of the PCF, the initial objective was to incentivize improved governance for poorer LGUs. The coverage was subsequently expanded to include richer LGUs, primarily because of the difficulty of the poorer ones to comply with the requirements, which alternatively meant that the funds allocated would not be utilized.

In almost a decade of existence, the PCF program and its prerequisite, the SGLG, has been redesigned to maintain its objective as an incentive for improved local governance. At the same time, while evidence showed the continuous success of LGUs that consistently made the mark despite the increasing difficulty in the eligibility criteria, there were LGUs that never satisfied the criteria for the seal, and, therefore, were not able to avail of the PCF. Given this and the passage of the SGLG Act, it is the best time to revisit the objectives and design of the seal and the PCF to determine whether the programs should be exclusive to the best performing LGUs in terms of governance and ensure that all LGU become eligible for both programs. Whichever may be the decision of policymakers, the following results should be considered in the discussion:

- The desire to improve the PCF and the SGLG based on the challenges in its implementation in previous years is evident. The changes were focused on (1) balancing the desire to incentivize LGUs from the lower income class and ensuring the utilization of the PCF facility by relaxing some preconditions; (2) encouraging improvements in transparency, accountability, and local governance by adding additional criteria in the performance evaluation but considering the varied capacity of LGUs to comply; and (3) addressing administrative and procedural concerns to facilitate fund utilization.
- The SGLG and the fund design should consider the evidence that LGUs from the 5th and 6th income classes have the largest number of nonpassers of the SGLG, while

repeated recipients are from the 1st to 4th income classes. Furthermore, the regions with more than 30 percent of nonpassers are Regions V, VII, and VIII. Finally, among other reasons identified by municipalities are administrative requirements, such as the filling of mandatory positions, granting PWD accessibility, and establishing needed infrastructure services like a sanitary landfill, which might also be more difficult for poorer LGUs to comply with. Moving forward, redesigning the PCF, or what may now come to be the SGLG fund, can offer different eligibility criteria or incentives to different LGUs by income class or regional location (e.g., benchmarked and gradually increasing utilization rates). These recommendations could be justified based on Section 13 of the SGLG law that mandates "concerned national government agencies should provide technical assistance for capacity-building for identified gaps of LGUs which have not qualified for the SGLG award."

- Although the numbers are small, there is evidence from the LGSF-AM baseline study survey that some LGU officials are unaware of the PCF and the SGLG facility. It is crucial that the SGLG capacity-building programs should not just promote awareness and create concrete steps to address identified gaps among LGUs but also highlight the importance of the objectives of improved governance over and above the perceived difficulty in receiving the seal.
- Another important insight from the survey results is that one of the reasons given by LGUs that have not availed of the PCF is the lack of certain plans. LGU planning should be highlighted as an area of improvement, especially with the evidence on the significant number of delayed projects and poor utilization of the local development fund. Failure to implement the investment programs in a timely manner also leads to delayed development in the local economy. Furthermore, the current assessment is based on the presence and absence of certain requirements. Thus, efforts should now focus on the in-depth evaluation of the submitted plans.

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Sustainable Value Chain Financing for Smallholder Agricultural Production in the Philippines

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ABSTRACT

Cognizant of the value, contribution, and challenges in the country's agricultural finance, the government has intensified its lending programs to help the sector, particularly smallholders, thus, boosting affordable and easy access retail lending in recent years. Despite these efforts, however, significant problems remain, including the lack of markets and low prices, which have had significant implications on the overall repayment capacity and credit rating of small farmers and fisherfolk in the Philippines. Indeed, lending programs are unlikely to become successful if financing and production are not viewed in the bigger context of value chain financing. This paper looks into the farmers and fisherfolk's financing ecosystem and provides recommendations on how the existing value chain financing in the Philippines can become more inclusive and sustainable for them.

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INTRODUCTION

Agricultural credit is an important element in agricultural development. It helps in smoothing consumption, given covariate shocks, and aid in the mismatch between consumption and production. It helps improve the sector's productivity by facilitating the adoption of modern technologies and purchase of farm inputs and upholds the efficiency of smallholders. However, agricultural finance all over the world is considered risky due to the asymmetry of information available to lenders and small farmers and fisherfolk (SFFs).

Since the early 1980s, credit rationing arising from imperfect information and high transaction cost has been a challenge in the Philippines. This is more pronounced for SFFs who resort to informal channels, such as landlords, traders, input suppliers, big farmers, warehouse owners, and spouses of overseas contract workers (Llanto 1989). Other than flexibility in terms of repayment schedules and loan amortization, informal credit markets in the Philippines are also attractive due to collateral substitutes. Llanto (1989) identified different types of collateral substitutes in the Philippines, namely, third party guarantee, tied contracts, threat of loss of future borrowing opportunities, and mortgaging of tenancy or cultivation rights. Access to credit of SFFs in the Philippines is affected by several factors including interest rate (De Guia-Abiad 1991; Briones 2007; Cuevas and Sumalde 2015) and transaction costs (De Guia-Abiad 1991; Cuevas and Sumalde 2015). Institutions that secure property rights in the country are also weak. For example, the "inefficient land administration system has resulted in high transaction costs in securing, registering, and transferring property rights" (Llanto and Ballesteros 2002, p. 3). "There is no efficient mechanism to resolve land disputes and the land administration system does not generate reliable information needed by the courts to hear land cases" (Llanto 2007, p. 30).

In 2018, about 36 percent of the country's total employment was in the agricultural sector. Data from the Philippine Statistics Authority (PSA) in the same year indicate that farmers and fisherfolk had the highest poverty incidence among the basic sectors in the country at 31.6 percent and 26.2 percent, respectively. The agricultural sector is critical in the attainment of Sustainable Development Goal 2, which pertains to zero hunger, and its targets of "doubling the agricultural productivity and income of small-scale producers (target 2.3) and ensuring sustainable production systems" (target 2.4) by 2030. Despite various well-meaning interventions, such as those found in the Agriculture and Fisheries Modernization Act, the sector is hounded by low productivity issues. The sector's contribution to the country's gross domestic product declined from 15 percent in 2009 to 9 percent in 2019. This is partly attributed to the inadequate credit and insurance in the agricultural sector that can adversely affect SFFs.

The agricultural sector's importance in providing inputs to the manufacturing and services sectors is recognized in the *Philippine Development Plan 2017–2022* and by numerous government lending programs. While financing challenges remain, aggressive lending and development programs are likely to manage lingering issues in the agricultural sector. Among the most pressing concerns are the inadequate markets and the attendant low farmgate prices.

This paper aims to answer the following questions: How widespread is credit rationing among SFFs? Are there limited formal credit market activities among agricultural households? What are the lending challenges and opportunities in agricultural value chains that involve SFFs? How do advancements in technology augment access to formal credit (e.g., mechanizing the processes and maximizing the use of mobile phones and electronic payment platforms)? To answer these questions, key informant interview and focus group discussions with various stakeholders were conducted from July 29, 2020 to September 23, 2020 with the help of on-ground personnel from the

Agriculture Credit Policy Council (ACPC). To select the sites, the PSA 2012 Census of Agriculture and Fisheries[2] was used to identify crops that were produced in high volume, including hog/swine (livestock), *palay* (temporary crop), and coconut, banana, and pineapple (high-value commercial crops). Provinces that produced these crops were chosen, such that there was a good mix of areas in Luzon, Visayas, and Mindanao. The final study sites are Nueva Ecija, Quezon, Negros Occidental, and Bukidnon. Respondents include 15 SFFs and 20 representatives from various credit sources (Table 1). The median age of SFF respondents is 49 years old. About 28 percent are college graduates, 19 percent have spouses that are college graduates, and 29 percent are lot owners. Respondents were asked questions not only on the process of acquiring credit, but also about the good practices, issues and challenges, and existing and potential SFF lending strategies.

Table 1. Respondents to the KII/FGD

Study area	Demand side	Supply side
Nueva Ecija	2	
Quezon	2	1
Negros Occidental	8	6
Bukidnon	3	13
Total	**15**	**20**

KII = key informant interview; FGD = focus group discussion

Note: Demand side: rice farmers in Nueva Ecija, coconut farmers in Quezon, fisherfolk and livestock raisers in Negros Occidental, and banana farmers in Bukidnon. Supply side: relevant loan officers from different financial institutions, such as the Land Bank of the Philippines, microfinance institutions, cooperative banks, officers and staff from cooperatives, and informal lenders.

Source: Authors' compilation

Bukidnon[3] is a landlocked province in Northern Mindanao with a total land area of 1,049,859 hectares (ha). Its major crop in terms of crop area harvested is corn, followed by palay and sugarcane, and also pineapple, banana, coffee, and coconut. Banana is an emerging prospect as major plantations are looking to further expand their operations in the area. Negros Occidental,[4] known as the "Sugarbowl of the Philippines", is a province in the Western Visayas region. Aside from sugarcane, its major crops are palay and corn. Livestock, poultry, and fishing are also major sources of livelihood in the province. The volatile nature of the sugar industry, however, is a challenge for the province's agricultural sector. Thus, agricultural diversification is promoted. The fishing industry can also be expanded, since many of its municipalities are located in rich coastal areas. Nueva Ecija is known as the "Rice Granary of the Philippines". In 2020, the PSA reported that Nueva Ecija produced 959,342 metric tons of palay, the highest among all provinces in the Philippines. Moreover, the 2012 Census for Agriculture and Fisheries reports that almost 60 percent of the *barangays* (villages) in Nueva Ecija have rice or corn mills. Nueva Ecija also produces corn and onion. Investments in infrastructure have already been in place, such as the completion of the PHP 190-million cold storage facility funded by the Department of Agriculture-Philippine Rural Development Project (DA-PRDP) for the benefit of onion farmers.[5] Quezon province, on the other

[2] The Public Use File is still not available although the PSA has released publication highlights.
[3] Taken from https://bukidnon.gov.ph/2012/11/19/agriculture/ (accessed on October 1, 2020).
[4] Taken from https://www.negros-occ.gov.ph/about/the-history-geography/ (accessed on October 1, 2020).
[5] Taken from https://www.pna.gov.ph/articles/1114736 (accessed on October 1, 2020).

hand, is the leading producer of coconut in the country. Major crops in the province include rice, corn, mango, and banana, while livestock and poultry production consists of chicken, duck, carabao, goat, and cattle. In 2019, the DA and the Philippine Coconut Authority piloted the Model Coconut Farm in Gumaca, Quezon, which aims to transform at least 1 million ha of monocropped coconut farms into model coconut farms wherein diversified farming and the use of modern technology are practiced by farmers.[6]

REVIEW OF RELATED LITERATURE

Credit rationing and risks

Access to credit was found to increase the technical efficiency of rice farmers in Pakistan (Chandio et al. 2019) and tomato, cabbage, and beetroot farmers in Swaziland (Masuku 2014) and the cultivation practices of farmers in Mekong Delta (Duy et al. 2012). Despite this, the high unmet demand for credit and access to formal credit appear problematic (Swain 2002; Maurer 2014). Credit rationing, broadly defined as excess demand for loans, can manifest in a situation where the amount of loan the borrowers received is less than what they requested for at a given loan rate (Padmanabhan 1981) or when borrowers "cannot borrow at the interest rate they consider appropriate", or are denied credit because lenders think they may not obtain the required return at any interest rate (Jaffee and Stiglitz 1990, p. 848).

While credit rationing can occur in any sector, rationing in agricultural credit is widespread due to several risks like in agriculture and agricultural finance. Risks in agriculture are from the farmers' perspective, while risks in agricultural finance are faced by financial institutions when lending to farmers (Maurer 2014). Risks in agriculture can come from production, market, financial, legal and environmental, and human resources risks (OECD 2009; Angelucci and Conforti 2010). Production and market risks are identified as the most prevalent in the agricultural sector. Agricultural finance risks, on the other hand, arise from the asymmetric information that results in adverse selection and moral hazard (Jaffee and Russell 1976; Stiglitz and Weiss 1981).

Since lenders do not have full information on the borrowers' attributes and actions after the loan is awarded, borrowers may receive an amount smaller than what was applied for, or none at all (Olomola and Gyimah-Brempong 2014). Problems brought about by imperfect information are more pronounced for SFFs due to the inadequacy of their productive assets that can be used as collateral.

As a result of credit rationing, small-scale farmers turn to informal credit sources. Borrowing from informal channels is attractive, since it offers flexible repayment schedules, variable amounts of loan amortization, adjustable collateral requirements, and payment of loan at the farmgate (Llanto 1989). The lack of "knowledge about the target clients' financial needs, the nature of their different economic activities, and the dynamics and risks in their commercial relations" resulted in the low penetration of the formal sector in rural areas (Hernandez 2017, p. 114).

Risks in agriculture and agricultural finance are necessarily interrelated (Maurer 2014). Uncertainties in production and market prices feed into the reluctance of lending institutions to extend credit to farmers and fisherfolk. Unless instruments, such as insurance and support networks, are in place, financial institutions will remain unwilling to provide credit especially in the possibility of systemic risks (Gonzalez-Vega 2017). The timing of production tasks, such as planting, fertilizing, and harvesting, needs careful planning. This is why monitoring, such as technical visits and reports,

[6] Taken from https://www.bworldonline.com/diversified-crop-program-targets-conversion-of-1-m- hectaresplanted to-coconut/ (accessed on October 27, 2021).

is devised to minimize the risks faced by lenders (Carrera et al. 2020). While this can increase the probability of repayment, monitoring can entail additional administrative and transaction costs, which discourage lenders from extending credit.

The three types of credit rationing are quantity rationing, risk rationing, and price rationing (Boucher et al. 2008; Ali et al. 2014). Quantity rationing is from the supply side and occurs when lenders reject loan applications due to the lack of collateral or perceived risks associated with the project. Risk rationing is from the demand side and happens when borrowers do not borrow due to fears of indebtedness or desire to preserve their productive assets (Olomola and Gyimah-Brempong 2014). Further, many farmers do not request credit due to the costs of project preparation, negotiation, and registration of guarantees (Carrera et al. 2020). On the other hand, price rationing[7] happens when borrowers do not borrow due to the amount of loan offered at the given interest rate. These types of rationing are affected by different factors.

Olomola and Gyimah-Brempong (2014) found that farming experience was a significant factor in quantity and price rationing. Financial and productive wealth appear to be the common determinants of risk rationing. For example, Boucher et al. (2008) noted that the financially wealthy would not be quantity-rationed but would be risk-rationed.

Various factors limit borrowers' access to financial services in rural areas. The most prominent one involves geographical location (Gonzalez-Vega 2017). Distance may result in high transaction costs due to the "greater spatial dispersion of production, the lower population densities, the generally lower quality of infrastructure, and seasonality and often high covariance of rural production activities" (Olomola and Gyimah-Brempong 2014, p. 2). Smallholder agriculture is constrained to adapt to today's financialized and integrated economy due to unclear property rights and other institutional issues. These barriers create challenges in verification and monitoring and exacerbates issues from imperfect information (Gonzalez-Vega 2017).

The institutional capacity of lending entities also affects smallholder access to financing services. For example, financial institutions in Nigeria display limited understanding of the agricultural sector, which leads to high interest rates and inadequate or inappropriate products and services (Olomola and Gyimah-Brempong 2014). When financial institutions cannot fully ascertain the borrower's creditworthiness, they exclude borrowers, allocate limited credit, or exact unfavorable contract terms (Benjamin et al. 2016; Gonzalez-Vega 2017).

Agricultural value chains and innovations

Due to risks in the agricultural sector, mitigation measures should be in place not only to attain productivity and efficiency but for countries to harness the sector's full potential. Various initiatives can manage risks and attract investments into the sector, such as macro-level initiatives like crop insurance, input subsidies, and state-sponsored agricultural credit (Akhtar et al. 2019), and farm-level initiatives like crop diversification and involvement in the off-farm generation of income (Santeramo et al. 2014; Saqib 2016).

Credit has been a major instrument that facilitates production activities in agriculture. The formal financial sector has a comparative advantage in terms of funds and financial products and services, but has a low penetration rate in rural areas due to issues like imperfect information, weak institutional capacity to navigate geographical challenges, and lack of knowledge on the nature and types of agricultural activities. The inherent variability from systemic and covariate risks has

[7] External price rationing happens when "lender raises the interest rate or transaction costs so that free choice, along the credit demand curve, results in a utility maximizing position," while internal price rationing "occurs when a borrower chooses whether or not to borrow at fair market prices and transaction costs" (Olomola and Gyimah-Brempong 2014, p. 11).

resulted in various types of credit rationing by the formal sector and borrowers seeking credit more from informal sources. Informal sources, such as local lenders and stakeholders in the production and trading chains, are attractive due to their flexibility and lower transaction costs.

There is a recognition that both formal and informal sources can come together in the agricultural value chain to support farmers and fisherfolk and promote their income through better market integration and value addition (Angelucci and Conforti 2010). Value chains are "conceived as networks that support three types of flows—physical, financial and informational—all of which are responsible for movements of physical products, payments and lending arrangements, and coordination among physical and financial flows" (Angelucci and Conforti 2010, p. 566).

Different stakeholders have different expertise, knowledge, and capabilities that value chain brings together to overcome the costs of acquiring information and improve the delivery of financial services in the countryside.

Several Asian countries have had positive experiences in the value chain. In Viet Nam, a private company that supplies ginger to large exporters and retailers used its capital to provide loans to quantity-rationed borrowers who are into ginger production and provided seedlings and extension services to small-scale producers (Hurri et al. 2017). Over the course of its operation, the company established successful collaboration with producers through its financial services and facilitated markets between ginger producers and exporters or retailers.

Digital technology can enhance the agricultural value chain. India leverages on information and communications technology (ICT) to enhance competition and transparency in bidding for agricultural produce through the electronic tender system (Puri and Shrivastava 2017). The activities of farmers, traders, and banks during e-tendering interrelate with each other through digital technology. Traders bid through the computer systems in shops or kiosks and winning bidders have an option to send money through mobile or bank transfers.

The tender system has features that enhance the partnership of farmers and financial intermediaries. Farmers have options to store their produce in accredited warehouses and use the warehouse receipt to secure their bank loan. This, and the fact that participants in the tender system have financial accounts, reduces credit rationing from imperfect information. By recording each transaction, the tender system helps develop appropriate financial products and services.

Interlinking credit transactions to overcome imperfect information issues is also practiced in the Philippines. A self-help group in Cotabato was documented to forge linkages with banks to develop a long-term relationship with formal financial channels. In one case, a corporation was organized to obtain production loans from a rural bank and act as a fund conduit and guarantor to farmer loans (Llanto 1989). In Nueva Ecija, Nagarajan and Meyer (1998) documented that farmers were required to pay their loans from trader-lenders with their harvests and sell their surplus harvest to them as well. This approach benefits both farmers and trader-lenders, with the former not having to worry about marketing and storage, and the latter assured of a reliable source of commodities to trade. A microfinance institution (MFI) in Nueva Ecija, known as *Alalay Sa Kaunlaran* Inc. (ASKI), uses the group-context lending approach where members are also guarantors. ASKI requires all farmers to put 15 percent of the loan into a savings account, which serves as the farmers' hedge against covariate risks. The marketing and trading cooperative of ASKI buys the cassava harvest and sells it to the San Miguel Corp. through its food division, thereby facilitating the marketing and selling of harvests and repayment of loans (Ani and Andales 2017).

SYNTHESIS OF KII AND FGD

The supply side: Players in the financing ecosystem

Various players provide credit to SFFs, including informal lenders, such as agro-input traders and formal sources like banks, MFIs, and cooperatives, which are conduits or partners of government lending programs. The Land Bank of the Philippines (LBP) is the major formal financial institution that serves SFFs through lending centers. Most of LBP's loans to SFFs are tie-up programs designed to relax most of the requirements that SFFs find burdensome to comply with. LBP facilitates the credit investigation, approval, monitoring, and collection. Crop insurance also covers the approved loans. LBP uses its internal funds and all loans financed through these are covered by the Agricultural Guarantee Fund Pool, which covers 85 percent to 90 percent of the loaned amount. The bank offers wholesale lending to local governments, cooperatives, MFIs, and other banks, which then lend to SFFs. Since the loaned amount to borrowers is typically bigger, the bank requires collection reports from cooperatives and collateral from the bigger ones. These borrowers allocate a small portion of their portfolio to SFF lending due to the risk involved. LBP also lends to input traders and strictly requires collateral.

Cooperatives are important players in facilitating SFFs' access to credits. They offer flexibility in repayment schedules and loan amortization. Some are conduits of government funds and target rural areas where SFFs are unlikely to access formal credit sources. They have personnel who assist SFFs in filling out the documents, articulating the project proposal, and monitoring the projects, especially in remote areas. Similar to LBP, other banks, such as microfinance rural banks and cooperative rural banks, lend to SFFs through their internal funds or tie-up programs. Some banks, however, have shifted priorities to big loans (PHP 500,000 and above), but continue to serve small farmers with good credit standing. MFIs offer flexible credit facility to SFFs although some are operating in limited areas. Several input traders and merchants provide credit to SFFs through tied contracts. This means that SFFs will receive inputs and repay using harvest.

The terms and conditions and eligibility requirements of government-led lending programs that have similar objectives must be rationalized and harmonized. Having clear and specific targets and outcomes can help in the program's successful design and implementation. For example, programs with small and easy access loans can be viewed as transitory, whose program design should focus on values formation and building SFF creditworthiness. Programs with bigger loans and require collateral other than real estate (e.g., harvest and other chattel mortgages) can be viewed as graduation programs that focus on SFFs' bankability, making technical knowhow, capacity building on technological adoption, and financial literacy imperative at this stage.

Cooperatives are important supply-side stakeholders, while capacity building in fund and risk management is critical, especially for those that are recently established. Their critical roles, notwithstanding prudence in crafting programs to capacitate cooperatives, should be exercised. Requiring collateral to safeguard against fund misuse is ideal. Small and young cooperatives should be able to establish good credit history and creditworthiness within an acceptable period (e.g., three to five years). Moreover, young cooperatives can be supported through organizational and enterprise development and by linking them to the value chain. The same developmental mindset can be applied to SFFs who have limited capacities. For example, a lending program providing loans in small amounts (PHP 5,000 to PHP 10,000) and at 0 percent interest rate in the short term (six months to one year) can be implemented to establish a credit record. As their demand for credit increases, requiring collaterals other than real estate assets (e.g., harvest and other chattel mortgages) can be instituted for accountability.

The demand side: SFFs

SFFs experience several types of credit rationing like quantity rationing and risk rationing. The former occurs as banks screen applicants and look into their credit history. Banks exercise prudence before approving loans because they are aware that in the case of SFFs, loans are often used in consumption that makes default a possibility. Banks perform credit investigation and use credit history and outstanding loans as factors in credit evaluation. Cooperatives may deny applicants, especially when they do not have the appropriate infrastructure for projects they are applying loans for (e.g., pig and poultry pens). Reduction of the loaned amount is also a strategy for some cooperatives, although the credit line is increased as outstanding loans are repaid. The latter takes place because borrowers fear indebtedness or worry about the various costs of borrowing. A common concern among SFFs is the fear of default from the variability and uncertainty in their income. Others have no intention to borrow either because they know that banks have requirements, such as land titles, and are not knowledgeable of the process or uncertain of loan approval anyway. Some want to minimize their exposure, since they have existing loans from other sources.

SFFs who do not experience risk rationing need to demonstrate creditworthiness to secure loans from banks, cooperatives, and MFIs, especially under the regular lending program. While a bulk of funds for SFF loans comes from government-funded credit programs, banks and other formal lending agencies allocate their own funds. Banks are mandated through the Agri-Agra law to allocate 25 percent of their loanable funds to agriculture and agrarian reform beneficiaries. Banks and other formal lending agencies are more cautious in lending to SFFs under their regular lending programs, which are usually offered to clients who have good credit ratings and can offer some form of collateral. On the other hand, government credit programs are directed to riskier clients, usually to new borrowers and those who cannot provide acceptable assets as collateral. The affordable and easy access government lending programs have encouraged some SFFs to go to formal credit sources for agricultural production loans. However, most of them use informal channels, such as input traders, merchants, and informal lenders, for their broader financial needs, since they are community-based lenders and grant loans faster than other credit sources. These sources do not require documents and offer easy payment terms compared with banks, MFIs, and cooperatives that require documents to be filled out, submitted, and validated, and loans, which take time to be approved and released. This credit channel is useful in addressing immediate cash needs, such as in cases when a family member gets sick. Due to poor credit history, borrowers who are blacklisted from formal credit sources also turn to informal lenders.

SFFs are not homogenous as a group. The DA defines small farmers as those who operate farms of 3 ha and below. Banks consider farmers who operate or manage farms up to 10 ha as small farmers. The 2017 ACPC SFF Indebtedness Survey shows that while the average farm size is similar between borrowing and nonborrowing farmers, the annual production income of farmers who borrow from formal credit sources is about twice that of nonborrowing farmers (Table 2).

Aside from land size, small farmers can be characterized by technology use, crop type, and access to the value chain. Within the SFF group, subsistence and backyard farmers engage in agriculture mainly as a safety net rather than for commercial purposes. In this case, farm production is usually for consumption and has limited or no plan for expansion. These farmers are also likely to have no desire to borrow. Meanwhile, some farmers are engaged in agriculture for commercial purposes. They sell a bulk of their produce in the local markets and invest in their farms for business expansion. Segmentation within SFFs has to be considered in designing credit programs for smallholders. Subsistence farmers may require more capacity building programs to be exposed or trained for technology and business networks before having

access to credit. Commercial SFFs can be supported by proving better access to formal credit and technology and by strengthening their links to the value chain.

Table 2. Characteristics of borrowing and nonborrowing farmers

	Borrower (formal)		Borrower (informal)		Borrower (both)		Nonborrower	
	n	Mean	n	Mean	N	Mean	n	Mean
Age	271	51.86	213	52.58	18	47.72	421	53.25
Household size	272	4.99	214	4.77	18	5.33	423	4.59
Size of parcel farmed (ha)	272	1.48	214	1.47	18	1.78	423	1.49
Production income (PHP)	272	94,412.61	214	75,415.64	18	111,589.90	423	55,600.93
Household income (PHP)	272	163,727.30	214	131,826.90	18	204,653.00	423	108,947.70

Ha = hectare; PHP = Philippine peso

Note: n is the number of observations; credit from pawnshops and local government units (LGUs) were classified as informal.

Source: ACPC (2018)

In Negros Occidental, a microfinance rural bank representative shared that it currently serves 150 out of the 1500 agrarian reform beneficiaries it initially started with. The remaining 150 clients are those with good credit standing. LBP denies the loans of individual borrowers or members of cooperatives who have records of default. A cooperative rural bank representative shared that they deny loans when there is no collateral, or the value of the collateral is lower than the loan applied for, and the loaned amount exceeds the amount needed to execute the farm plan.

Some cooperatives perform background and credit investigation with 5 percent of their members rejected. Informal lenders employ prudence in lending to SFFs as well. A feeds distributor in Negros Occidental shared that he did not completely turn down input loans from hog raisers but reduced the amount of inputs he approved. Similarly, banana merchants in Bukidnon implied that they stopped lending to farmers when the latter had big outstanding loans. Reducing the loaned amount was also a strategy of a multipurpose cooperative in Bukidnon. MFIs also limit the initial loan that one can borrow (e.g., PHP 5,000), although the credit line is increased as outstanding loans are repaid.

There are cases when there are no LBP branches (such as in Sumilang, Bukidnon) or the existing branches are recently established (like in Quezon), or there are credit facilities, such as rural banks and cooperative banks, but the distance and transaction costs are deterrent factors.

Issues identified and specific actions suggested by supply-side players

Inadequate manpower to monitor loans

The recent push toward direct lending and the influx of government-funded lending programs have provided a more focused approach to help SFFs and brought positive spillover effects in the SFF financing ecosystem, including the high repayment rates of some programs. Competition has led rural banks and informal lenders to continuously review their products and services. These lending channels have reached out to communities that are likely to experience credit rationing. Despite these, challenges to government-funded credit programs need to be highlighted to improve

the effectiveness and efficiency of service delivery. These include issues on project monitoring, which LBP does not have the manpower for, and the collateral-free policy, which can be a source of moral hazard in SFF lending. Projects approved by LBP under the government-led lending programs are not regularly monitored due to the lack of manpower. Monitoring can ensure SFFs' access to formal credit sources, since it helps in the early detection of production issues and potential misuse of borrowed funds, and determines the time of harvest and collection. All of these can improve loan repayment and help SFFs build a good credit history. Monitoring also helps banks evaluate defaults.

Given LBP's limited manpower, collaboration with other cooperatives and other stakeholders, such as MFIs and SFF associations, must be strengthened. These institutions have personnel who go to communities to organize people with financing needs and assess their eligibilities. Thus, they can help reach out to coastal and rural communities for SFFs who are more likely to experience credit rationing. They are also more capable of delivering personalized services, like training on financial literacy and forum to discuss strategies for SFF projects. Officers also conduct regular monitoring of the projects, which helps reduce the probability of default.

Quick implementation of some programs

Stakeholders from banks indicate that not all lending programs are considered, since some are quickly implemented to get political leverage. Such programs are implemented even when borrowers are not ready and the manpower is not yet in place. The strong presence of critical elements can make lending programs successful. However, some programs benefitted from careful planning prior to implementation, like *Sikat Saka,* which started in 2013 and is still delivers financing services to SFFs. Thorough screening, the readiness of borrowers (in terms of infrastructure, training, and technical know-how), and the availability of manpower or on-ground personnel to monitor projects are important for efficient and effective delivery of financing and related services. This means that manpower is in place to screen applicants prior to their endorsement for financing, which has helped in high repayment rates.

Training programs, particularly on financial literacy, should be included in the SFF loan packages, to educate SFFs on the proper use of money and develop their skills in managing an agribusiness. Training programs to reshape SFFs' attitudes toward government money can help build the trust of formal lenders in SFFs' ability and intention to repay. Based on the cooperative banks' experiences, most of their SFF clients who have availed of government-funded loans do not repay due to the mindset that government money is free. In part, this is validated by LBP lending center representatives who maintained that only about 20 percent of SFF borrowers repaid their loans and that their attitudes must be rectified. One defaulting SFF can send the wrong signal to the entire community. This sentiment was echoed by the representatives of cooperative rural banks who said that they had difficulties in succeeding loan cycles.

Cooperatives are critical in reaching out to SFFs in far-flung communities. Members of cooperatives need training programs, especially for the newly established entities, because most of them are not skilled enough in fund management. A representative of LBP shared that a sincere implementation of lending programs means that organizations become lending partners, not because of the pass-on rate, but because of their genuine efforts to deliver quality services to farmers and fisherfolk. This makes training programs significant in instilling this mindset in cooperatives.

Mixed responses to technological adoption

Stakeholders have mixed responses in terms of technological adoption. Technology is used by lenders to deliver allied services in some areas, such as entertaining queries from potential clients and establishing a financial portal to provide information on farm financing and a learning management system. This helps people learn about businesses that facilitate their loans. Radio programs and online livestreaming through social networking services like Facebook can promote awareness and explain the trends and relevance of various agricultural sectors. Some banks have leveraged technology through mobile banking. Meanwhile, the lack of connectivity, infrastructure, and technological knowhow are serious impediments to SFFs' adoption of technology. SFFs and even credit supply-side stakeholders have agreed that the use of technology for loan application is a challenge, since most SFFs need assistance in filling out forms manually, more so digitally. Some supply-side stakeholders still release the loan proceeds by issuing checks, rather than through electronic banking functions like an automated teller machine.

Among the barriers to SFFs' adoption of new technology, particularly in remote areas, are inadequate capital and the lack of education and technical knowhow. Rural bank players agree that educated farmers and those who can afford to invest in technology have benefited the most from mechanization. SFFs' mindset that producing more is better has presented more challenges than solutions, especially in the cash crops production, which can easily flood the market during harvest season. Farmers need to practice smart farming or right size farming to enhance productivity. This is particularly needed amid challenges on the low-coverage delayed payments of crop insurance.

Issues identified and specific actions suggested by SFFs

Inadequate markets

Inadequate markets and low prices have hounded SFFs and become a major concern articulated by stakeholders from the study sites. For crab gatherers in Negros Occidental, the industry was doing well. However, due to community lockdowns imposed against the coronavirus disease 2019 (COVID-19), the industry's value chain, from production to marketing, was disrupted. As such, crab gatherers were restricted in their movement. The transport of their harvest to nearby markets was also delayed. This resulted in oversupply and low market prices of crabs. Even before the COVID-19 pandemic, however, low prices were a major concern for some SFFs, especially during harvest season. Since gatherers deal with products that can go stale and do not have the appropriate equipment to store their produce, they are forced to sell them at low prices.

Inadequate crop insurance

Crop insurance is not enough to cover damages sustained due to natural calamities. Some fisherfolk, for example, noted that no coverage was given for partial damages and they could only claim if their boats were completely wrecked. Similar stories were affirmed by farmers when they claimed PHP 3,500 for a 1-ha banana plantation devastated by the *El Niño* warming phenomenon. A lag in payment was also noted as some farmers filed claims in the first quarter of 2019, but the proceeds were given in early 2020. Others are discouraged from filing claims because the cost is higher than the indemnity they can collect. Damages to crops increase the probability of default, and although loans can be restructured by banks, low prices and other production and marketing risks prevent SFFs from completely repaying their loans.

Other commodity-specific concerns

Commodity-specific concerns are present as well. In hog-raising, which is input-intensive, missing the appropriate inputs can have serious implications in profitability. In the grow-out operation where young pigs are raised, fattened, and sold after three to four months, it is crucial to finance the appropriate hog diet to maximize profits. Due to the lower prices of corn during harvest season, corn farmers in Bukidnon recently diversified into the banana-growing industry.

However, banana-growing can be challenging due to pests and diseases affecting the quality of produce. There were cases when only about 60 percent of the harvest were absorbed by buyers in Davao, with class A and B valued at PHP 30 per kilogram (kg), and class C valued at PHP 20 per kg. Rejected harvests are sold in a fruit stand, while the rest is fed to the pigs. To prevent infestation and consequent low marketability of harvests, growers need to spray insecticide twice or thrice every month. Most landowners in Bukidnon rented out their farms to multinational agricultural firms like Dole. Thus, little help is given to backyard banana growers.

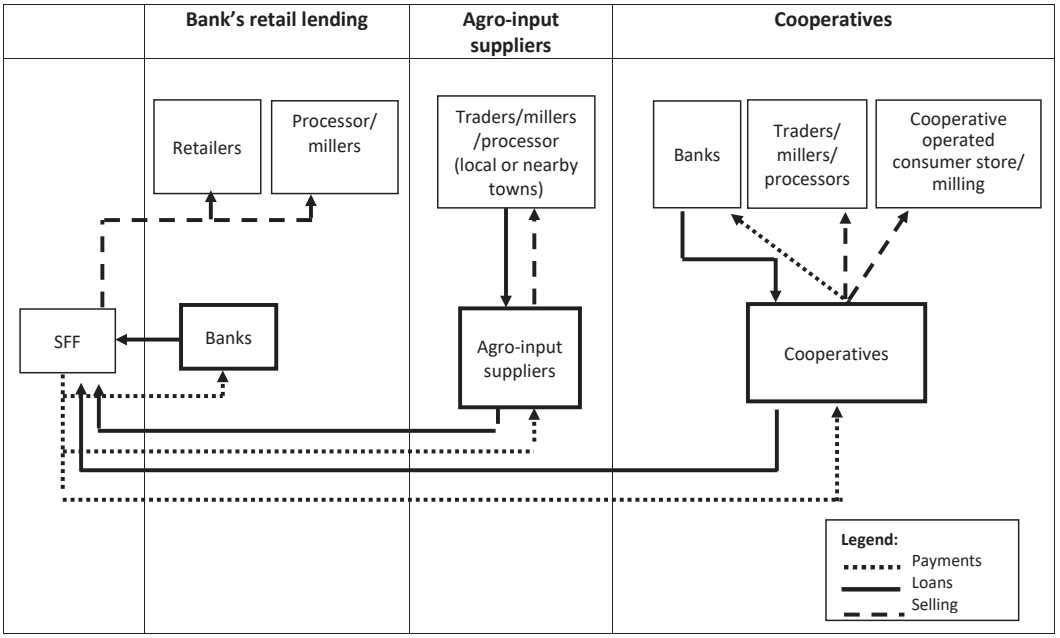
Despite the existing LGU assistance, SFFs also identified several ways to improve LGU services, such as the following:

- Strengthen the enforcement of fishery laws. Some fisherfolk shared that illegal fishers entered their areas.
- Continue the enforcement of crab reseeding policy, which helps sustain the crab industry, but has not received full support from the local officials in Negros Occidental. This emphasizes the need to shield good programs from politics.
- Strengthen monitoring and technical assistance for hog raisers, particularly for early detection of diseases, which prevents losses. However, most agriculture offices do not have enough manpower to conduct regular monitoring.
- Assist banana farmers in Bukidnon who are not in partnership with multinational companies in the form of insurance and agro-input supplies. Most of the assistance are channeled to corn, the major crop in Bukidnon, although banana farming appears to be an emerging source of income.
- Strengthen information dissemination on commodity-specific services, including the appropriate harvesting of crabs and the availability of insurance on hogs.

AVCF in the study sites

The value chain in the study sites is traditional and generally characterized by many small and independent SFFs who secure financing from financial institutions through tie-up programs among the government, agro-input suppliers, and cooperatives or MFIs (Figure 1). In the retail lending channel, banks provide financing to SFFs prequalified by funding agencies. However, there are several challenges in this channel. Banks do not have adequate manpower to regularly monitor the projects. SFFs have no assured markets and are vulnerable to low prices due to oversupply during harvest season. This is often exacerbated by traders or buyers who take advantage of the glut and the SFFs' immediate need for money. More often than not, SFFs end up with little or no profit margin, which affects their loan repayments.

Figure 1. Financing and marketing flow in different credit channels



SFF = small farmers and fisherfolk
Source: Authors' compilation

However, there are channels in the study sites that exhibit internal agricultural value chain financing (AVCF), including trade financing wherein agro-input merchants who provide inputs to SFFs take the harvests as repayment and sell them to partners or local retailers in nearby towns. This informal and unsupervised model allows trade lenders to impose unfavorable prices by raising the interest rates on loans and the selling price of inputs or reducing the price for the produce (Llanto and Badiola 2010). Cooperatives also provide credit to SFFs through government lending programs. While most cooperatives accept money as loan repayment, others have more organized financing and marketing approaches.

One promising AVCF is the tripartite arrangement among banks, institutions, and growers in Bukidnon, which can potentially be scaled up to address marketing issues. In this AVCF, a cooperative rural bank in Bukidnon, which directed its programs to big loans (at least PHP 500,000), entered into an institutional arrangement with the Asian Hybrid Seed Technologies Inc. (AHSTI).[8] In the arrangement, the cooperative bank lends to farmers-growers identified and endorsed by the AHSTI. Farmers-growers are required to become associate members of the cooperative rural bank before the loans are released. The AHSTI guarantees the loan by providing the collateral to the cooperative rural bank. It supervises farmers-growers from planting to harvesting. In turn, farmers-growers sell the harvest to the AHSTI at a guaranteed price. The harvest becomes certified commercial seeds, which the government buys for distribution to farmers, while the rest are sold to the local market as commercial seeds.

[8] A 100-percent Filipino-owned corporation located in Malaybalay City, Bukidnon, that creates low-cost seeds of high-yielding corn varieties that suit the tropical agricultural conditions in the Philippines and other tropical and subtropical regions (https://ahsti.com.ph/) (accessed on October 27, 2020).

This approach eliminates middlemen by identifying institutional buyers who assure a price floor and can solve the issues of inadequate markets and concomitant low prices. However, only selected farmers-growers can participate in this AVCF because they are recommended by the AHSTI. Farmers-growers also need to be associate members of the cooperative rural bank. This means that farmers-growers who have poor credit history cannot participate in the value chain financing.

WAYS FORWARD: FROM FACILITATOR-DRIVEN TO INTEGRATED AVCF

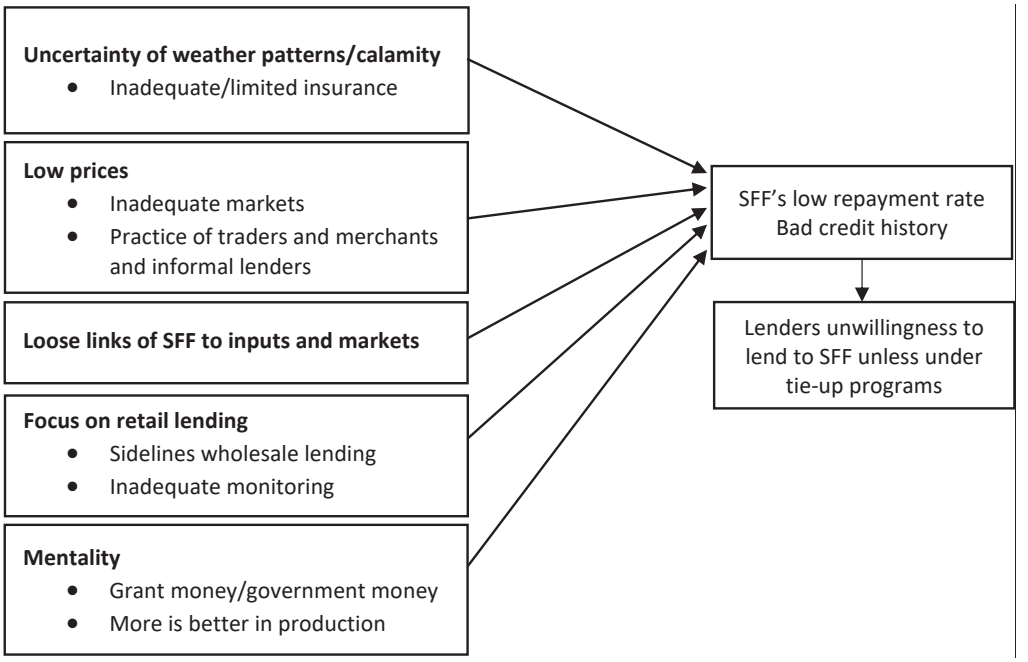
Issues and challenges remain, notwithstanding the availability of easy access and affordable government lending programs. While risks in agriculture have various sources, production market risks are prevalent in the sector. This leads to the high variability in production due to the daily vagaries of weather and occasional but destructive natural calamities or pestilence. Climate change, manifested by extreme and protracted drought or excessive rains resulting in floods, has become a challenge in the agricultural sector in recent years. Market risks are associated with uncertainties in prices that agricultural commodities will fetch during harvest time. Planting similar crops at the same time, which entails similar harvesting time, contributes to risks associated with lower market prices.

While these two risks have been the overarching concerns, other attendant issues contribute to risks in agricultural finance (Figure 2). These include limited insurance to cover damages sustained due to natural calamities and unfavorable practices of traders and merchants. Moreover, while LBP's focus on retail lending encourages competition in the SFF financing ecosystem that results in more service-oriented products, it also presents challenges in project monitoring. There are also misplaced mindsets among SFFs that money from government lending programs is a grant (e.g., not to be repaid), which is partly reflected in the low repayment rates, and the "more is better" mentality, which equates successful farming to bountiful harvest. In the case of SFFs who have limited inputs to production, the appropriate mentality is to use the right amount of inputs to generate maximum profits.

A potential approach to address these challenges involves value chain financing in agriculture. A value chain "identifies the set of actors and activities that bring a basic agricultural product from production to final consumption", connected through a vertical linkage or "a network of various independent business organizations, and can involve processing, packaging, storage, transport and distribution" (FAO 2010, p. 2). The two types of agricultural value chains are traditional and modern. Players in the former often engage in spot market transactions, with little or no accumulation of relationships, trust, and information, while modern players engage with each other in a coordinated and integrated manner.

AVCF has become a major focus of agricultural development programs all over the world, owing to the fast-paced lifestyle that boosts the demand for processed foods and paves the way for more retail stores and supermarkets. AVCF is "any or all of the financial services, products, and support services flowing to and/or through a value chain to address the needs and constraints of those the chain, be it a need to access finance, secure sales, procure products, reduce risk and/or improve efficiency within the chain" (Miller and Jones 2010, p. 2). The two types of AVCF are internal and external (FAO 2010). The former takes place in the value chain (e.g., input supplier financing farmers) and the latter is facilitated by the relationships in the value chain (e.g., a bank issues loans to farmers because it is guaranteed by a player in the value chain).

Figure 2. Risks in agricultural finance



SFF = small farmers and fisherfolk
Source: Authors' compilation

The different models of AVCF depend on who drives the value chain development: producer-driven, buyer-driven, facilitator-driven, and integrated (Table 3). Producer-driven value chain models are driven by producer associations through the provision of finance, inputs, and technical assistance to access new markets and obtain higher prices. This is driven from the bottom end of the chain and may have challenges as producers may not fully understand the needs of those in the topmost chain (Miller and Jones 2010). Buyer-driven value chain models are run by exporters or processors and demonstrated in contract farming and trade financing where buyers or traders commit to finance the production and producers and associations agree to sell their harvests to buyers or traders. Facilitator-driven value chain is driven by donors, such as the government or nongovernment organizations. An integrated value chain is the most evolved, connecting all players, including the SFFs, suppliers, processors or millers, wholesalers or retailers, cooperatives, and banks. It links actors through vertical integration (e.g., from producers and wholesalers up to the supermarkets). Financing, information, inputs, and technical training flow from other players to the producers in this model.

Table 3. Typical value chain models of smallholder production

Model	Driver of organization	Rationale
Producer-driven (association)	• Small-scale producers, especially when formed into groups, such as associations or cooperatives • Large-scale farmers	• Access new markets • Obtain a higher market price • Stabilize and secure market position

Table 3. (continuation)

Model	Driver of organization	Rationale
Buyer-driven	• Processors	• Assure supply
	• Exporters	• Increase supply volumes
	• Retailers	• Supply more discerning customers meeting market niches and interests
	• Traders, wholesalers, and other traditional market actors	
Facilitator-driven	• NGOs and other support agencies	• Make markets work for the poor
	• National and local governments	• Regional and local development
Integrated	• Lead firms	• New and higher value markets
	• Supermarkets	• Low prices for good quality
	• Multi-nationals	• Market monopolies

NGOs = nongovernment organizations
Source: Miller and Jones (2010, p. 28)

Short-run strategic actions

In the short run, the facilitator-driven AVCF appears as the most suitable approach to integrate SFFs into the value chain, thereby ensuring inclusiveness. As the lead in the facilitator-driven AVCF, the government can replicate AVCFs that are already in place. The approach with the AHSTI, for example, can be replicated in other commodities and communities. However, it is a challenge to find players who are willing to participate in the AVCF. The government needs to look for firms, buyers, or institutions that will vouch for SFFs' loan applications and look for a financial institution willing to provide the loan.

Many SFFs are independent producers who likely lack the capacity to meet the volume and quality requirements of wholesalers and institutional buyers and have yet to fully appreciate the importance of technology and trust, among others. The government can help prepare SFFs for a sustainable AVCF. While the development of AVCF is crop-specific, there are common elements for the case of a facilitator-driven AVCF in its infancy. The starting point is to perform a situation analysis to understand the market and the available players and resources, such as the items listed below.

- Understanding the market includes the assessment of institutional buyers (e.g., What do they need? How much do they need? At what price are they willing to pay for these? How often do they need the delivery?)
- Understanding the players requires the assessment of available partners (e.g., How will agro-input suppliers be able to scale up their lending facility? How can the participation of LBP, cooperatives, and MFIs evolve from lending to market facilitation?)
- Understanding the resources involves the assessment of SFFs' readiness for new approaches and technologies (e.g., What approach will work in forming sustainable associations? What dynamics in the community can present opportunities and challenges in the AVCF?

The government must ensure the collective voice of SFFs as it facilitates the replication and scaling up of successful small-scale AVCF. Markets may determine the price, but big players have substantial influence as well. This idea can be leveraged for SFFs to tilt market outcomes in their favor. It is important not only to organize SFFs into groups but to identify leaders as well. In the short run, leaders should manage individual harvests to prevent oversupply during peak seasons and help mobilize members to actively participate in government-led consultation, training, and capacity building. Consultation with SFFs is critical in understanding feasible options, given the existing human capital and physical resources, and can foster a sense of ownership among SFFs and make the AVCF successful.

SFFs should undertake training and capacity building. While some SFFs are currently forming groups or associations, they should evolve to improve access to financing and marketing and enhance collective and individual welfare. Groups and associations are formed to avail of government assistance. They must look beyond the assistance mentality and evolve towards the adoption of correct attitudes and mindset. There is a prevailing "government money" mentality associated with government lending programs—one that implies that there is no need to repay because the funds are from the government. It underscores the need to capacitate SFFs' technical knowhow, financial literacy, production-related knowledge, and more importantly, values formation to develop a strong sense of commitment. Training activities to introduce the use of technology and short- and medium-run plans to solve marketing problems and other related issues can be included in the tie-up lending programs.

SFFs need to ease into the use of technology. This is important in the flow of information in the value chain. There are obstacles to SFFs' adoption of technology in payment systems or mobile banking, not only the lack of connectivity, but SFFs' attitudes as well. Some SFFs do not see the need to adopt technologies, since they borrow from community-based credit sources and do over-the-counter payments or via roving account officers. Conduits and lending partners should help introduce technologies to SFFs through mobile banking and electronic payment systems.

Develop a savings habit and improve the agricultural insurance program to enhance the credit access of SFFs. Uncertainties in agricultural production can be mitigated by savings and insurance programs. Banks and other financial institutions that lend to SFFs should strengthen their savings programs, not only for lending purposes, but to also hedge against covariate shocks. Efforts to improve agricultural insurance in the country are undertaken. Reyes et al. (2019) suggested several areas for improvement for the Philippine Crop Insurance Corporation. This involves the need to improve penetration rate and strengthen partnerships with LGUs and target beneficiaries for free insurance program. The latter can be improved through the development of better information system that will provide an updated and complete listing and geotagging of agricultural producers and households in the country.

Cooperatives should evolve from being conduits and facilitate markets. Cooperatives have collective bargaining and marketing strategies that can link SFFs with institutional buyers. Some cooperatives in Bukidnon have practiced this approach and accepted harvests as payment and delivered them to buyers in nearby towns. Despite this, the problem of low prices remains. Cooperatives that have direct buyers in nearby towns noted that they need to strike a balance on the price that they demand, since some of their members opt to individually sell their harvests. This emphasizes the importance of groups and associations and their potential to sway market outcomes. The government lending programs should look into how its lending partners can strengthen their AVCF involvement.

LBP should help link SFFs with their merchant or trader clients. LBP has successful lending programs, such as the *Sikat Saka,* which can be a starting point for AVCF. The bank can forge linkages between SFFs and its retail clients who are merchants and traders.

Agro-input suppliers should have strong links with financial institutions. Some agro-input suppliers have created an ecosystem of financing and marketing, although currently small-scale due to financing issues. Despite issues on the timing and the availability of financing, opportunities can be scaled up (e.g., linkages have been established). Agro-input suppliers are community-based and can leverage their familiarity with borrowers and communities, not only in monitoring, but in risk management as well. Strengthening the link of the agro-input suppliers with financial institutions can reach SFF communities that do not have access to credit and with limited connection to markets.

Improve information systems to properly record and analyze agriculture loans to be better informed on product designs, risk management strategies, and innovations. The establishment of credit information bureau for rural credit can be explored. No single organization has credit information on small farmers. LBP provides wholesale loans to cooperatives and farmers' organizations and does not have individual farmer data. The credit bureau can provide the risk profile of individual SFFs and agricultural borrowers. This will reduce the transaction costs of agricultural credit and help financial institutions and government develop programs to complement the risk profile of SFFs. With the establishment and operation of the Credit Information Corporation, the collection of credit information of small farmers will be feasible.

Medium-run strategic actions

Infrastructures are needed in the medium run. These include the establishment of postharvest facilities where crops may be stored while waiting for prices to become less disadvantageous to SFFs. Facilities need competent people who are skilled in commodity management to ensure the security and quality of inventory. Collaboration between the public and the private sectors is critical in building capacity and putting up regulations to ensure transparency in the operation and management of facilities. The establishment of processing hubs in strategic areas can be explored for perishable products. Postharvest facilities work only for nonperishable commodities like grains. The development of the agro-processing industry is a good strategy for perishable commodities.

Improve the speed and coverage of internet connection. Reliable and low cost connectivity is essential in the use of electronic payment systems. Connectivity is an element that all stakeholders find problematic. Based on the 2019 National ICT and Household Survey, 82.8 percent of households have no internet access. The high internet cost and equipment are the top reasons for this. The most common internet service provider (ISP) for both urban and rural communities in the Philippines[9] is also the slowest, with download speed of 6.44 megabits per second (mbps) (Globe Mobile) and 7.49 mbps (Globe Telecom).[10] In addition, 502 out of the 1,604 *barangays* have no ISPs.

Strengthen institutions to secure property rights and generate reliable information for land ownership disputes. This is an age-old issue that needs to be addressed to reduce transaction costs, eliminate fraud, and enhance borrowing capacities.

[9] https://dict.gov.ph/ictstatistics/wp-content/uploads/2020/06/NICTHS-FINAL-REPORT-PRESENTATION_26-JUNE-2020.pdf (accessed on November 29, 2021).

[10] As of June 2020, Comclark was the fastest at 22.54 mbps, followed by Converge ICT Solutions at 21.37 mbps, Converge at 20.56 mbps, Philippine Long Distance Telephone Company at 19.41 mbps, Sky Cable at 11.82 mbps, Smart Broadband at 9.6 mbps, and Eastern Telecoms Philippines at 9.08 mbps (https://www.statista.com/ statistics/1117074/ philippines-fastest-internet-service-providers-by-download-speed/) (accessed on October 20, 2020).

Long-run strategic actions

In the long run, the facilitator-driven AVCF must evolve into an integrated AVCF. One that is independent of government subsidies, in which information and financing are flowing seamlessly across the chains. Institutional buyers, SFF associations, and financial institutions are closely linked to facilitate the various aspects of value chain. SFFs and their associations should strengthen the linkages set out by the facilitator-driven AVCF and come up with innovative AVCF strategies to forge new linkages. Information systems allowing AVCF players to monitor the movement of goods, download or repay loans, purchase inputs, and access critical information should be in place. Information systems that link data on financing instruments (such as warehouse receipts) with financial institutions are critical to reducing administrative costs associated with verification on the part of the lender and to produce a proof on the part of the borrower.

Further develop infrastructures that are interlinked to financing and marketing. Services provided by postharvest facilities for nonperishable commodities, for example, should evolve into warehouse receipt financing (WRF), which provides both secure storage and access to credit. The National Bulk Handling Corporation (NBHC) is a warehouse management company in India that provides not only a trading platform to all participants of the value chain, but also secure collateral management and a single-window and customized end-to-end solutions (Miller and Jones 2010). To guarantee the condition and security of stored goods at field warehouses, the NBHC obtains regular audit and stock condition intelligence through an in-house team, conducts quality testing, administers security, and manages the health of stored goods (Choudhary 2007). In the Philippines, an enabling legal framework for the WRF is in place.[11] However, the warehouse stock receipt issued by the National Food Authority is not considered a negotiable instrument. If properly managed and regulated, WRF can help in the AVCF, since it guarantees credit and can stabilize prices. For WRF to become successful, there must be commodity grades and accepted standards in the trading community. Warehouses must be well managed and receipts should be recognized collateral. There should be transparency throughout the systems (Miller and Jones 2010). Support research must be conducted, such as a situation analysis, aside from piloting test WRF in suitable areas in the country.

SUMMARY

In the short run, a facilitator-driven AVCF is recommended to pave the way for inclusive AVCF. Several critical elements are highlighted, including (1) capacity building and reshaping of the SFFs' mindset and the key role of associations in mobilizing them to actively participate in government-led consultation and training; (2) adoption of technology; (3) improvements in risk-mitigating measures, such as developing a savings habit and innovative agricultural insurance among SFFs; (4) strengthening of links between agro-input suppliers and financial institutions; (5) participation of banks and conduits in forging SFF links with markets; and (6) establishment of a credit information bureau for rural credit. In the medium run, the government can focus on connectivity improvements and physical infrastructures, such as postharvest facilities and processing hubs.

[11] There is an established legal framework governing warehousing and warehouse receipts in the Philippines. Two separate laws that cover warehousing and warehousing receipts in the Philippines are the Bonded Warehouse Act of 1932, as amended by the General Bonded Warehouse Act, and the Warehouse Receipts Act of 1912 (Llanto and Badiola 2010; Briones and Tolin 2016). "Specific rules and regulations for rice and corn were initially outlined in National Grains Authority Act of 1972 (Presidential Decree 4) and were expanded and developed through the Revised Rules and Regulation of the NFA on Grains Business of 2006" (Briones and Tolin 2016, p. 8).

In the long run, while AVCF is specific to crops and may differ based on the available players and resources in communities, the government can set up the necessary elements for a sustainable AVCF that is also independent of government subsidies. This implies that the government credit programs need to be strategic and designed not just to give credit access, but to capacitate SFFs, farmers' organizations, and cooperatives for AVCFs. Banks and other financial institutions have the funds to supply credit to the agricultural sector and SFFs. However, the reduction of uncertainties in small farm production is imperative for funds to flow.

Facilitator-driven AVCF has to evolve into an integrated AVCF, with SFF associations and financial institutions being closely linked to facilitate value chain activities. SFFs and their associations must strengthen the linkages set out by facilitator-driven AVCF and come up with innovative AVCF strategies for new linkages. Information systems should be in place to link financing instruments with financial institutions and facilitate seamless transactions in the chains.

Given that the value chain in the country is still traditional and it takes time to set up the requisites of successful AVCFs (e.g., capacitating SFFs, associations, and small cooperatives; linking SFFs with input and output markets; and forging linkages with institutional buyers), buyer-driven AVCF can be explored as the second best alternative in the long run. This is a scaled down version of the integrated AVCF in terms of markets, although the systems that facilitate the flow of information and the interlinking of financial instruments with financial institutions remain essential.

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Disentangling the Effects of Maternal Employment on Child Stunting in the Philippines[1]

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ABSTRACT

Stunting is defined by the World Health Organization (WHO) as impaired growth and development experienced by children due to "poor nutrition, repeated infection, and inadequate psychosocial stimulation". Children whose height-for-age fall below the WHO's child growth standards median are considered stunted. This study analyzes the effects of maternal employment, along with mother's education, civil status, and wealth, and the child's age, sex, number of siblings, and regional dummy variable, on child stunting in the Philippines. It uses logit regression and data from the 8th National Nutrition Survey 2015 of the Department of Science and Technology-Food and Nutritional Research Institute. Interaction variables considered are the mother's years of schooling, work, civil status, and age. It supports the literature that maternal employment increases the likelihood of stunting among children. The results show a decrease in the likelihood of child stunting if employed mothers acquired a higher level of education. The number of children in the household increases the probability of stunting, while wealth decreases the likelihood of children being stunted. Male children and those with ages between 25 and 36 months have higher stunting incidence. Based on the significant variables in the logit regression, policies should focus on mothers who are employed, particularly those who attained a lower level of education. Serious attention should also be specific to the children's age group, sex, and family poverty status.

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INTRODUCTION

In 2018, 30.3 percent of children below the age of five in the Philippines were stunted, according to the Food and Nutrition Research Institute (FNRI) of the Department of Science and Technology (DOST). The End of Childhood Survey, conducted by Save the Children, an international child welfare organization, reported that the Philippines ranked 96th in terms of stunting among 172 countries in 2017 (Geoghegan 2017). Stunting, a form of undernutrition among children, is a consequence of prolonged or repeated episodes of malnutrition beginning from the mothers' pregnancy (Cadiz 2014).

Herrin et al. (2018) pointed out that the consequences of stunting need to be taken seriously because it affects children's survival, economic productivity, and educational performance. Once children are stunted in their growth and cognitive development, it would be difficult for them to catch up. There are also fewer chances to regain lost opportunities.

A stunted child at an early age (up to five years old) is likely to experience damaging consequences throughout his lifetime. Stunted children at this age would eventually not reach their full physical and brain development. According to the Center on Developing Child at Harvard University (2007), 90 percent of a child's brain development occurs from their early years up to five years old. Stunting affects productivity and thus increases the probability of a continuous cycle of poverty down to the next generation. As Habito (2019) asserted in his opinion column, stunting holds back the development of children and the country.

The role of mothers in preventing stunting is very specific because mothers directly affect children's health (Graham and Jordan 2013). However, low-income families force mothers to engage in work activities to support the needs of children. This eventually leads to neglect of caregiving. Mother's care is important, especially in optimal breastfeeding, which benefits the child's overall health outcome (Haddad et al. 2015).

Female participation in the labor force may positively or negatively affect a child's wellbeing. In 2018, female participation in the Philippine workforce was at 49.76 percent, with an average value of 47.91 percent (World Bank 2018). Over the last decade, the country has seen an increase in maternal employment and an alarming prevalence of stunting. This research seeks to determine the effects of maternal employment on child stunting in the Philippines and recommend policies to help address this problem.

Factors affecting child stunting

Maternal employment

Recent childhood stunting studies in different countries have noted positive, negative, or no relationship between maternal employment and child nutrition. Rashad and Sharaf (2019) found that maternal employment had a negative effect on child nutrition or contributed to child stunting in Egypt. Compared with employed mothers, unemployed mothers in Ethiopia are 23 percent less likely to have stunted children (Amaha and Woldeamanuel 2021). Studies have analyzed the kind of mothers' work related to the likelihood of children being stunted. For instance, higher stunting odds were reported on children whose mothers were engaged in agriculture or manual work than mothers engaged in professional work in Uganda (Nakinga et al. 2019). The same study found that children whose mothers were employed by nonfamily members had higher stunting odds than children whose mothers were employed by their family members. Nakpong et al. (2021) demonstrated that socioeconomic status, such as maternal employment and

household wealth in service or manual occupations, were the main drivers of stunting among overweight mothers in Cambodia. Willey et al. (2009) found a decreased likelihood of stunting among children from Johannesburg and Soweto in South Africa whose mothers were employed. The magnitude of stunting was lower among children of employed mothers against unemployed mothers in three town administrations in Wolaita Zone, Ethiopia (Zewdu and Handiso 2020).

Ngenzebuke and Akachi (2017) found that maternal employment was positively related with child nutrition, or did not contribute to stunting in Nigeria. Mothers' income from employment had higher benefits for older children. Meanwhile, studies like that of Kulwa et al. (2006) found no significant relationship between maternal employment and stunting in Tanzania.

Other maternal characteristics

Maternal education

In the Philippines, parents' low educational attainment was one of the strong influences on the health outcomes of children (Graham and Jordan 2013). Ricci and Becker (1996) found that low maternal education and training had been considerable hazard issues for children under 12 to 24 months in Metro Cebu, Philippines. Cortes (2011) identified that married mothers strongly influenced the upbringing of children's intellect. Semba et al. (2008) identified mother's education as a significant predictor of low toddler height in Bangladesh and Indonesia. Miller and Rodgers (2009) asserted that children's diet was associated with mothers' education in Cambodia. Iftikhar et al. (2017) concluded that better health outcomes for children in Pakistan would have happened if the early stages of mothers' lives were supported with education to somehow guide their children in combating malnutrition.

Marital status

Dawson (1991) demonstrated that the absence of a biological mother could result in adverse health risks among American children. This finding shows consistency with the hypothesis that children are affected by different factors endogenous to marital status. The results showed divorce and single parenting's effect on the child's physicality. Zeritu (2017) noted that the likelihood of having stunted children in Southern Ethiopia was four times higher for divorced or widowed mothers than married mothers. The generalization of the result on the mother's marital status may differ based on the norms and culture in a country.

Child characteristics

Age of stunted child

Several studies have looked at the relationship between a child's essential characteristics and health outcomes. A survey conducted in the Philippines and South Africa concluded that the malnutrition rate increased dramatically at an early age when the child did not get the specific nutrients or the mother's milk was substituted. This was more pronounced among two-year-old children (Jones et al. 2008). Undernutrition in Jamaica affects children under the ages of one to three years old because this period is the most critical to child development (Bourne 2009). Children in South Asia coped with getting stunted at a certain age. Specific factors like brain development remain under the influence of malnutrition, as it is off-timing during brain development (Mehrotra 2006).

Sex of stunted child

Nutritional status is often measured regardless of the child's sex. In Viet Nam, it was observed that more male children were malnourished than female children (Hien and Hoa 2009). Mehrotra (2006) showed that the health status of female children from poor households in South Asia was more affected compared with male children. Evidence shows that the allocation of a limited resource may be more favorable for male children than female children. For example, more female children were stunted than male children in poor households in Uganda (Wamani et al. 2004).

Household profile

Household wealth

Most researchers recognize poverty as a key determinant in children's health outcomes. Graham and Jordan (2013) emphasized that an increase in income for households in the Philippines could improve children's dietary intake by strengthening food safety and allowing households to buy nutritional ingredients. Many studies have proved that children being born poor and remaining poor until their first to second years eventually leads to an increase in infant mortality and the number of underweight and undernourished children. In the country, poverty is one of the major causes of stunting, which is somehow related to other determinants (Adair 1997; O'Donnell et al. 2009). There was a high occurrence of health problems among low socioeconomic status families based on data from the Demographic and Health Surveys for two countries in Asia, five in Latin America, and four in Africa (Menon et al. 2000).

Pasricha and Biggs (2010) noted that an impoverished household in South and Southeast Asia was likely to have less intake of nutritious food. John (2000) identified that earnings from employment were significant in decreasing poverty and malnutrition problems for children in Guatemala.

Number of siblings

Economic theories emphasize how a family makes a rational decision on how many children to have, with health as a crucial human capital investment (Becker 2007). There is a tradeoff between investing in the children's health and increasing the family size (Becker and Tomes 1976). Living in a bigger family often increases stress levels or worsens the health outcome of family members, especially toddlers (Evans 2006). In addition, children's health under a large household may be lower than the average, because bigger families may lack financial resources and time to monitor the food intake of children (Lindsay et al. 2006). A child in a large family may have fewer advantages than in a small family. According to Downey (2001), material support was crucial to a child's development. Material and nonmaterial allocation are reduced to accommodate additional members of the family, and thus, children who grow up in a big family often experience a lower level of health outcomes. However, other researchers found a positive impact of having many siblings on a child's health. For example, in his study using census data between 1961 and 1991 for England and New Zealand, Strachan (2000) found that siblings in a large family often did not encounter serious infections but strengthened their immune systems compared with having fewer siblings in the family. In addition, according to Moor and Komter (2012), in Eastern and Western Europe, siblings can also be viewed as support resources, since they may care for and protect each other, which, in turn, did have a positive impact on the child's wellbeing.

Policy implications based on studies

Habito (2019) underscored the importance of addressing stunting for the first 1,000 days of Filipino children. As pointed out, 90 percent of brain growth and development happens before the child's fifth year. Therefore, when children experience severe malnutrition, they will eventually fail to achieve full physical and brain development.

Herrin (2016) emphasized the importance of a more strategic and focused nutritional agenda that is also cost-effective and can be implemented effectively. From Herrin's review, the Philippines has made little progress in addressing child stunting in the past 20 years. He pointed out the significance of mobilizing local government units (LGUs) toward achieving this millennium goal. With the guidance of LGUs, free health services for undernourished children and families can be identified and implemented. The organization of existing health programs and intervention on the first 1,000 days of a child's life can help decrease further health issues (e.g., micronutrient deficiencies for mothers and children).

Furthermore, the use of a conditional cash transfer (CCT) platform in targeting nutritional intervention among poor beneficiaries is a key element in reducing malnutrition in the Philippines, as the stunting problem is closely related to poverty (Herrin et al. 2018). Programs mentioned under the platform include benefit packages from the Philippine Health Insurance Corporation that incorporate reproductive health and family planning interventions.

Another program is the paid maternity leave that was increased to 105 days, with additional 15 days for single mothers, for both the private and public sectors under Republic Act (RA) 11210 or the Expanded Maternity Leave Act. The law primarily addresses child feeding problems and less time for mothers to rest that may cause health issues in the long run. In addition, RA 10028 or the Expanded Breastfeeding Promotion Act gives mothers 40 minutes of lactation break for every eight hours of their working period (PCW 2010).

THEORETICAL AND CONCEPTUAL FRAMEWORK

Becker (1965) is greatly acknowledged for his work on the choices of households as producers or consumers toward proper allocation of resources. The household production theory points to the household's role in the consumption and production of goods. Maximizing utility is achieved by efficiently allocating necessary inputs, such as services, time, and income, in producing goods and consuming the goods, given a household's set of budget constraints (Becker 1965).

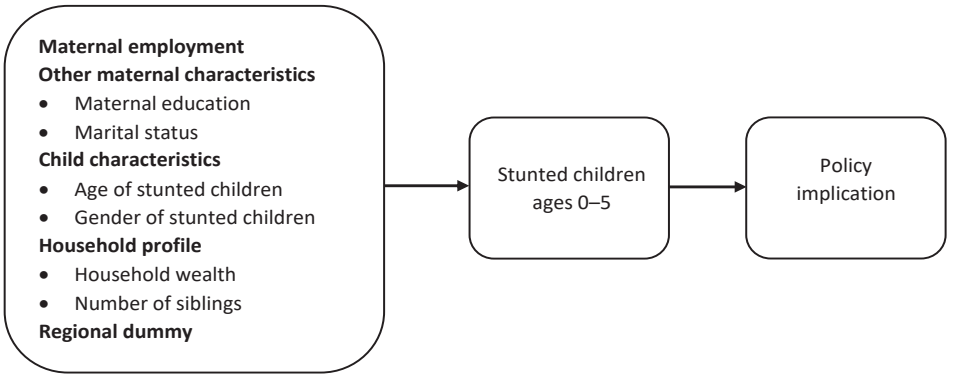
Kabubo et al. (2008) utilized a model guided by the household production framework to determine child nutrition by integrating the child's growth in the model and the corresponding budget constraint. Thus, a biological production function is generated for child nutrition, integrating several inputs resulting from the household's decision.

$$U = u(X, L, N)$$

In the model, X is goods either bought in the market or made at home, L is leisure, and N is the child's growth, since "most human capital outcomes cannot be purchased." The household production function "lends itself to the integration of biological, demographic and economic considerations" (Strauss and Thomas 1995, chapter 34). The nutritional production function (Kabubo et al. 2008) is given by $N = f(W_i, H_j, Z_k, e_l)$ where the growth of the child (N) is the function of the variable for the child (W) and the child's specific characteristics (i); a variable of household (H) with corresponding specific characteristics (j); a variable of the community (Z) with its corresponding level characteristics (k); and a child-specific disturbance term (e).

Mothers' employment options affect child investment through time allocation and income effect. In analyzing the outcome of interest, the independent variables utilized in the study are maternal employment, other maternal characteristics, child characteristics, household profile, and regional location (dummy variable), as presented in the conceptual framework (Figure 1). In addition, specific variables were based on the framework of the United Nations Children's Fund (1990) for malnutrition. The dependent variable in this study is a categorical variable, which is 0 if the child is not stunted, and 1 if stunted.

Figure 1. Conceptual framework of the study



Source: Authors' work

DATA

The study used data from the 2015 National Nutrition Survey (NNS) of the DOST-FNRI. The sample used was 7,379 children. From the summary statistics (Table 1), 41 percent of children in the sample were stunted. The female children comprised 48 percent of the sample, while male children comprised 52 percent. The average age of stunted children in the study was 35.15 months old, with the lowest age of 7.2 months, and 60 months as the highest. The standard deviation was 16.48. The average years of maternal education were 9.63 years, which means that mothers had almost completed high school education. For maternal employment, 29 percent of the children had mothers who were working. The average number of siblings per household was 3.11, with 11 as the largest number of siblings. About three in every four of the sampled children had married mothers (civil status_2). Lastly, 30 percent of the sampled children belonged to the lowest wealth index (wealth_1).

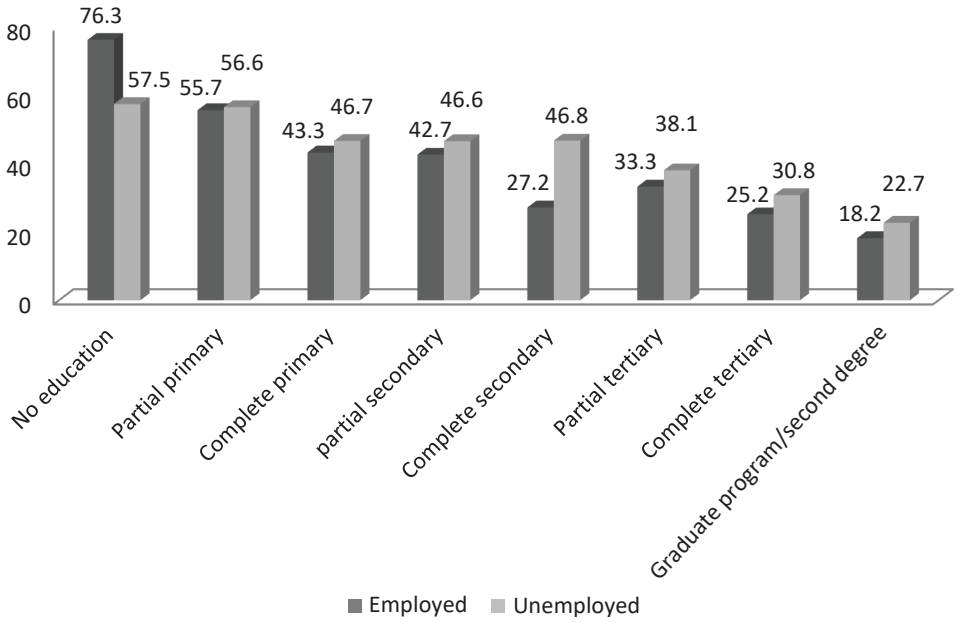
Figure 2 presents the proportion of stunted children by mother's employment, conditional on maternal education in the sample used for the year 2015. It suggests that the stunting prevalence among children whose mothers were employed but uneducated was 76.3 percent. On the other hand, the stunting rate among children whose mothers were unemployed and uneducated was 57.5 percent. For those who could complete a second-degree program, the stunting rate among children was 18.2 percent for employed mothers, and 22.7 percent for unemployed mothers. A higher rate of difference of stunting incidence for employed and unemployed mothers was noted in the completion of secondary education. The rate was 27.2 percent for employed mothers, and 46.8 percent for unemployed mothers. The decrease in the rate of stunting incidence among children was higher when mothers were employed and educated than unemployed and educated mothers, with a difference of 58.1 percent and 34.8 percent, respectively.

Table 1. Summary statistics of variables used in the logit regression

Variables	(1) Mean/Proportion	(2) Std. Dev.	(3) Min	(4) Max
Stunted	0.4052707	0.4909776	0	1
Sex	0.4837102	0.4997684	0	1
Age	35.15004	16.48025	0.12	60
Education	9.636492	4.189343	0	20
Work	0.290104	0.4538409	0	1
Siblings	3.118427	1.599846	1	11
Civil status_1	0.0154699	0.1234207	0	1
Civil status_2	0.7572371	0.428782	0	1
Civil status_3	0.0173184	0.1304638	0	1
Civil status_4	0.009232	0.0956454	0	1
Civil status_5	0.2007626	0.400583	0	1
Wealth_1	0.3067058	0.4611574	0	1
Wealth_2	0.2377921	0.42576	0	1
Wealth_3	0.1911526	0.3932356	0	1
Wealth_4	0.1466651	0.3537957	0	1
Wealth_5	0.1176844	0.3222559	0	1

Std. Dev. = standard deviation
Source: Authors' compilation

Figure 2. Prevalence of stunting among children ages 0–60 months old by maternal education and employment status, Philippines, 2015 subsample



Source: Authors' computation

Estimation

Logit regression was used to determine the effect of maternal employment on childhood stunting based on the child's characteristics, household characteristics, maternal characteristics, maternal employment, and interaction variables as the explanatory variables or the Xs. Sampling weights were used to avoid bias and other departures between the sample and the reference population in the data analysis.

The logistic regression function model is shown below:

$$p(Y = 1|X_1, X_2, \dots, X_k) = F(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k)$$

$$= \frac{1}{1 + e - (\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 * X_2 + \beta_5 X_1 * X_4 + \beta_8 X_6 * X_7 \cdots + \beta_k X_k)}$$

The logit regression utilizes the cumulative distribution function, given by:

$$F = \frac{1}{1+e^{-x}} \qquad \text{(Eq. 2)}$$

In running the logit regression, the *logit* command is used to identify the expected signs of the independent variables. The average marginal effect determines the effects of a change in the values of the predictor variables on the dependent variable.

(Eq. 3)

$$\pi_i = \beta_0 + \beta_1 \text{work} + \beta_2 \text{educ} + \beta_3 \text{work x educ} + \beta_4 \text{civilstat} + \beta_5 \text{work x civilstat} + \beta_6 \text{sex} + \beta_7 \text{age\_group} + \beta_8 \text{sex xage\_group} + \beta_9 \textit{siblings} + \beta_{10} \text{wealth} + \beta_{11} \text{region} + \varepsilon$$

Where:

π_i	ln (p/1-p) or the log odds ratio or logit
ln	natural logarithm
p / 1-p	odds ratio
$\beta_{'s}$	coefficients of the explanatory variables
ε	disturbance term regression equation.

All statistical analyses were performed using STATA and statistical significance was evaluated at the 0.05 level. Table 2 presents the categorization of variables used in the econometric model.

Table 2. Categorization of explanatory variables

Variable with codes	Categorization of variables in the econometric model
Maternal education-educ	educ_1 no education (educ=0)
	educ_2 partial primary (educ>0 & educ<6)
	educ_3 complete primary (educ=6)
	educ_4 partial secondary (educ>6 & educ<10)
	educ_5 complete secondary (educ=10)
	educ_6 partial tertiary (educ>10 & educ <14)
	educ_7 complete tertiary (educ>13)
	educ_8 graduate program, second degree, law school, medicine (educ>14)

Table 2. (continuation)

Variable with codes	Categorization of variables in the econometric model
Mother's civil status	civilstat_1 single, civilstat_2 married
	civilstat_3 widow/widower, civilstat_4 annulled/ separate and civilstat_5 common law/live-in
Wealth - adopted from the survey (based on family's wealth index constructed using housing characteristics and household assets)	wealth_1 poorest, wealth_2 poor, wealth_3 middle, wealth_4 rich and wealth_5 richest
Child's sex - sex	0 for male, 1 for female
Child's age group - age_group	age_group_1 age>0 & age<12.001
(months)	age_group_2 age>12 & age<24.001
	age_group_3 age>24 & age <36.001
	age_group_4 age>36 & age<48.001
	age_group_5 age>48 & age<60.001
Regional dummy - region	region_1 Ilocos Region, region_2 Cagayan Valley, region_3-Central Luzon, region_4-Bicol Region, region_5 Western Visyas, region_6 Central Visayas, region_7 Eastern Visayas, region_8 Zamboanga Peninsula, region_9 Northern Mindanao, region_10 Davao Region, region_11 SOCCSKSARGEN, region_12 Caraga region, 13_Cordillera Administrative Region, region_14 ARMM, region_15 National Capital Region (NCR), region_16 CALABARZON and region_17 MIMAROPA

SOCCKSARGEN = South Cotabato, Cotabato, Sultan Kudarat, Saranggani, and General Santos; ARMM = Autonomous Region of Muslim Mindanao; CALABARZON = Cavite, Laguna, Batangas, Rizal, Quezon; MIMAROPA = Mindoro, Marinduque, Romblon, and Palawan.

Source: Authors' compilation

RESULTS

Factors affecting child stunting

The logit regression results are shown in Table 3. The positive influence of maternal employment on childhood stunting supported the studies of Graham and Jordan (2013), Rashad and Sharaf (2019), Amaha and Woldeamanuel (2021), and Nakpong et al. (2021). As the mother engages in work, the likelihood for a child to be stunted also increases since the mother has less time for her child. Similar to the results of Cortes (2011) and Iftikhar et al. (2017), maternal education was a significant factor that predicted child stunting. In this study, the significance was determined in the mother's highest number of years of schooling. Thus, higher educational levels or years of education among mothers contribute to childcare knowledge and practices (Alcantara et al. n.d.).

The same results came out in O'Donnell et al. (2009) and Duncan et al. (2010) for the wealth variable. Wealth is determined as a strong child stunting predictor. Poor nutrition and hospitalization from diseases are among the many reasons for the higher probability of child stunting in poor households (Menon et al. 2000). Based on the results, there is higher probability of stunting for a child whose mother has many children. Undernourished children with higher severity are observed in larger households (Alcantara et al. n.d.). Each additional sibling competes for material resource allocation (Downey 2001).

The interaction variable between maternal employment and level of education was determined as a strong significant factor that influenced child stunting. As mothers' educational level increased, the likelihood of child stunting decreased for employed mothers, compared with the unemployed ones. The classification educ_7 were mothers who completed tertiary education. Mothers with higher educational levels acquire financial resources from employment, resulting in increased spending on food for their children.

As a dummy variable with 0 for males and 1 for females, the sex of children was seen to have a significant effect on the likelihood of them getting stunted. Since the sign is negative, male children have a greater probability of being stunted than female children. In addition, the child's age in the different age groups from 0 to 50 months was a significant positive factor in determining stunting. This finding was similar to those of Jones et al. (2008) and Bourne (2009) that when sufficient nutrition was not provided at the early stage of a child's life, malnutrition problems increased with age.

Table 3. Logit regression results for child stunting

Variable	Coeff.	Std. Err.	Z	p-value
Work	1.224866**	0.618822	1.98	0.048
educ_level_2	0.0357109	0.2233804	0.16	0.873
educ_level_3	-0.2064871	0.2237334	-0.92	0.356
educ_level_4	-0.13036	0.2216318	-0.59	0.556
educ_level_5	0.3071645	0.4868979	0.63	0.528
educ_level_6	-0.2088105	0.2198083	-0.95	0.342
educ_level_7	-0.2960835	0.2571414	-1.15	0.250
educ_level_8	-0.5844099**	0.2558267	-2.28	0.022
work_educ2	-0.9421833**	0.4269433	-2.21	0.027
work_educ3	-0.9326231**	0.4243846	-2.20	0.028
work_educ4	-0.979363**	0.4195008	-2.33	0.020
work_educ5	-1.679245*	0.9455383	-1.78	0.076
work_educ6	-0.9583301**	0.4102222	-2.34	0.019
work_educ7	-1.074495**	0.4608539	-2.33	0.020
work_educ8	-0.9116873**	0.4375686	-2.08	0.037
civilstat_2	0.1277825	0.3042832	0.42	0.675
civilstat_3	0.4024693	0.4385493	0.92	0.359
civilstat_4	0.0092908	0.5463281	0.02	0.986
civilstat_5	0.2361608	0.3097099	0.76	0.446

Table 3. (continuation)

Variable	Coeff.	Std. Err.	Z	p-value
work_married	-0.4097716	0.4879098	-0.84	0.401
work_widow	-0.5283606	0.6341444	-0.83	0.405
work_divorced	-0.0547439	0.7469754	-0.07	0.942
work_livin	-0.3130218	0.5056608	-0.62	0.536
Sex	-0.3959065**	0.1915585	-2.07	0.039
age_group_2	1.058904***	0.1496055	7.08	0.000
age_group_3	1.092295***	0.1440033	7.59	0.000
age_group_4	0.6589564***	0.1388066	4.75	0.000
age_group_5	0.5552953***	0.1381315	4.02	0.000
sex_age2	0.0298173	0.2339325	0.13	0.899
sex_age3	0.1660575	0.225301	0.74	0.461
sex_age4	0.5294283**	0.218301	2.43	0.015
sex_age5	0.3806164*	0.2167925	1.76	0.079
Sibling	0.3126445***	0.0607351	5.15	0.000
wealth_2	-0.3410038***	0.0685637	-4.97	0.000
wealth_3	-0.5915426***	0.0844493	-7.00	0.000
wealth_4	-1.001845***	0.10674	-9.39	0.000
wealth_5	-1.436388***	0.140465	-10.23	0.000
region_1	-0.0045522	0.1612531	-0.03	0.977
region_2	-0.0629773	0.1613139	-0.39	0.696
region_3	-0.2533626*	0.154931	-1.64	0.102
region_4	0.050293	0.1354019	0.37	0.711
region_5	0.1928423	0.1388888	1.39	0.165
region_6	0.1790316	0.1450329	1.23	0.217
region_7	0.1231888	0.1364042	0.90	0.366
region_8	0.0020748	0.1518663	0.01	0.989
region_9	-0.006874	0.147111	-0.05	0.963
region_10	-0.1145854	0.1518152	-0.75	0.450
region_11	0.0733234	0.1447978	0.51	0.613
region_12	0.0043526	0.1488879	0.03	0.977
region_14	0.3668739**	0.166641	2.20	0.028
region_15	-0.1965617	0.15866	-1.24	0.215
region_16	0.0334732	0.1381812	0.24	0.809
region_17	0.1388974	0.1629087	0.85	0.397
Constant	-1.239255	0.3944423	-3.14	0.002

Note: N=7379; Pseudo R2 = 0.1006; Prob> F:0.0005 at 95% confidence level; *** 1% significance level, ** 5% significance level, * 10% significance level; Coeff. = Coefficient; Std. Err. = standard error
Source: Authors' computation

Additionally, the interaction variable (age_group), which is the association of the child's age (age_group) and sex, showed that some stage in the child's life contributed to the likelihood that the child would be stunted. When the child reached 36 to 48 months old (three to four years old), the risk of stunting prevalence was more pronounced among female children than male children, conditional to maternal employment (sex_group_4). Male children tend to catch up when they reached 48 to 60 months old (five years old).

The interaction between the mother's employment and civil status (work_married, work_widow, work_divorced, work_livin) did not significantly influence child stunting. Thus, civil status and the regional dummy variables did not explain childhood stunting from the logit regression results.

In this study, the pseudo R2 of 0.16 meant that the explanatory variables in the logistic model accounted for 16 percent of the explanation for why the child was stunted or not. Furthermore, the logit regression had a Prob>F of 0.0005, indicating that the explanatory variables, as a whole, could reliably predict the outcome variable.

Average marginal effects were used to determine how much a change of a variable would affect the likelihood of a child being stunted (Table 4). On average, a child of an employed mother had a higher risk of being stunted by 29.4 percent, holding other factors constant. However, the risk of stunting decreased if the mother acquired additional years of schooling and uplifted the family from poverty.

Table 4. Average marginal effects for child stunting

Variable	dy/dx	Std. Err.	Z	p-value
Work	0.2942073	0.14354	2.05	0.040
educ_level_2	0.0084957	0.16	0.16	0.873
educ_level_3	-0.0480703	0.05099	-0.94	0.346
educ_level_4	-0.0306124	0.05147	-0.59	0.552
educ_level_5	0.0748538	0.12097	0.62	0.536
educ_level_6	-0.0491033	0.05116	-0.96	0.337
educ_level_7	-0.0678922	0.05662	-1.20	0.231
educ_level_8	-0.1294193	0.05186	-2.50	0.013
work_educ2	-1.916094	0.06978	-2.75	0.006
work_educ3	-0.1903995	0.07008	-2.72	0.007
work_educ4	-0.198872	0.06831	-2.91	0.004
work_educ5	-0.2819895	0.08966	-3.15	0.002
work_educ6	-0.1988601	0.07071	-2.81	0.005
work_educ7	-0.2121161	0.06963	-3.05	0.002
work_educ8	-0.1885368	0.07475	-2.52	0.012
civilstat_2	0.0300696	0.07098	0.42	0.672
civilstat_3	0.0985405	0.10941	0.90	0.368
civilstat_4	0.0022061	0.12986	0.02	0.986
civilstat_5	0.0567943	0.07531	0.75	0.451
work_married	-0.0942094	0.10808	-0.87	0.383

Table 4. (continuation)

Variable	dy/dx	Std. Err.	Z	p-value
work_widow	-0.1159297	0.1258	-0.92	0.357
work_divorced	-0.0129032	0.17489	-0.07	0.941
work_livin	-0.074469	0.1103	-0.65	0.517
Sex	-0.0935148	0.04489	-2.08	0.037
age_group_2	0.2581122	0.03542	7.29	0.000
age_group_3	0.2654618	0.03401	7.81	0.000
age_group_4	0.1597206	0.03384	4.72	0.000
age_group_5	0.1342928	0.03369	3.99	0.000
sex_age2	0.0070925	0.05579	0.13	0.899
sex_age3	0.0399297	0.05481	0.73	0.466
sex_age4	0.1294183	0.0541	2.39	0.017
sex_age5	0.0924874	0.05352	1.73	0.084
Sibling	0.0741599	0.0144	5.15	0.000
wealth_2	-0.0789677	0.01545	-5.11	0.000
wealth_3	-0.1328988	0.0177	-7.51	0.000
wealth_4	-0.2106633	0.01901	-11.08	0.000
wealth_5	-0.2767856	0.01963	-14.10	0.000
region_1	-0.0010793	0.03822	-0.03	0.977
region_2	-0.014835	0.03776	-0.39	0.694
region_3	-0.0584735	0.03479	-1.68	0.093
region_4	0.0119726	0.03238	0.37	0.712
region_5	0.0465044	0.03387	1.37	0.170
region_6	0.0431255	0.03532	1.22	0.222
region_7	0.0295546	0.03299	0.90	0.370
region_8	0.0004923	0.03604	0.01	0.989
region_9	-0.0016294	0.03485	-0.05	0.963
region_10	-0.0268393	0.03515	-0.76	0.445
region_11	0.0175163	0.03478	0.50	0.615
region_12	0.0010329	0.03535	0.03	0.977
region_14	0.0896641	0.04137	2.17	0.030
region_15	-0.0457585	0.03626	-1.26	0.207
region_16	0.0079619	0.03294	0.24	0.809
region_17	0.0333973	0.03957	0.84	0.399

N = 7379; Std. Err. = standard error
Source: Authors' computation

When the mother achieved 14 years of education (completed graduate program, second degree, law school, or medicine), the additional year added to maternal education decreased the child's likelihood of stunting by 12.9 percentage points. The likelihood of stunted male children was at 9.3 percentage points higher than stunted female children. For every additional year added to the child's age (0–60 months old and 0–5 years old), the likelihood that the child would be stunted increased by 13.4 percentage to 26.5 percentage points. Every additional sibling in the family increased the likelihood that the child would be stunted by 7.4 percentage points. As the household moved to the higher wealth quintile, the likelihood that the child would be stunted decreased by 7.8 percentage to 27.6 percentage points.

POLICY IMPLICATIONS

The Philippines has enacted several policies and programs to address maternal health care and child nutrition, such as RA 11210, which was passed in the first half of 2019 (CSC 2019). This law allows employed mothers to have enough time for the first three months of their children's life.

Stunting is strongly associated with maternal education, which offers a unique platform for fighting malnutrition. Starting from basic education, the health and nutrition curriculum promotes awareness and provides knowledge for future mothers. Caregiving subjects under the technical and vocational livelihood career track can be extended to prospective mothers. In addition, the Philippines has enacted laws to uphold the access of the public, particularly women, to education like the Universal Access to Quality Tertiary Education Act of 2017.

The *Pantawid Pamilyang Pilipino* Program (4Ps) was institutionalized in May 2019. Such cash incentives allow mothers to purchase their children's basic health and educational needs. Meanwhile, the Responsible Parenthood and Reproductive Health Act of 2012 aims to manage fertility and population growth and the number of siblings, among others, as significant factors that explain childhood stunting. In addition, adolescent pregnancy contributes to the prevalence of stunting as shown in a study in Bangladesh (Nguyen et al. 2020).

Determining key elements that influence male against female child nutrition should be distinguished at different stages of gender development. The gender-sensitive approach practices no discrimination and emphasizes equal opportunity for male and female children. The government should strengthen the first 1,000 days program, with stunting incidence being more pronounced between two and three years old and the age of the child as a significant variable in this study.

In addition, the Department of Health has implemented several nutrition programs and policies like the *Masustansyang Pagkain Para sa Batang Pilipino* (RA 11037) and the *Kalusugan at Nutrisyon ng Mag-Nanay* Act (RA 11148), which were passed in 2018. The programs aim to ensure that pregnant women and their children are properly taken care of from the start of pregnancy up to the first two years of the child's life. LGUs can support programs that promote good nutrition, such as through home gardening or by growing vegetables and distributing seedlings. Livelihood programs for mothers should also be promoted to enable them to earn a living without having to leave their homes.

Peru, one of the countries identified to have successfully fought stunting, initiated similar strategies in addressing malnutrition. The country enacted mandatory 98-day maternity leave and breastfeeding programs in the public and private sectors (Marini et al. 2017). In addition, Viet Nam reduced fertility rates successfully through its population program in the 1990s and focused on improving child nutrition and increased their healthcare investments.

Increased maternal schooling is considered one of the factors behind Brazil's success in addressing stunting (Monteiro et al. 2010). Under Brazil's *Fome Zero* (zero hunger strategy), the country adopted a multisectoral approach towards universal access to education and other services, especially among women. Brazil's *Bolsa Familia* Program (BFP) has underlying health and education conditions that "allow families to break the inter-generational cycle of poverty in the conditional cash transfer" (Monteiro 2010, p. 308).

In Peru and Viet Nam, the nudging technique is to give volunteers incentives, whether in money or through government services (Khan et al. 2007). Recognizing their efforts encourages various community health workers or "mobilizers" to improve their services and reduce the turnover rate of community workers involved in the implementation of these programs.

CONCLUSION

Maternal employment and education are associated with child stunting. As the mother engages in work, she does not have enough time to take care of her child. However, when maternal employment is associated with additional educational level or years of schooling, which denotes knowledge and learning on proper childcare, the likelihood of stunting incidence decreases. In addition, mothers augment food spending for the household from financial resources gained from employment. On the other hand, population and poverty are closely linked to the health and nutrition of children.

From the discussions above, the Philippines has various policies addressing the significant variables in the study, namely, maternal employment and education, poverty, and number of siblings. Although some of the laws and programs are recent, the government must provide further support and establish firm monitoring among involved agencies. In the case of Brazil, the BFP is strongly monitored and evaluated, thus, increasing the provisional strength of the incentive, supporting the correction of policy actions, and expanding the program itself (Monteiro et al. 2010). In Peru, steady monitoring and support from government agencies make the strategy effective in addressing malnutrition (Marini et al. 2017). There is no one-size-fits-all solution to eradicate malnutrition among children. Like Peru, the Philippines should focus on investing in the first three years of a child's life, especially in poor communities. Priority should also be given to areas with high stunting incidence. Coordinated efforts and consistent commitment are required among mobilizers to achieve a national impact. A concerted effort among the national and local governments and civil society organizations supporting collective actions and initiatives will significantly improve children's health and maternal wellbeing.

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Surveying the Extent and Wage Consequences of Education-Job Mismatches in the Philippine Labor Market

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ABSTRACT

The translation of educational investments into expanded employment opportunities and higher wages is among the ways in which a nation's educational outcomes are deemed successful. However, while education-skill mismatches are prevalent in both developed and developing economies, there is a need to extensively analyze this gap in the developing economy context, owing to the lack of data and other constraints. This paper seeks to estimate the extent of education-employment mismatches and the resulting wage consequences in the Philippine labor market. The results find that 39 percent of employed individuals are overeducated while over a quarter are undereducated. Overeducated individuals earn only 5 percent more for a surplus year of schooling, relative to required years of schooling, which have returns of 7 percent to 19 percent. They underline the importance of labor market policies for improved job-skills matching, for instance, through the reduction of information asymmetries. Moreover, public subsidies must be reconsidered for higher education that are premised on improved wage prospects or higher productivity for highly educated individuals.

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INTRODUCTION

Educational outcomes are deemed successful when educational investments are translated into expanded employment opportunities and higher wage outcomes. While education-labor mismatches are prevalent in both developed and developing economies (Duncan and Hoffman 1981; Rumberger 1987; Hartog and Oosterbeek 1988; Sicherman 1991; Alba-Ramirez 1993; Cohn and Khan 1995; Groot and Van den Brink 1997), empirical analyses seem less extensive in the developing economy context because of the lack of data needed to quantify education-employment mismatches, such as the individual's number of years of schooling and the number of years of schooling needed to perform a given job (Mehta et al. 2011; Epetia 2018).

An individual is deemed to be overeducated (undereducated) when the level of education he has attained exceeds the years of schooling required by his current job. The prevalence of overeducation in an economy signals potential inefficiencies in the labor market, as investments to pursue education, such as time, financing, and other resources, fail to translate into higher wages or improved employment outcomes.[2] Workers whose educational attainment exceeds the level needed to perform their current jobs suffer a significant wage penalty and diminished job satisfaction, relative to their well-matched peers (Dolton and Vignoles 2000; Hartog 2000; Frenette 2004; Korpi and Tåhlin 2009; Carroll and Tani 2013). The negative implications of education-labor market mismatches may be compounded in a developing economy, where the rapid rise of education levels from a low base, low incomes, and highly variable education quality are prevalent (Mehta et al. 2011).

While education-labor market mismatches are indicative of labor market inefficiencies, they may not necessarily be inefficient or require policy intervention. Pay differences among individuals may reflect compensating differentials, as workers trade monetary compensation for nonpecuniary characteristics of the job, which may be hard to observe (e.g., lower effort requirements, improved working conditions, and better amenities) (Acemoglu and Autor 2011; Sloane 2014). Overeducation may reflect individual preferences and personal reasons or may stem from one's desire to change job or profession. In such cases, social inefficiencies arise if overeducated workers received subsidies while in school. Education-labor market mismatches can also be attributed to rigidities in education programs or policies. Required coursework might not be needed in the modern workplace but could be beneficial to society, such as in the form of well-rounded and more civic-minded individuals (Todaro and Smith 2015). Mismatches might be temporary for several reasons. Overeducation may stem from an individual's desire to invest in his future earning potential as it may translate to frequent promotions (Sicherman and Galor 1990). Job mismatches reflect the changing nature of jobs, with the growing complexity of tasks that require increasing education, skills, or competencies (Sloane 2014). It is difficult to categorically define education-labor market mismatches as inefficient or prescribe policy implications *ex-ante*. A starting point for analysis is to identify the extent of education-labor mismatches, particularly the degree to which an individual's acquired education exceeds or falls short of the level of education required by his job.

Given the potentially negative impacts of education-labor mismatches and the lack of similar studies in the Philippine setting, this paper seeks to build on the work of Mehta et al. (2011) and

[2] Overeducation is a form of vertical mismatch in the labor market. Vertical mismatches occur when an individual's level of education or skills is less or more than what is required for his current occupation. Horizontal mismatches occur when a worker's field of education or skill is not appropriate for his current occupation (e.g., worker obtained a humanities degree but working in a job that requires a mathematics background). In the Philippines, for instance, there is evidence for sheepskin effects, as investments in education does not necessarily translate to improved worker productivity but signals an individual's pre-existing ability (Olfindo 2018).

Epetia (2018)[3] to examine the extent of overeducation and undereducation in the country. The paper uses recent labor force survey data. It analyzes the extent and wage consequences of overeducation and undereducation and seeks to account for industry and regional labor market characteristics by adding controls for occupation, sector, region, and urban and rural dummies. The analysis adopts different approaches in identifying overeducated and undereducated individuals using job analysis and realized matches methods. It seeks to answer the questions: What is the extent of overeducation and undereducation in the Philippine labor market? Are the returns to surplus and deficit schooling significantly different from the returns to required schooling? What are the policy implications of the results?

DATA AND METHODS

Measuring education-labor mismatches

The literature on education-labor mismatches utilizes both subjective and objective means to establish discrepancies between an individual's educational credentials and his current occupation's requirements. Three methods to estimate job-specific required years of schooling are prevalent,[4] including (a) worker self-assessment, which directly appeals to the workers' judgments of the education requirements of their current occupations; (b) job analysis from information contained in occupational classifications and undertaken by labor market experts; and (c) realized matches or statistical methods—the mean and mode methods—which feature a systematic estimation of education level needed for each occupation. Any amount of schooling beyond (below) the required amount is considered a surplus (deficit). In the developing economy context, the mean or mode method is often difficult to implement, as years of schooling data are often missing from the labor force surveys (Mehta et al. 2011). To gauge the extent of education-labor mismatches in the Philippine labor market, this study applies job analysis and realized matches to define the amount of education required in a given occupation.[5] The Labor Force Survey (LFS) and the Family Income and Expenditures Survey (FIES) data preclude the utilization of worker self-assessments, as these do not ask respondents the level of education they think is required to perform their jobs.

Job analysis

The estimates of required years of schooling for each occupational grouping are in line with the classification system of the Filipino working population's occupations in the Philippine Standard Occupational Classification (PSOC) at the one-digit level set by the Philippine Statistics Authority (PSA). The PSOC is adapted from the International Labour Organization's International Standard Classification of Occupations (ISCO). Table 1 shows the major occupational groupings at the one-digit level and corresponding ISCO skill levels and the required level of education.[6]

[3] The analysis of Mehta et al. (2011) covers the Philippine labor force data from 1991 to 2004. Meanwhile, this analysis draws on data in 2006 and 2012. Epetia (2018) seeks to answer a similar question utilizing the merged FIES and LFS data from 2003 to 2009 to examine the extent of overeducation among college graduates in the Philippine labor market.

[4] Leuven and Oosterbeek (2011) provide a brief overview of the methods, while Epetia (2018) discusses the merits and disadvantages of each approach.

[5] As the LFS and the FIES lack data on the individual's years of schooling, this is imputed based on data on the highest grade completed. These correspond to 0 years of schooling for no grade completed, 4 years for elementary undergraduates, 6 for elementary graduates, 8 for high school undergraduates, 10 for high school graduates, 12 for college undergraduates, and 14 for college graduates. Figures for unfinished years of schooling are based on calculations using the Annual Poverty Indicators in 2004, 2007, 2008, and 2010, and follow Epetia (2018).

[6] Data cover the pre-K to 12 period. The years of education required assigned to ISCO skill level 4 is 14 rather than 16 years.

Table 1. Major occupational grouping, ISCO skill level, and general level of required education

Major occupational grouping		ISCO skill level	Skills	General level of required education	Required years of education
1	Managers	3, 4	Complex problem solving and decisionmaking, extended levels of literacy and numeracy, and excellent interpersonal communication skills	Higher education	14
2	Professionals	4	Complex problem solving and decisionmaking, extended levels of literacy and numeracy, and excellent interpersonal communication skills	Higher education	14
3	Technicians and associate professionals	3	Factual, technical, and procedural knowledge in a specialized field; high level of literacy and numeracy; and well-developed interpersonal communication skills	Higher education	12
4	Clerical support workers	2	Basic literacy, simple arithmetic	First stage of secondary education	10
5	Service and sales workers				10
6	Skilled agricultural, forestry, and fishery workers				10
7	Craft and related trades workers				10
8	Plant and machine operators and assemblers				10
9	Elementary occupations	1	Simple routine physical or manual tasks	Primary education or first stage of basic education	6

ISCO = International Standard Classification of Occupations

Note: The classification above draws from the ISCO 2008 mapping of major groups to skill levels. Armed forces occupations are omitted from the analysis because they are subsumed under public sector employees. The years of education required for occupations with a two-digit PSOC code of 14 corresponding to supervisors are specified to be 12 years.

Source: International Labour Organization (2012)

The same reasoning is applied to ISCO skill levels 3 and 2. The use of the PSOC's one-digit level to determine the extent of education-labor mismatches can lead to aggregation biases, as it adopts a broad definition of occupation, particularly a higher estimate of the incidence of overeducation. See the subsection *"Estimating the extent of education-labor mismatches in the Philippine labor market"* for a broader discussion of the limitations of the job analysis method.

Realized matches

The years of education required for each occupational grouping are computed using the mean and mode methods. The computation takes the years of education required for each occupation as the mean (mode) years of education attained by individuals in an occupation.

Computing years of overeducation and undereducation

Years of overeducation are computed using job analysis and realized matches methods as the difference between the years of education attained and the year of education required in the occupational grouping for individuals whose years of attained education exceed that of required education. Years of undereducation are given as the difference between the years of education required for an occupation and the years of education attained for individuals whose level of education fall short of the amount required for their occupations. Years of overeducation (undereducation) equal zero if workers are not overeducated (undereducated).

Applying job analysis and realized matches methods to determine the required level of education in a given job helps circumvent any measurement errors in a specific method and allows for a comparison of the wage effects in different methods.

Examining the wage effects of education-labor mismatches

Following Duncan and Hoffman (1981), the analysis adopts the convention used prominently in the overeducation literature of extending the Mincerian wage equation to account for over-, under-, and required education. It also includes controls for the region, industry sector, family size, and urban and rural areas. A control for the change in the mean number of years of schooling accounts for changes in labor market conditions. The mean years of schooling arise as a result of the prevailing demand and supply in the labor market. The function estimating the wage effects of overeducation is specified as follows:

$$\ln W_i = \beta_0 + \beta_1 educ_i^r + \beta_2 educ_i^o + \beta_3 educ_i^u + \beta_4 exp_i + \beta_5 exp_i^2 + \beta_6 changeschool_{i,k} + \sum p_j sector_i + \sum r_j region_j + \mu urb_{ij} + \boldsymbol{X_i}\boldsymbol{\delta} + u_i \quad (1)$$

where W_i measures the wage of individual *i;* $educ_i^r$ signifies years of required education, $educ_i^u$ years of overeducation, and years of undereducation; *exp* denotes potential labor market experience;[7] exp^2 signifies the squared term of potential labor market experience; $changeschool_{i,k}$ refers to the change in the mean number of years of schooling from 2006 to 2012 in occupation *k* for 2012, and from 2003 to 2006 for 2006; *sector* represents occupational sector; *region* is a dummy variable for location (i.e., region); *urb* is a dummy variable signifying urban or rural; $\boldsymbol{X_i}$ is a vector of demographic characteristics, including marital status and sex; and u_i is the error term. In the absence of direct data on the relative bargaining power of an individual, controls for local labor market conditions and changes in these conditions are included to account for the employer's bargaining power and mitigate the possibility of omitted variable bias.[8] A limitation in the Duncan and Hoffman specification, and more generally, the standard Mincerian wage equation, is that it does not control for sample selection bias because the analysis is concentrated on individuals with observable wages, i.e., the analysis excludes nonworking individuals whose wages are not observable, or individuals who might be unemployed, as they have higher reservation wages.

[7] Potential labor market experience is defined as age in years of schooling (see footnote 6 about the computation). This measure is used in place of actual years of work experience, since such data are missing from the LFS.

[8] Controls for industry, occupation, and location partly capture the local labor market conditions.

The analysis employs the Heckman selection method to control for the sample selection bias. The selection equation to estimate an individual's probability of being employed is specified below:

$$employed_i = \propto_0 + \propto_1 familysize_{i,j} + \propto_2 householdhead_{i,j} + Z\,less5_{i,j} + \sum r_j region_j + \boldsymbol{\delta X_i} + V_i \quad (2)$$

where $employed_i$ is a dummy variable taking the value of 1 if an individual is employed and 0 otherwise; $familysize_{i,j}$ signifies the number of family members belonging to household *j*; $householdhead_{i,j}$ is a dummy variable taking the value of 1 if individual, *i,* is the head of household *j* and 0 otherwise; $less5_{i,j}$ is an instrumental variable signifying the number of children below the age of five residing in the household *j*;[9] $region_j$ is a dummy variable for location; $\boldsymbol{X_i}$ is a vector of demographic characteristics, including marital status, sex, age, and a squared age term; and V_i is the error term. The choice to instrument for the number of young children (defined as individuals below five years old) in the household follows Epetia (2018) and is further motivated by empirical evidence that the presence of young children in the household affects an individual's likelihood of employment (Bose 1984; Cook and Beaujot 1996; Das and Zumbyte 2017).[10]

Test of coefficients: Examining theories for education-labor mismatches

Studies have utilized the Duncan and Hoffman modification (equation [1]) to the Mincerian wage equation to test which among the labor market theories best explain the incidence of overeducation, with studies concentrating on the human capital theory, job competition model, and assignment theory (McGuiness 2006; Leuven and Oosterbeek 2011).

The assignment theory advances the idea that wages are shaped by the human capital of an individual, as encapsulated by his level of education, and the requirements of the job. Thus, drawing from equation (1), the following should hold under the assignment model:[11]

$$H_o: \beta_1 \neq \beta_2 \neq \beta_3; \beta_i \neq 0 \text{ for } i = 1, 2, 3 \quad (3)$$

The years of required, surplus, and deficit schooling will have an effect on an individual's wage, but the effect will not be equal.

The assumption that wages reflect the marginal productivity of a worker is embedded in the human capital model. Under this framework, only the amount of schooling attained by an individual should matter for wages. The formal test for whether the job competition model holds is therefore one of joint equality where:

$$H_o: \beta_1 = \beta_2 = \beta_3 \quad (4)$$

That is, the years of required schooling and the years of deficit or surplus schooling have an equal effect on wages.

In contrast, the job competition model puts forward the idea that an individual's amount of schooling does not directly affect his wages and the marginal product is determined by his job's requirements. As such, using equation (1), the following should hold:

$$H_o: \beta_2 = \beta_3 = 0 \quad (5)$$

That is, years of surplus or deficit schooling have no effect on wages.

McGuiness (2006) and Leuven and Oosterbeek (2011) note that the tests embodied by equations (4) and (5) are almost always rejected by the data. This signifies that the human capital

[9] In 2006, 39 percent or 12,303 employed individuals included in the sample were residing in households with children below the age of five. In 2012, the corresponding figure was 39 percent or 14,293.

[10] Empirical analysis points to the reduced employment probability for women in households with young children and the increased probability of employment for men.

[11] Further elaboration on the connection of the empirical tests and the theoretical framework can be found in Dolton and Vignoles (2000); Rubb (2003); McGuiness (2006); Leuven and Oosterbeek (2011).

theory and job competition model fail to effectively explain the emergence of overeducation and undereducation. They consequently find support for the assignment theory, which asserts the importance of human capital characteristics and job requirements in determining wages (Annexes 2.1 to 2.4).

Data reject the argument of joint equality of the coefficients of required, surplus, and deficit schooling embodied by the human capital theory ($\beta_1 = \beta_2 = \beta_3$) and the argument advanced by the job competition model that only job characteristics matter for wages ($\beta_2 = \beta_3 = 0$). These findings provide support for the assignment model ($\beta_1 \neq \beta_2 \neq \beta_3$).

Data

Data were drawn from the merged FIES and LFS in 2006 and 2012,[12] which utilized multistage stratified random sampling, covering a sample of about 50,000 households representing the national and regional levels.

Summary statistics in Annex 1 are in line with expectations and generally within bounds.[13] The mean basic pay per day of PHP 227 in 2006 and PHP 294 in 2012 roughly cohere with the average minimum daily wage rates across the regions. It reflects a higher representation of males than females among employed individuals and a greater concentration of married than single individuals. Permanent employees and individuals working in the services sector account for nearly half of wage earners in the sample. In 2006, over half of the wage earners were located in rural areas. In 2012, the divide between urban and rural workers was roughly equal. Individuals residing in the National Capital Region (NCR) account for the highest share at 16 percent to 17 percent.

RESULTS

Estimating the extent of education-labor mismatches in the Philippine labor market

The estimated proportions of overeducated and undereducated individuals in the Philippines in 2006 and 2012, based on the method used, are presented in Figure 1. In both survey years, job analysis identifies the largest share of workers who were overeducated at 38 percent to 39 percent of the total employed individuals. The mode method identifies the next highest proportion of overeducated individuals at nearly a quarter of the total employed workers. The mean method of determining overeducation returns the smallest proportion of 10 percent of employed individuals classified as overeducated. Similarly, estimates of undereducated individuals vary considerably, ranging from 28 percent to 29 percent under the job analysis method to nearly 80 percent under the realized matches mean method. Therefore, the method used to determine education-labor mismatches plays a critical role in establishing the proportion of overeducated and undereducated individuals in the Philippine labor market, as the range is considerable.[14]

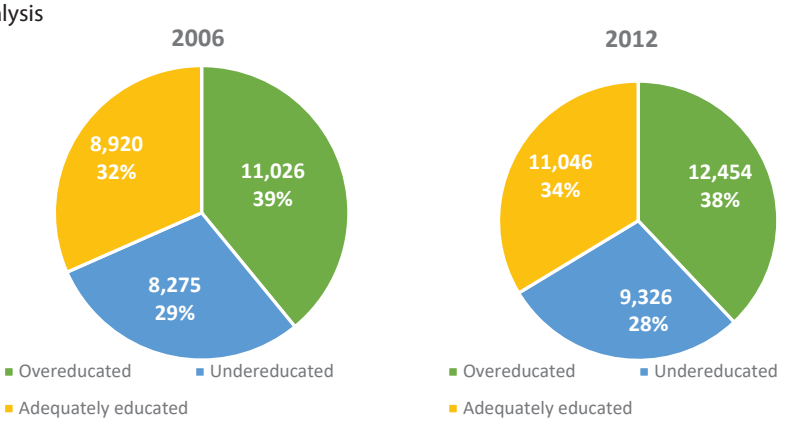
[12] Although the 2015 and 2018 rounds of the FIES-LFS were available at the time of writing, the older datasets were chosen in the interest of consistency in variable definition and inclusion. The variable of the highest grade completed was defined differently starting in the 2015 round to account for the beginning of the K to 12 program. A variable of interest, the rural-urban distinction, was not available in the later rounds.

[13] In 2006, the change in the mean number of school years was -5.1 for traditional medicine practitioners, -5.7 for shoemakers and related workers, and -9.4 for charcoal makers and related workers. In 2012, the corresponding figures were -5.4 for precision instrument makers and repairers and -9.4 for traditional medicine practitioners.

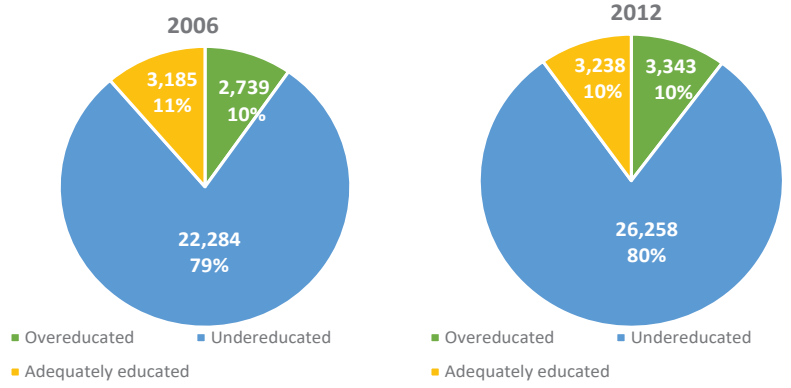
[14] Surveys of the literature on overeducation document a wide range of estimates. McGuinness (2006) cites estimates of the incidence of overeducation, which range from 7 percent to 57 percent. Hartog (2000) documents a considerable variation of the estimates of overeducation, ranging from 7 percent to 42 percent, and variations in estimated incidences of undereducation from 11 percent to 48 percent.

Figure 1. Proportion of overeducated and undereducated individuals

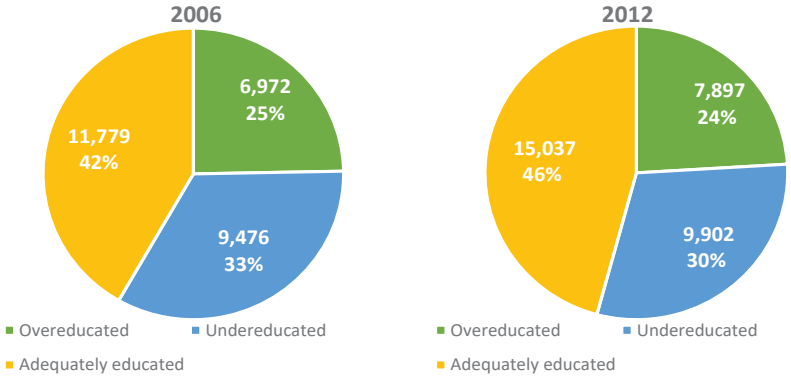
a. Job analysis



b. Realized matches (mean)



c. Realized matches (mode)



Note: The figures depict the frequencies and percentages of overeducated, undereducated, and adequately educated individuals under the different methods for a given year.
Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

A limitation of the realized matches method is the tendency to overestimate the number of years of required schooling, in case the supply in highly educated workers—in this case, secondary and tertiary workers—is not met with an equivalent demand for skilled workers (Epetia 2018). Highly educated individuals would then occupy unskilled jobs, raising the years of required schooling for these jobs. This would result in the underestimation of the proportion of overeducated workers under the realized matches methods. In addition, the elevated estimates of required years of schooling under this method can simultaneously lead to the overestimation of undereducation incidence. Under the mean method, nearly 80 percent of individuals are identified as undereducated in both years. This could result in considerable bias—the mean method estimates that only 10 percent to 11 percent of individuals are adequately matched across the two survey years. In the mode method, these figures rise more reasonably to 42 percent to 46 percent.

While the job analysis method is considered more objective and can provide more detailed descriptions of needed qualifications, it cannot easily account for the jobs' changing requirements, since updates are infrequent and costly (Hartog 2000). Job analyses are unable to account for variations in required schooling across jobs (Leuven and Oosterbeek 2011). Under the job analysis method, 32 percent to 34 percent of individuals are classified as adequately matched.

All told, the estimates under the realized matches methods, particularly the mean method, can be taken as the lower bound estimate of overeducation and upper bound estimate of undereducation. The corresponding proportions from the job analysis method can be considered as the upper bound estimate of overeducation and lower bound estimate of undereducation. The mode method might be considered in future analyses because it identifies a more reasonable extent of mismatch, relative to the mean method, while circumventing the limitations inherent in job analyses—the infrequency and costliness of reflecting changing job requirements.

Estimating the wage consequences of education-labor mismatches

Ordinary least squares (OLS) estimation

Estimates of overeducation's wage effects, following OLS analysis, are shown in Tables 2 and 3. The returns to years of over-, under-, and required education are in line with the general findings that while the returns to surplus schooling are positive, they are substantially lower than the returns to required education. The estimated returns to years of surplus schooling range from 5 percent to 8 percent across different specifications, in line with the meta-analysis of Rubb (2003), which estimated a mean value of 5.2 percent for excess years of schooling. These estimates are all significant at 1-percent level. By contrast, returns to required years of schooling range from 7 percent to 19 percent across the different estimations. Estimates for the returns to undereducation range from -4 percent to -10 percent.[15] The returns to experience and the squared experience term are consistent with expectations in both years, demonstrating increasing returns to experience but at a decreasing rate. Similarly, females and single individuals earn less than their male and married counterparts, respectively. The existence of wage disparities across men and women echo the earlier findings of significant gender disparities in labor and employment outcomes in the Philippines (Yap and Melchor 2015).[16] Workers from the NCR earn more, relative to their counterparts from different regions. All results are significant at the 1-percent level.

[15] See Annex 2 for a discussion on the test of coefficients.

[16] See Doan et al. (2018) for similar findings for the returns to experience, squared experience, and sex in a developing country setting, particularly in Viet Nam.

Across different estimations for both survey years, workers from urban areas earn less than their rural counterparts, with the results being significant at the 1-percent level. Nominal urban-rural wage gaps almost disappear when prices and wages are measured with greater precision (Williamson 2016). After controlling for skill level, for instance, the urban-rural real wage gap declined to 6 percent for unskilled labor, and 0 percent for skilled labor from the earlier estimates of 34 percent. Utilizing the Oaxaca decomposition of urban-rural wage gaps shows that education and experience, alone, account for 71 percent of the real income gap (Chua et al. 2015; Williamson 2016). Individuals from urban areas have lower returns than those from rural areas under certain specifications (Gerochi 2002). In examining the returns to technical-vocational education, Choi (2021) finds that returns to education are more pronounced.

Results for the occupational sector suggest that the industry sector yields the highest wages (significant at the 1-percent level). This coheres with the findings of Luo and Terada (2009) that manufacturing or industry workers earn more than the individuals employed in services or manufacturing. In line with expectations, permanent employees enjoy higher returns than their peers employed in seasonal or casual work. This is significant at the 1-percent level across specifications for both years, with exceptions of the realized matches mean method in 2006, when the coefficient is still positive but insignificant. The results for change in the mean number of school years by occupation suggest that increasing education attainment per occupation has a positive effect on wages. This is significant at the 1-percent level for all specifications.

Table 2. Regression results, 2006

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Natural logarithm of basic pay per hour						
Years of education required	0.174***	0.084***	0.191***	0.134***	0.138***	0.083***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.065***	0.047***	0.054***	0.050***	0.076***	0.047***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.070***	-0.045***	-0.063***	-0.041***	-0.096***	-0.046***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Experience	0.033***	0.020***	0.038***	0.020***	0.036***	0.020***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Squared experience	-0.0005***	-0.0003***	-0.0006***	-0.0003***	-0.0005***	-0.0003***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Male		0.303***		0.322***		0.326***
		(0.01)		(0.01)		(0.01)
Single		-0.125***		-0.132***		-0.133***
		(0.01)		(0.01)		(0.01)
Permanent		0.049***		0.028***		0.060***
		(0.01)		(0.01)		(0.01)
Urban		-0.075***		-0.075***		-0.075***

Table 2. (continuation)

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
		(0.01)		(0.01)		(0.01)
Change in mean number of school years		0.121***		0.075***		0.133***
		(0.00)		(0.01)		(0.00)
Regional controls		Yes		Yes		Yes
Controls for sector of employment		Yes		Yes		Yes
N	28178	26625	28222	26667	28135	26590
F	2972.578	916.253	2907.385	895.528	2420.845	894.601
R-squared	0.355	0.496	0.332	0.490	0.289	0.493

Notes: Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01

Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Table 3. Regression results, 2012

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Natural logarithm of basic pay per hour						
Years of education required	0.156***	0.066***	0.178***	0.151***	0.127***	0.101***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.060***	0.046***	0.052***	0.048***	0.074***	0.046***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.064***	-0.042***	-0.055***	-0.037***	-0.083***	-0.041***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Experience	0.028***	0.018***	0.031***	0.018***	0.028***	0.018***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Squared experience	-0.0004***	-0.0002***	-0.0005***	-0.0002***	-0.0004***	-0.0002***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Male		0.278***		0.293***		0.298***
		(0.01)		(0.01)		(0.01)
Single		-0.099***		-0.104***		-0.105***
		(0.01)		(0.01)		(0.01)
Permanent		0.052***		0.006		0.041***
		(0.01)		(0.01)		(0.01)
Urban		-0.073***		-0.074***		-0.074***

Table 3. (continuation)

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
		(0.01)		(0.01)		(0.01)
Change in mean number of school years		0.140***		0.060***		0.121***
		(0.00)		(0.01)		(0.00)
Regional controls		Yes		Yes		Yes
Controls for sector of employment		Yes		Yes		Yes
N	32822	30928	32829	30934	32811	30918
F	2585.216	777.670	2588.842	775.005	2141.582	785.969
R-squared	0.297	0.432	0.285	0.432	0.247	0.436

Notes: Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01
Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Heckman model

The returns to over-, under-, and required education after controlling for selection bias are shown in Tables 4 and 5. The returns to years of overeducation are positive for both years, yielding a return of 5 percent, after controlling for personal attributes, household characteristics, region, and nature of employment. The returns to required years of schooling in both survey years range from 7 percent to 19 percent after the inclusion of additional controls. Undereducation yields returns in the range of -3 percent to -10 percent. These estimates are significant at the 1-percent level.

After accounting for selection bias under the Heckman method, the results are slightly lower than those under the OLS regression, particularly with returns to years of overeducation being lower under the Heckman method. Tests of the differences in the coefficients of required education, overeducation, and undereducation under the OLS and the Heckman methods in Annex 3 generally point to statistically significant differences between the coefficients using these two methods. This reinforces the importance of accounting for sample selection bias. Moreover, as highlighted in the regression tables (Tables 4 and 5), empirics on the instruments used suggest their validity (a first-stage F statistic greater than 10 and a Hansen J statistic in line with valid instrumentation) and the inverse Mills ratio is significant at the 1-percent level across the different models, indicating the presence of bias using OLS analysis.

The results for experience, squared experience, and personal attributes are in line with the general expectations in both survey years. Increasing years of experience lead to positive returns, but do so at a decreasing rate. Once again, it suggests the concavity of experience. In line with expectations, males earn more than their female counterparts (an estimated 32 percent to 35 percent more for both years), single individuals earn less than married individuals (-10 percent in 2006 and -6 percent to -7 percent in 2012), and employed individuals residing in the NCR earn the highest returns across both survey years. Likewise, employees in permanent positions earn more than those in seasonal or casual employment in 2006 and 2012, and individuals employed in the industry sector enjoy higher returns than their peers in services and agriculture. Individuals

employed in urban areas earn less than their counterparts in rural areas. An increase in the mean years of schooling of an occupation translates to an increase in wage. Results are significant at the 1-percent level.

While the study suggests the existence of education-labor mismatches in the Philippine labor market and its negative impact on wages, there are a few areas that might be considered for future study. A limitation of the present analysis is the inability to directly account for the relative bargaining powers of employed individuals and their employers and for their reservation wages and incomes. To attenuate the effect of omitted variables in the estimates, additional controls that capture local labor markets conditions were included. Notwithstanding these controls as proxy variables, part of the worker's productivity captured by years of education is fairly exogenous. Most employees included in the survey already completed their reported years of schooling before joining the labor market.

The present analysis fails to account for the possible effects of socioeconomic factors, or the role of sex in potentially exacerbating education-labor mismatches despite previous evidence that these play a significant role in the Philippine labor market (de Dios and Dinglasan 2013; Yap and Melchor 2015; Epetia 2018). It is beyond the scope of this study to examine heterogeneities in the skill profiles of educated workers or different skill requirements across similar occupations.[17]

While the study identifies the extent and wage impact of undereducation, policy implications are not examined at length. It concentrates on the implications of overeducation, as the effects of negative wages on overeducated individuals are believed to be greater. Sattinger and Hartog (2013) model the wage effects of undereducation as a reward, as individuals with a lower education level profit from finding a job whose education requirement exceeds their own level of schooling. In this way, undereducated individuals earn a higher wage from obtaining employment in roles that require a higher level of schooling than they possess relative to the wage they would earn from jobs that matched their level of education. Sattinger and Hartog (2013) note that a positive undereducation reward is consistent with empirical findings.[18] Among the explanations advanced for the occurrence of undereducation is the presence of individual heterogeneity among workers, as undereducated workers possess above average abilities (Büchel and Mertens 2004). Undereducated workers may also substitute their lack of schooling with a greater amount of relevant experience. The presence of undereducation may reflect a mix of schooling and experience, which workers and employers deem sufficient (Kiker et al. 1997). In this way, a tradeoff between education and human capital can contribute to the presence of undereducation, such that individuals with different levels of schooling but similar levels of human capital occupy the same jobs. Greater elaboration on the causes and policy implications underlying undereducation suggests possible avenues for further study or potential extensions.

[17] Further research to better account for differing skill levels can be useful. Recent analyses point to the role of skills, as captured by learning outcomes, among others, in impacting wages (Patrinos and Psacharopoulos 2020).

[18] A negative coefficient on the return to years of deficit schooling would still be consistent with an undereducation reward, as the returns to undereducation are estimated relative to returns to required education. Should the return to each year of required education exceed the return to each year of deficit schooling, the coefficient for returns to undereducation would be negative. However, an undereducation reward would persist, as returns to years of deficit schooling are positive, although lower than for those of required education.

Table 4. Heckman results, 2006

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Natural logarithm of basic pay per hour					
Main						
Required years of education	0.175***	0.084***	0.193***	0.135***	0.139***	0.084***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.065***	0.048***	0.052***	0.051***	0.072***	0.049***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.072***	-0.045***	-0.065***	0.041***	-0.097***	-0.046***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Experience	0.042***	0.017***	0.050***	0.017***	0.047***	0.017***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Squared experience	-0.0007***	-0.0002***	-0.0008***	-0.0002***	-0.0007***	-0.0002***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Male		0.327***		0.354***		0.354***
		(0.01)		(0.01)		(0.01)
Single		-0.099***		-0.099***		-0.103***
		(0.01)		(0.01)		(0.01)
Permanent		0.048***		0.026***		0.059***
		(0.01)		(0.01)		(0.01)
Urban		-0.075***		-0.075***		-0.075***
		(0.01)		(0.01)		(0.01)
Change in mean number of school years		0.121***		0.075***		0.133***
		(0.00)		(0.01)		(0.00)
Regional controls		Yes		Yes		Yes
Controls for sector of employment		Yes		Yes		Yes
Selection						
Number of household members below age 5	0.026**	0.026**	0.026**	0.026**	0.026**	0.026**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Male	-0.300***	-0.300***	-0.299***	-0.299***	-0.300***	-0.300***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Single	-0.177***	-0.177***	-0.178***	-0.178***	-0.178***	-0.178***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Age as of last birthday	0.055***	0.055***	0.054***	0.054***	0.054***	0.054***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***

Table 4. (continuation)

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Natural logarithm of basic pay per hour						
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
College	-0.037	-0.037	-0.036	-0.036	-0.037	-0.037
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Household head	0.161***	0.161***	0.161***	0.161***	0.161***	0.161***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Family size	-0.008**	-0.008**	-0.008**	-0.008**	-0.008**	-0.008**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Natural logarithm of basic pay per hour						
Regional controls		Yes		Yes		Yes
Inverse-Mills Ratio	0.576***	-0.220***	0.746***	-0.285***	0.701***	-0.256***
	(0.04)	(0.07)	(0.05)	(0.07)	(0.05)	(0.07)
Wald test of independent equations (rho = 0) chi-square	929.11	140.46	1158.43	140.88	1090.12	140.34
Chi-square p-value	0.00	0.00	0.00	0.00	0.00	0.00
N	35290	35290	35332	35332	35255	35255
N censored	8665	8665	8665	8665	8665	8665

Test of validity of instrument

	Job analysis	Realized matches: Mean	Realized matches: Mode
Hansen J statistic (overidentification test of all instruments)	1.167	1.097	1.387
Chi-square p value	0.280	0.295	0.239

Notes: Standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01

Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Table 5. Heckman results, 2012

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Natural logarithm of basic pay per hour						
Main						
Required years of education	0.154***	0.066***	0.178***	0.151***	0.126***	0.101***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.060***	0.046***	0.051***	0.049***	0.072***	0.047***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.064***	-0.043***	-0.055***	-0.038***	-0.082***	-0.041***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Experience	0.031***	0.013***	0.037***	0.013***	0.032***	0.013***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Squared experience	-0.0005***	-0.0001***	-0.0006***	-0.0001***	-0.0005***	-0.0001***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Male		0.323***		0.340***		0.340***
		(0.01)		(0.01)		(0.01)
Single		-0.059***		-0.062***		-0.068***
		(0.01)		(0.01)		(0.01)
Permanent		0.050***		0.003		0.039***
		(0.01)		(0.01)		(0.01)
Urban		-0.073***		-0.074***		-0.075***
		(0.01)		(0.01)		(0.01)
Change in mean number of school years		0.138***		0.058***		0.120***
		(0.00)		(0.01)		(0.00)
Regional controls		Yes		Yes		Yes
Controls for sector of employment		Yes		Yes		Yes
Selection						
Number of household members below age 5	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Male	-0.231***	-0.231***	-0.231***	-0.231***	-0.231***	-0.231***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Single	-0.175***	-0.175***	-0.176***	-0.176***	-0.175***	-0.175***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Age as of last birthday	0.056***	0.056***	0.056***	0.056***	0.056***	0.056***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***

Table 5. (continuation)

	Job analysis		Realized matches: Mean		Realized matches: Mode	
	(1)	(2)	(3)	(4)	(5)	(6)
Some college	-0.142***	-0.142***	-0.143***	-0.143***	-0.142***	-0.142***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
College	0.010	0.010	0.010	0.010	0.010	0.010
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Household head	0.054**	0.054**	0.054**	0.054**	0.053**	0.053**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Family size	-0.008**	-0.008**	-0.008**	-0.008**	-0.008**	-0.008**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Regional controls		Yes		Yes		Yes
	Job analysis		**Realized matches: Mean**		**Realized matches: Mode**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Dependent variable: Natural logarithm of basic pay per hour					
Inverse-Mills Ratio	0.229***	-0.465***	0.383***	-0.489***	0.274***	-0.440***
	(0.04)	(0.09)	(0.04)	(0.09)	(0.04)	(0.09)
Wald test of independent equations (rho = 0) chi-square	588.88	108.79	796.69	113.37	750.30	100.36
Chi-square p-value	0.00	0.00	0.00	0.00	0.00	0.00
N	40388	40388	40394	40394	40378	40378
N censored	9460	9460	9460	9460	9460	9460
Test of validity of instrument						
	Job analysis		**Realized matches: Mean**		**Realized matches: Mode**	
Hansen J statistic (overidentification test of all instruments)	2.586		2.284		2.281	
Chi-square p value	0.108		0.131		0.131	

Note: Standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01
Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

DISCUSSION AND CONCLUSION

This paper sought to establish the extent of overeducation and undereducation in the Philippine labor market and their ensuing wage effects using merged FIES and LFS data in 2006 and 2012. Job analysis and realized matches methods were employed to determine the extent of overeducation. In both survey years, job analysis identified the highest share of overeducated individuals, at an estimated 38 percent to 39 percent of the total employed individuals. The mode and mean methods

estimated from 24 percent to 25 percent, and 10 percent, respectively, of employed individuals as overeducated. As the range of estimates resulting from the job analysis and realized matches methods is considerable, the method used to determine education-labor mismatches is critical. It suggests the mode method for future analyses and identifies a more moderate extent of education-labor mismatches relative to the mean method while circumventing the limitations inherent in job analysis methods—the infrequency and costliness of accounting for changing job requirements. The different methods do not fully account for the different skill requirements within a given occupation, as it is beyond the scope of the study. The strengths and limitations of each approach should be considered in determining mismatches.

The results suggest an estimated 5-percent return to years of overeducation across the different specifications after controlling for individual, sectoral, and regional conditions, among other controls. By contrast, returns to required years of schooling are higher, ranging from 7 percent to 19 percent across different estimations. Estimates for the returns to undereducation range from -4 percent to -10 percent. These results point to the wage penalty facing overeducated individuals, as returns to surplus schooling, while positive, are substantially lower than the returns to required years of schooling.

The high prevalence of overeducation has important implications. Previous studies found evidence to support the connection of overeducation, diminished job satisfaction, and large wage penalties that signal inefficiencies in the labor market. Investments in time, money, and other resources do not translate to improved employment outcomes or higher wages. Such negative effects are significant in a developing economy context, where education quality is highly variable and low incomes are prevalent.

The results have two broad policy implications. First, labor market policies to improve job-skills matching, including those that aim to minimize job information asymmetries or enhance job matches should be considered (e.g., by labor market fairs or platforms that expand individuals' knowledge on prospective opportunities or skills). Improvements in job-skills matching can help promote job satisfaction and boost wages.

Policies to facilitate job-skills matching can alleviate challenges in the Philippine labor market, such as the continued gender disparities in labor outcomes. The coronavirus disease (COVID-19) pandemic has largely exacerbated existing job market vulnerabilities. In August 2021, LFS data showed that the unemployment rate increased to 8.1 percent from 5.3 percent in January 2020 before the onset of the pandemic. Female unemployment rate was higher at 8.3 percent, relative to their male counterparts at 7.9 percent. In the same month, more than 70 percent of individuals in the labor force worked fewer than 40 hours in a week. Of this number, nearly 60 percent cited the variable nature of working time and work as the motivation for reduced hours. Social safety nets and adequate social protection can help mitigate these challenges and the wage penalties experienced by overeducated individuals.

The results prompt policymakers to reconsider the merits of full subsidies for higher education. Arguments that publicly subsidized higher or tertiary education will translate into improved wage prospects for highly educated individuals or higher productivity may not bear out in reality, raising concerns over the efficiency of public investment in tertiary schooling. The 2021 Commission on Higher Education budget for universal access to tertiary education amounted to PHP 44.2 billion—the bulk of the agency's PHP 50.9-billion budget in the said year (de la Cruz 2020). As of October 2021, an estimated 1.6 million students enrolled in 219 state universities and colleges who benefitted from free tertiary education were set to graduate in 2022 (Montemayor 2021). In light of the considerable funding allocated to subsidies

and the evidence that this has failed to translate to improved wage prospects, there must be strong consideration for more targeted higher education support. Subsidies for those from the lower income and vulnerable groups, combined with strong social safety nets, can better balance tradeoffs between efficient public investments and sufficient social support.

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ANNEXES

Annex 1.1. Summary statistics of variables included in the analysis, 2006

Variable	Obs.	Mean	Std. Dev.	Min	Max
Log basic pay per hour	28,222	5.17	0.74	1.61	9.17
Employed	31,439	0.90	0.30	0	1
Some college	31,439	0.13	0.34	0	1
College	31,439	0.14	0.34	0	1
Required years of education: job analysis	31,385	8.71	2.59	6	14
Years of overeducation: job analysis	31,385	1.20	1.75	0	8
Years of undereducation: job analysis	31,385	0.96	1.72	0	12
Required years of education: realized matches - mean	31,439	8.95	2.13	5.82	14
Years of overeducation: realized matches - mean	31,439	0.99	1.41	0	8
Years of undereducation: realized matches - mean	31,439	0.93	1.55	0	13
Required years of education: realized matches - mode	31,342	9.37	3.19	4	14
Years of overeducation: realized matches - mode	31,342	0.85	1.69	0	10
Years of undereducation: realized matches - mode	31,342	1.26	2.06	0	14
Experience	31,439	18.75	12.62	0	58
Squared experience term	31,439	510.81	586.11	0	3364
Male	31,439	0.64	0.48	0	1
Female	31,439	0.36	0.48	0	1
Single	31,439	0.38	0.48	0	1
Married	31,439	0.58	0.49	0	1
Age as of last birthday	31,439	33.70	11.77	15	64
Age squared	31,439	1274.21	868.69	225	4096
Household head	31,439	0.39	0.49	0	1
Family size	29,713	5.55	2.30	1	27
Number of household members below age 5	31,439	0.54	0.79	0	6
Agriculture	31,439	0.23	0.42	0	1
Industry	31,439	0.25	0.44	0	1
Services	31,439	0.52	0.50	0	1
Permanent	31,439	0.66	0.47	0	1
Short term/seasonal/casual	31,439	0.34	0.47	0	1
Urban	29,713	0.44	0.50	0	1
Rural	29,713	0.56	0.50	0	1

Annex 1.1. (continuation)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Change in mean number of school years	31,439	0.00	1.65	-9.43	7.58
Ilocos Region	31,439	0.05	0.21	0	1
Cagayan Valley	31,439	0.05	0.21	0	1
Central Luzon	31,439	0.10	0.30	0	1
CALABARZON	31,439	0.12	0.33	0	1
MIMAROPA	31,439	0.04	0.18	0	1
Bicol Region	31,439	0.05	0.21	0	1
Western Visayas	31,439	0.07	0.26	0	1
Central Visayas	31,439	0.07	0.25	0	1
Eastern Visayas	31,439	0.04	0.19	0	1
Zamboanga Peninsula	31,439	0.03	0.17	0	1
Northern Mindanao	31,439	0.04	0.21	0	1
Davao Region	31,439	0.06	0.23	0	1
SOCCSKSARGEN	31,439	0.05	0.22	0	1
National Capital Region	31,439	0.17	0.37	0	1
Cordillera Administrative Region	31,439	0.03	0.16	0	1
Autonomous Region in Muslim Mindanao	31,439	0.01	0.09	0	1
Caraga	31,439	0.03	0.18	0	1

Obs = observations; Std. Dev. = standard deviation; Min = minimum; Max = maximum; CALABARZON = Cavite, Laguna, Batangas, Rizal, and Quezon; MIMAROPA = Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon, and Palawan; SOCCKSARGEN = South Cotabato, Cotabato, Sultan Kudarat, and Sarangani

Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Annex 1.2. Summary statistics of variables included in the analysis, 2012

Variable	Obs.	Mean	Std. Dev.	Min	Max
Log basic pay per hour	32,829	5.44	0.72	1.16	10.78
Employed	37,138	0.88	0.32	0	1
Some college	37,138	0.09	0.29	0	1
College	37,138	0.14	0.34	0	1
Required years of education: job analysis	37,127	8.66	2.60	6	14
Years of overeducation: job analysis	37,127	1.18	1.74	0	8
Years of undereducation: job analysis	37,127	0.89	1.63	0	14
Required years of education: realized matches - mean	37,138	8.95	2.10	0	14
Years of overeducation: realized matches - mean	37,138	0.97	1.41	0	8

Annex 1.2. (continuation)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Years of undereducation: realized matches - mean	37,138	0.91	1.53	0	11
Required years of education: realized matches - mode	37,118	9.24	3.20	0	14
Years of overeducation: realized matches - mode	37,118	0.87	1.75	0	10
Years of undereducation: realized matches - mode	37,118	1.17	2.01	0	14
Experience	37,138	19.93	13.24	-2	58
Squared experience term	37,138	572.50	631.04	0	3364
Male	37,138	0.65	0.48	0	1
Female	37,138	0.35	0.48	0	1
Single	37,138	0.37	0.48	0	1
Married	37,138	0.58	0.49	0	1
Age as of last birthday	37,138	34.87	12.40	15	64
Age squared	37,138	1370.05	935.51	225	4096
Household head	37,138	0.37	0.48	0	1
Family size	35,017	5.53	2.34	1	19.5
Number of household members below age 5	37,138	0.53	0.78	0	5
Agriculture	37,138	0.24	0.42	0	1
Industry	37,138	0.24	0.43	0	1
Services	37,138	0.52	0.50	0	1
Permanent	37,138	0.61	0.49	0	1
Short term/seasonal/casual	37,138	0.39	0.49	0	1
Urban	35,017	0.53	0.50	0	1
Rural	35,017	0.47	0.50	0	1
Change in mean number of school years	37,138	0.00	1.55	-9.41	7.56
Ilocos Region	37,138	0.05	0.21	0	1
Cagayan Valley	37,138	0.05	0.22	0	1
Central Luzon	37,138	0.10	0.30	0	1
CALABARZON	37,138	0.12	0.33	0	1
MIMAROPA	37,138	0.03	0.17	0	1
Bicol Region	37,138	0.05	0.21	0	1
Western Visayas	37,138	0.07	0.26	0	1
Central Visayas	37,138	0.07	0.25	0	1
Eastern Visayas	37,138	0.04	0.20	0	1
Zamboanga Peninsula	37,138	0.04	0.19	0	1
Northern Mindanao	37,138	0.05	0.21	0	1

Annex 1.2. (continuation)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Davao Region	37,138	0.06	0.24	0	1
SOCCKSARGEN	37,138	0.05	0.22	0	1
National Capital Region	37,138	0.16	0.37	0	1
Cordillera Administrative Region	37,138	0.03	0.18	0	1
Autonomous Region in Muslim Mindanao	37,138	0.01	0.12	0	1
Caraga	37,138	0.03	0.17	0	1

Obs = observations; Std. Dev. = standard deviation; Min = minimum; Max = maximum; CALABARZON = Cavite, Laguna, Batangas, Rizal, and Quezon; MIMAROPA = Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon, and Palawan; SOCCKSARGEN = South Cotabato, Cotabato, Sultan Kudarat, and Sarangani

Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Annex 2.1. Test of coefficients and regression, 2006

Variables	Job analysis		Realized matches: Mean		Realized matches: Mode	
Dependent variable: Natural logarithm of basic pay per hour						
Years of education required	0.17***	0.08***	0.19***	0.13***	0.14***	0.08***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.06***	0.05***	0.05***	0.05***	0.08***	0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.07***	-0.04***	-0.06***	-0.04***	-0.10***	-0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
F value (Beta of years of overeducation = 0)	701.59	423.27	357.01	352.75	990.15	435.82
p value	0.00	0.00	0.00	0.00	0.00	0.00
F value (Beta of required years = Beta of years of overeducation)	2130.02	181.43	2212.50	42.62	944.69	64.81
p value	0.00	0.00	0.00	0.00	0.00	0.00
F value (Beta of years of overeducation = Beta of years of undereducation)	2081.17	903.19	1304.83	897.06	3131.11	953.99
p value	0.00	0.00	0.00	0.00	0.00	0.00

Note: Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01

Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Annex 2.2. Test of coefficients and regression, 2012

Variables	Job analysis		Realized matches: Mean		Realized matches: Mode	
Dependent variable: Natural logarithm of basic pay per hour						
Years of education required	0.16***	0.07***	0.18***	0.15***	0.13***	0.10***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.06***	0.05***	0.05***	0.05***	0.07***	0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.06***	-0.04***	-0.05***	-0.04***	-0.08***	-0.04***
Dependent variable: Natural logarithm of basic pay per hour						
F value (Beta of years of overeducation = 0)	734.43	456.75	406.52	397.97	1187.23	512.60
p value	0.00	0.00	0.00	0.00	0.00	0.00
F value (Beta of required years = Beta of years of overeducation)	1963.98	58.34	2254.45	73.07	873.11	176.46
p value	0.00	0.00	0.00	0.00	0.00	0.00
F value (Beta of years of overeducation = Beta of years of undereducation)	2064.91	963.11	1336.14	942.96	3201.15	984.42
p value	0.00	0.00	0.00	0.00	0.00	0.00

Note: Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01
Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Annex 2.3 Test of coefficients, Heckman, 2006

Variables	Job Analysis		Realized Matches: Mean		Realized Matches: Mode	
Dependent variable: Natural logarithm of basic pay per hour						
Years of education required	0.17***	0.08***	0.19***	0.13***	0.14***	0.08***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.07***	0.05***	0.05***	0.05***	0.07***	0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.07***	-0.05***	-0.06***	-0.04***	-0.10***	-0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Chi-square (Beta of years of overeducation = 0)	695.81	456.47	281.63	357.50	634.28	392.83
p value	0.00	0.00	0.00	0.00	0.00	0.00
Chi-square (Beta of required years = Beta of years of overeducation)	2191.51	182.57	2019.58	59.84	762.49	73.82
p value	0.00	0.00	0.00	0.00	0.00	0.00

Annex 2.3. (continuation)

Variables	Job Analysis		Realized Matches: Mean		Realized Matches: Mode	
Chi-square (Beta of years of overeducation = Beta of years of undereducation)	2037.80	999.47	1209.99	968.99	2496.59	971.90
p value	0.00	0.00	0.00	0.00	0.00	0.00

Note: Standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01
Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Annex 2.4. Test of coefficients, Heckman, 2012

Variables	Job analysis		Realized matches: Mean		Realized matches: Mode	
Dependent variable: Natural logarithm of basic pay per hour						
Years of education required	0.15***	0.07***	0.18***	0.15***	0.13***	0.10***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.06***	0.05***	0.05***	0.05***	0.07***	0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.06***	-0.04***	-0.06***	-0.04***	-0.08***	-0.04***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Chi-square (Beta of years of overeducation = 0)	682.25	451.11	328.67	362.96	842.54	448.91
p value	0.00	0.00	0.00	0.00	0.00	0.00
Chi-square (Beta of required years = Beta of years of overeducation)	1905.77	55.91	1952.79	89.36	648.60	197.33
p value	0.00	0.00	0.00	0.00	0.00	0.00
Chi-square (Beta of years of overeducation = Beta of years of undereducation)	1973.11	997.11	1242.42	953.22	2736.00	966.53
p value	0.00	0.00	0.00	0.00	0.00	0.00

Note: Standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01
Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Test of Coefficients under OLS and Heckman methods

The estimated returns to surplus, deficit, and required years of schooling under the job analysis and realized matches methods, employing an OLS regression and Heckman model are summarized in Annex 3.1 and Annex 3.2. The results, after accounting for selection bias under the Heckman method, are slightly lower, although similar to those under the OLS regression.

Tests of the differences in the coefficients of required, overeducation, and undereducation under the OLS and Heckman methods generally point to statistically significant differences between coefficients using the two methods, with some exceptions. While the coefficients are statistically and significantly different, the difference in coefficients is economically small.

Annex 3.1. Summary of results and test of coefficients: OLS regression and Heckman, 2006

Variables	Job analysis		Realized matches: Mean		Realized matches: Mode	
OLS Regression						
Years of education required	0.174***	0.084***	0.191***	0.134***	0.138***	0.083***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.065***	0.047***	0.054***	0.050***	0.076***	0.047***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.070***	-0.045***	-0.063***	-0.041***	-0.096***	-0.046***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Heckman						
Years of education required	0.175***	0.084***	0.193***	0.135***	0.139***	0.084***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.065***	0.048***	0.052***	0.051***	0.072***	0.049***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.072***	-0.045***	-0.065***	-0.041***	-0.097***	-0.046***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Beta OLS = Beta Heckman						
Chi-square (Years of required education)	68.48	1.45	41.44	0.00	80.12	0.10
p value	0.00	0.00	0.00	1.00	0.00	1.00
Chi-square (Years of overeducation)	7.83	0.01	12.77	4.72	38.99	15.72
p value	0	1.00	0.00	0.00	0.00	0.00
Chi-square (Years of undereducation)	3.73	0.02	6.02	7.58	5.93	7.44
p value	0	1.00	0.00	0.00	0.00	0.00

OLS = ordinary least squares

Notes: Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01

Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

Annex 3.2. Summary of results and test of coefficients: OLS regression and Heckman, 2012

Variables	Job analysis		Realized matches: Mean		Realized matches: Mode	
OLS Regression						
Years of education required	0.156***	0.066***	0.178***	0.151***	0.127***	0.101***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.060***	0.046***	0.052***	0.048***	0.074***	0.046***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00)
Years of undereducation	-0.064***	-0.042***	-0.055***	-0.037***	-0.083***	-0.041***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Heckman						
Years of education required	0.154***	0.066***	0.178***	0.151***	0.126***	0.101***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Years of overeducation	0.060***	0.046***	0.051***	0.049***	0.072***	0.047***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of undereducation	-0.064***	-0.043***	-0.055***	-0.038***	-0.082***	-0.041***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Beta OLS = Beta Heckman						
Chi-square (Years of required education)	56.43	6.25	24.43	0.33	54.33	6.96
p value	0.00	0.00	0.00	1.00	0.00	0.00
Chi-square (Years of overeducation)	7.16	7.21	10.79	3.11	28.38	0.00
p value	0.00	0.00	0.00	0.00	0.00	1.00
Chi-square (Years of undereducation)	0.50	0.21	2.22	2.18	16.05	8.12
p value	0.00	1.00	0.00	0.00	0.00	0.00

OLS = ordinary least squares

Note: Robust standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01. Wages are expressed in Philippine peso.

Source: Author's computation based on data from PSA (2006a, 2006b, 2012a, and 2012b)

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