Impact Program

WORLD BANK GROUP
Trade & Competitiveness

# Broadband for Development in Georgia
# Targeting and preparing firms to compete in new markets
# Concept Note

February, 2017


## Abstract

Access to the internet facilitates development, but does not guarantee it. This is the message from the World Development Report 2016 (WDR16) on Digital Dividends and the current impact evaluation literature showing mixed benefits from broadband expansion supports this assertion (e.g. de Stefano *et al*. 2014). In the spirit of the WDR16, and building on this literature, this impact evaluation (IE) aims to understand ways to help small businesses grow and create jobs by using information & communication technologies (ICTs). We focus on providing high-speed broadband internet and testing how to get more micro and small sized businesses in Georgia to actively engage in e-commerce and the resulting development impacts that come from this – in particular understanding how the demand for skilled versus unskilled labor changes as businesses shift from traditional to online sales. The first phase of the study leverages available firm and broadband expansion data to estimate the impact of the historical rollout of broadband internet across parts of the country. Using a difference-in-differences approach, we find null effects on turnover, employment and wages in aggregate, but suggestive evidence that firms with higher baseline endowments are more likely to benefit from broadband expansion, in line with the messages from the WDR16. But can government intervention help firms that may otherwise be left on the wrong side of the digital divide, and if so, which firms are likely to benefit from this support? In the second phase of the study we test an innovative e-commerce training competition and benchmark this against a control group and a more standard training program through a prospective randomized control trial (RCT). The training takes a task-based competition format designed to allocate training resources to the most promising firms through revealed performance. A benchmark training uses the same material but follows a more typical training format, allocating resources equally across all participants. The training alternatives will be cost-equivalent to allow the study to answer the following questions:

1. Can e-commerce training increase firms' participation in online markets and performance as measured by turnover and profit? Does this increase the demand for high skilled versus low skilled laborers?
2. Can a competitive, task-based e-commerce training program that allocates proportionally more resources to high achievers have a larger impact on firm performance than a more standard training approach that allocates resources equally across firms?

The IE forms an integral part of the Georgia National Innovation Ecosystem project and will provide early evidence to inform the project and broader innovation strategy in Georgia.

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## 1. Background

Approximately 1 Billion people now have access to broadband internet and 3.2 billion[1] have access to some form of internet service. The steady expansion of information and communication technologies (ICTs) has brought with it increased access to information, a reduction in search and screening costs, improved efficiency through automation of unskilled tasks, and new opportunities for innovation. Not surprisingly, the expansion of internet services is now part of the Sustainable Development Goals. Despite the steady expansion of internet access and its promise of development impact, important challenges persist. Adoption barriers for the unconnected world remain substantial, and differential access has the potential to exacerbate existing inequalities and expanding the digital divide. The recurring theme of the World Development Report 2016 (WDR16) on Digital Dividends is that without appropriate analog complements, internet services may fall short of their potential, and drive a wedge between those with resources and those without, increasing barriers to entry for some markets and consolidating natural monopolies for incumbents.

There is little direct and convincing evidence about what can be done to help economies and firms best utilize ICTs for growth. There is some theoretical work showing that adoption of ICT technology by firms depends on firm size and labor market characteristics (Brambilla, 2016) as ICT and skilled labor tend to be complementary inputs. Recent empirical work exploring the impact of ICTs on firms can be found in Akerman et al. (2015) who estimate that the introduction of broadband internet in Norway led to increases in firms' productivity and skilled jobs. Hjort and Poulsen (2016), Canzian et al. (2015), and Brambilla and Tortarolo (2016) found similar results for South Africa, Italy and Argentina respectively, whereas Dutz et al. (2016) found mixed results for Brazil. While their results are encouraging, large questions remain regarding the mechanisms that are at work when broadband internet becomes available, and how analog complements can help realize the positive potential of ICTs.

There are at least two competing theories about how ICT adoption can impact existing enterprises. First, ICT adoption is skewed in favor of well-endowed, formalized firms who are able to pay for the fixed cost investments in these technologies and absorb the risk of uncertain returns. Hence, the benefits of ICTs could be skewed towards these firms who generally also have the best access to analog complements to these services such as large networks, skilled laborers and a strong business climate. Large barriers to engaging in online markets makes it easier for market concentration to occur which may reduce competition and consumer surplus, while limiting the potential for broad-based participation of outsider firms in online markets. In this world, the gains go to the top, potentially at the expense of those firms at the bottom.

On the other hand, ICT adoption could allow smaller, less well-known firms to break into new markets where they have comparative advantages but where they were unknown due to high search costs. For example, a niche hotel that provides superior services but was never featured in travel guides could find itself a new customer base through getting itself onto well-known travel websites. Additionally, these technologies could serve as a way for firms to more easily find analog complements for their business, or learn new ways to improve their productivity. In this world, the gains from ICTs could go to small firms,

[1] ITU estimate, 2015.

allowing the most productive firms rise to the top. The appropriate policy response differs depending on which of these two scenarios are most prevalent. The first case justifies direct intervention at the firm level while the second case suggests that intervention should focus on public investments such as broadband infrastructure. Although results from the first–, retrospective phase of the study are not conclusive, they provide support for the former theory that well-endowed firms are most likely to benefit directly. But what, if any, is the role for government to intervene and support businesses that may otherwise fail to utilize the potential of the new digital economy? And how should government target finite resources to generate the most impact? This motivates the second stage of the study, which explores alternative approaches to more directly support less-endowed firms to have a better chance of reaping digital dividends through e-commerce.

In Georgia, the transition to a market economy has faced important challenges. The economy shrank by almost 60% from 1989 to 2003. Since then, the country has made substantial investment climate reforms, moving from 115th place in 2005 to 15th in 2015 in the *Doing Business* ranking. However, Micro, Small and Medium Enterprises (MSMEs) which represent 94% of the approximately 60,000 registered businesses in the country contribute less than 20 percent to the GDP (compared to 60% in the ECA region)[2]. Low levels of innovation and productivity (estimated to be one third of large firms) has been identified as a major barrier to growth for these businesses (Project PAD). Georgia's ranking of 123 out of 140 in the Global Competitiveness Index's innovation pillar highlights the problem. What little innovation takes place is typically concentrated among large, well-established firms able to make use of the limited infrastructure in place to foster innovation. For instance, while 97.5% of firms have access to internet, only 9.5% engage in online sales, and this is mostly driven by businesses in Tbilisi.

To address these issues, the Government has prepared a National Innovation Strategy 2020, which aims to "maximize Georgia's growth potential by creating an entrepreneurial, knowledge-based economy, where innovation-led growth will foster increased economic productivity and growth." This backdrop has motivated the financing of the GeNIE project—a US$40M IBRD project implemented by the Georgian Innovation & Technology Agency (GITA) under the Ministry of Economy and Sustainable Development (MoESD). GeNIE aims to foster innovation, particularly for otherwise marginalized firms, and will provide 3000 firms outside of the capital with tailored e-commerce training as part of its "Broadband for Development" program.

This concept note outlines an impact evaluation design that will be integrated into the GeNIE project to improve our understanding of the impact of broadband expansion and the potential analog complements needed to help firms leverage this access to maximize the potential development impact of the infrastructure investments.

## 2. Intervention to be evaluated

**Engagement**

[2] Papiashvli, Tatiana (2012), "The Role of SME Sector in Georgian Economy".

Discussions on an IE were initiated early in the GeNIE project design. Based on an initial expression of interest from GITA and members of the project team, GITA participated in a four-day World Bank workshop on impact evaluation in May 2015. Based on the discussions in the workshop and following further development of the project design, GITA requested assistance in studying the "Broadband for Development" component of the GeNIE program which promotes the adoption of IT and broadband services among MSMEs in rural areas to ensure their participation in the digital and knowledge economy, specifically through e-commerce. This two-part impact evaluation first focuses on the general broadband expansion across Georgia and then specifically addresses questions related to the Broadband for Development program.

**Phase 1: Broadband Expansion**

Internet emerged in Georgia in 1994 as an off-line e-mail service, with full internet services following in 1996 and broadband internet becoming available with the introduction of DSL in 2002. While internet use expanded rapidly from 2002 to 2007, high-speed broadband usage grew relatively slowly as a result of limited infrastructure and stood at 41,000 users out of a population of approximately 4.4 million at the end of 2007. Since then, there has been an expansion in the broadband infrastructure. As Figure 1 shows, only 35 settlements (the lowest administrative level in Georgia) were connected in 2010, but broadband became available in more than 1600 settlements by 2016. Given complementary firm data availability, we focus on the expansion that takes place between 2010 and 2014.

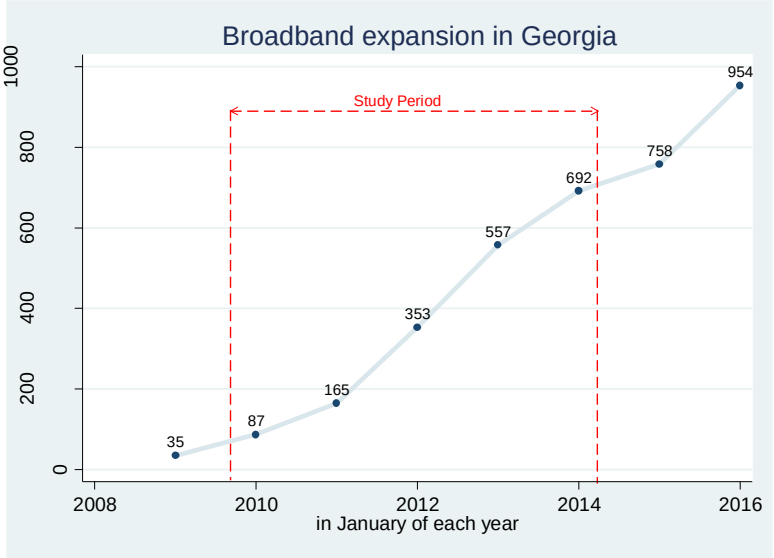


*Figure 1: Broadband expansion in Georgia*

In settlements without broadband, residents would typically have access to some form of internet. A nationally representative 2016 survey found that of the 97.5% of firms that have access to internet, 40% have broadband, 31% use DSL connections and the remainder access internet through their mobile phones (typically using a GSM connection).

**Phase 2: Analog complements to broadband**

To complement the strong expansion of broadband infrastructure, which will be bolstered by the government's "OpenNet" program to add infrastructure to increase access to the remaining 2100 settlements over three years, the government is also implementing a demand-side component focusing on rural households and rural MSMEs to improve the take-up for broadband internet, with the assistance of the WBG through the GeNIE project. It includes support for rural household connections and e-commerce adoption by MSMEs in rural areas. The impact evaluation will focus on the e-commerce aspect of this program. In part this is motivated by the large disparity between who uses internet for what. Of the 97.5% of businesses that use internet, 44% have a website/webpage, 33% participate in social media, 21% submit tax returns electronically and 9.5% do some forms of online sales for their business. Although data are not disaggregated by region, it is commonly understood that the majority of online activity is driven by firms in Tblisi. In this case, the program aims to help firms in Georgian Regions to start making better use of internet availability.

**Designing the e-commerce training:** To design the format of the e-commerce training, a joint WB project and IE team met with nearly 70 small businesses in Baghdati / Kharagauli (Imereti region), Tevali and Tbilisi, as well as approximately 20 internet service providers in December 2016. The interviews helped trace out the progression of firms as they move towards ecommerce. The transition from offline to online business follows a natural order as the experience and sophistication of the firm grows. It starts with using the internet for information to get ideas about new production approaches or potential markets. This expands to the use of social media platforms (predominantly Facebook) to build awareness of their product, and in some situations, to the use of ecommerce designated platforms for actual sales of this product. Adoption of online government services may take place at this point too. Online tax submissions through the Revenue Authority is the most common online service used, but other offers are also relatively common. As businesses start to build their online brand and expand the geographical customer range, transport logistics become an important consideration. Building trust through the brand and repeat customers starts to become more important as geographical scope expands, and with this, there is a greater need for consistently reliable and high-quality products/services. While still very limited in Georgia, once there is a trusted system available, actual online transactions may start to take place. With these tools, and a better understanding of relevant regulations and potential markets, firms may begin to export.

The path described above highlights the potential for broadband to enable a transition from local, to regional, and finally, to global production and sales but it also shows the many complex steps required that may be out of reach for the majority of firms. With the right support, a subset of firms may be able to realize this potential transition, but this suggests that targeting of businesses to receive different levels of support may be important in order to avoid training firms in sophisticated techniques that they are

unlikely to use, and focusing higher-level training to those that stand the best chance of benefitting from the program.

To build this "natural selection" into the training program, the GeNIE team has decided to develop a task-based competition format where a large set of firms will be trained on basic "first-stage" online activities, with firms progressing to higher-level stages if they are able to successfully complete increasingly complicated tasks. While the specific content is currently being finalized, it will focus on at least 3 stages, using the most popular online platform in Georgia – Facebook – as a basis. Each phase will consist of a classroom training (of 1 to 2 days depending on the complexity of the topic) and an assigned task that, if completed successfully within the allocated time period, would allow them access to the next stage of training. In the first stage, firms will be taught the basics of setting up an online profile and using the Internet as an information tool to improve their business. They will be tasked with building their own profile and producing a business plan based on market research conducted online. The second phase will focus on building an interested customer base/network and will require firms to generate online advertising content and secure a set number of followers on their business page. In phase 3, firms will then be trained on how to sell online and will be tasked with securing a set of online sales. A potential fourth phase would focus specifically on selling beyond the firm's locality and potentially securing exports but will only be included if deemed feasible.

By allocating resources to firms most able to absorb them, the competition-style training provides a novel approach for mitigating the possibility that funds are wasted on firms that are not sophisticated enough to benefit from the training material. However, we may worry that this approach simply provides winners with additional support that they would not have needed and shifts resources away from firms that may have benefited the most, further exacerbating the digital divide. As such, as a benchmark for comparison the same training material and activities will be provided to another set of businesses that receive all training modules regardless of their ability to complete tasks. This would essentially amount to a more standard classroom training common among business training programs.

**Creating cost-equivalent programs:** To most accurately design cost-equivalent programs we would need 2 things: (i) estimates of the pass rate through each stage of the competitive program and (ii) cost estimates for each module[3]. We plan to generate estimates of this in the piloting that will take place in April. For now let's consider a stylized design for the competitive training. Let's assume we start with 500 businesses and we find the following number of businesses enter into each of the next levels: Level 2 – 400; Level 3 – 200; Level 4 – 50. Now for simplicity let's assume equal resources are assigned to each level (25% of funds respectively). This would then imply that the cost per firm in Level 4 training (50 firms) is 10 times that of Level 1 training (500 firms). Now we can ask how many firms should be trained in the standard training for overall costs to be equivalent to the competitive training? Simple algebra will result in a cost-equivalent sample of 136 firms for the standard training.

[3] For simplicity we avoid a discussion on economies of scale here.

The target population is micro and small firms outside of the capital, Tbilisi, that currently do not subscribe to broadband internet services, but live in areas that have, or will soon have broadband infrastructure in place[4].

The interventions are still expected to be piloted and refined in April / May 2017 to finalize all implementation details. In particular, the pilot will help (i) refine the content and awareness approach; (ii) assess take up; and (iii) estimate the proportion of firms expected to pass through each phase of training.

## 3. Theory of Change

We consider two elements of the theory of change (ToC) here. First we consider the ToC for e-commerce training as a whole, and its impact on firm performance. We then consider the ToC related the different training formats.

**E-commerce training and firm outcomes – Figure 2~~Figure 2~~:**

We hypothesize that firms that may otherwise benefit from engaging in e-commerce do not do so because of (i) limited skills and understanding of how to develop an online profile and secure online customers; (ii) a lack of awareness of their own potential in e-commerce markets; and (iii) the high costs / risks associated with learning (i) and (ii) through experimentation. The e-commerce training reduces these costs, allowing firms to learn about their potential and build up the skills needed to invest in e-commerce activities.

The training modules, combined with task-based activities are designed to help firms move through the first important steps of bringing their business online and is expected to increase firms' online presence and understanding of how to engage in e-commerce in the short-run. By making the training task-based, firms will also be able to learn more about their own ability to engage and compete in online markets in the short run.

Once firms have successfully completed the training, we expect them to begin expanding their customer base to customers less connected to their immediate location, and more likely to be found online. The nature of online transactions (being more transparent and likely to rely on open feedback) will result in firms being more attentive to customer feedback. Finally, by moving to more online sales, firms will rely more heavily on technology-skilled employees and automated activities, increasing demand for high-skilled and reducing the demand for low-skilled labor.

In the longer-run we expect the increased attention to customer feedback to increase production efficiency and quality, and the increased demand for high-skilled labor to result in a change in the labor mix within business towards more high-skilled labor. This increased efficiency, larger customer base and higher-skilled labor will result in increased turnover and profits.

[4] We use IFC's definition of firm size. Micro is then defined as having from 1 to 9 employees whereas small firms are those with 10 to 49 employees.

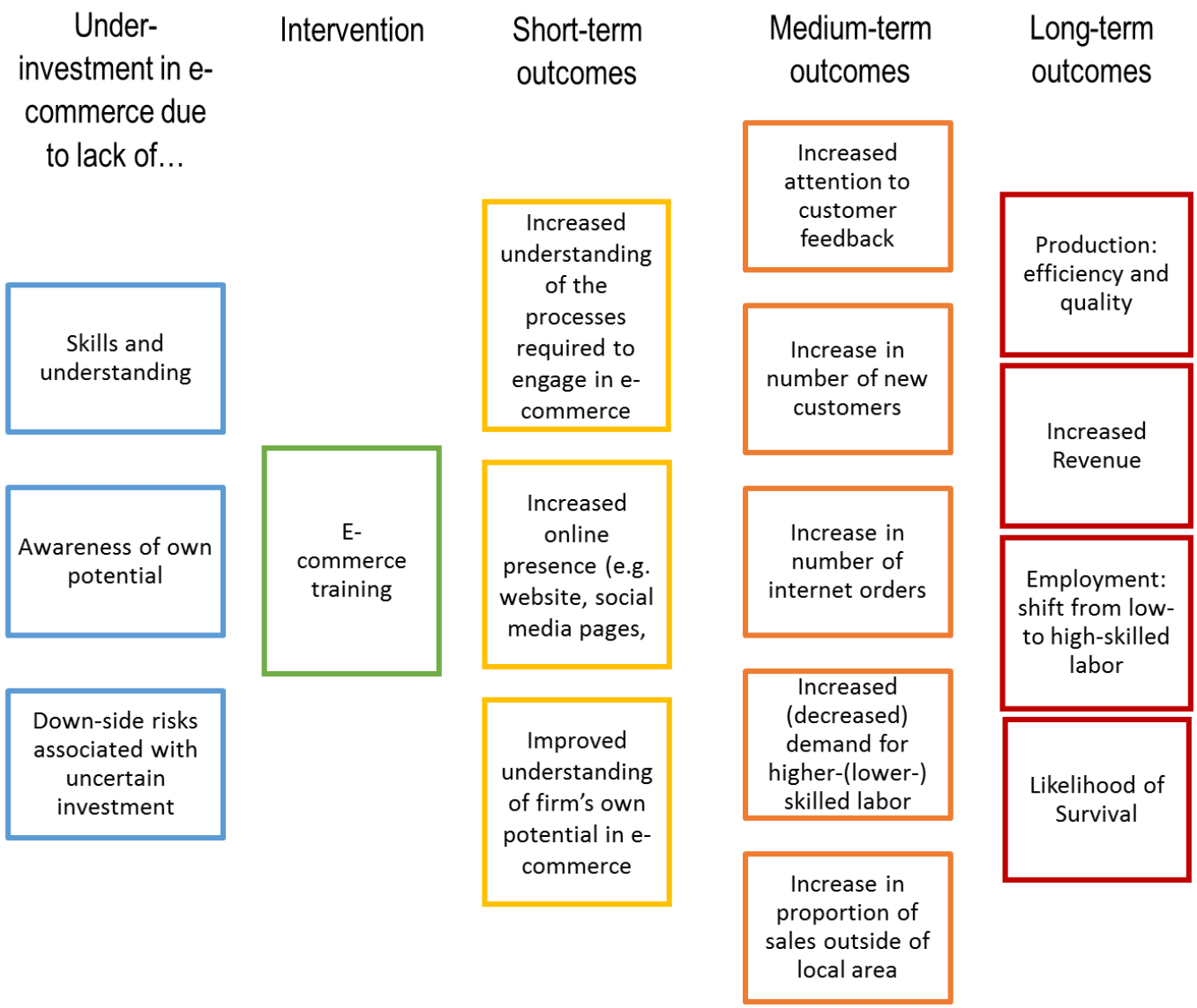


*Figure 2: Overall Theory of Change*

**More efficient training through revealed potential - Figure 3~~Figure 3~~:**

Here we discuss the different results expected from the task-based competitive versus more standard e-commerce training. In the competitive training firms will only proceed to higher levels if they succeed in tasks related to lower-level training. All else equal, compared to a more standard training where all firms progress through each stage of training, this would result in a progressively smaller group of selected firms as training stages increase. If the same resources are allocated to each training, this would result in

more resources being available to make training more individualized at higher levels. By progressing through different stages, firms in the competitive training would also receive direct signals about their ability to perform tasks related to e-commerce. As a result, we expect higher-performing firms with increased skills and signals to confirm their quality to be more likely to invest in e-commerce activities at the end of the training compared to high-performing firms in the standard training format. Similarly lower-ability firms would be less likely to invest in e-commerce after the competitive versus standard training. If the signals and performance in the training are good indicators of their potential performance in reality, then this would result in more efficient firm e-commerce investment decisions and greater overall impact generated from the competitive training format.

While this is the anticipated result, the results are in fact ambiguous. It could be the case that high-performing firms would have invested and been successful in e-commerce anyway, and low-performing firms neglected in the competitive format are the firms that, if provided more support would have been able to overcome more binding constraints to e-commerce participation which they could benefit from. This would result in a windfall gain for high-performers in the competitive framework and yield a lower average impact when compared to a more equal training support program.

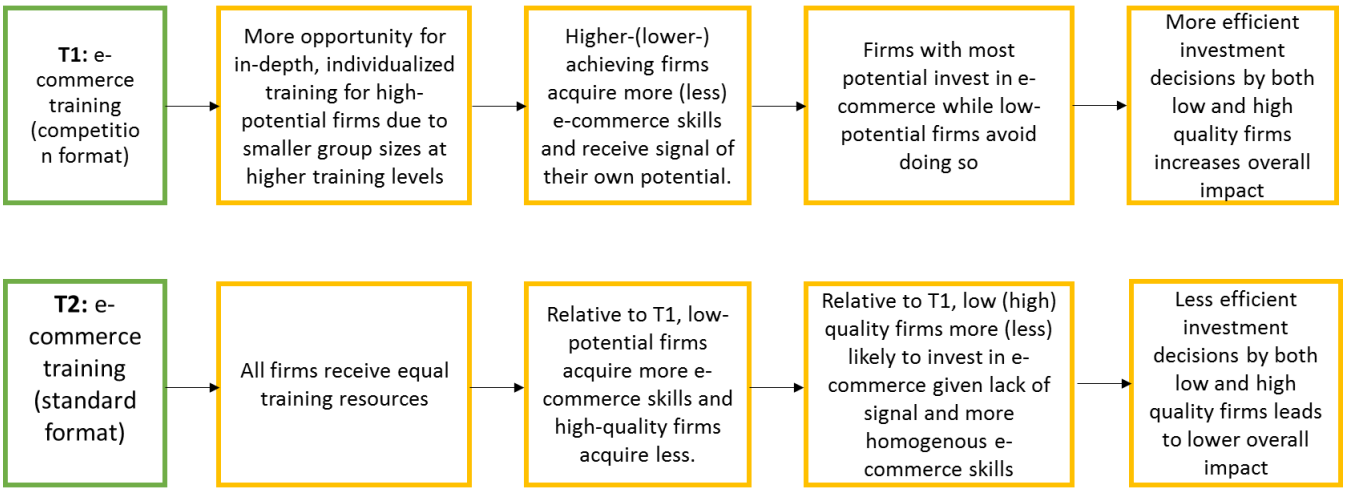


*Figure 3: ToC - Standard vs. Competition-Based Training*

**Main outcomes of interest**

| Outcome Type | Outcome Name | Definition | Measurement Level |
|---|---|---|---|
| **Primary/Secondary** | | | |
| **Primary** | Profits | Self-reported revenue minus expenses | Firm level |
| **Secondary** | Revenue | Self-reported | Firm level |

| | | | |
|---|---|---|---|
| **Primary** | Share of high-skilled labor | Wages and Instructional level | Worker level |
| **Secondary** | Productivity | Revenue/employees or<br><br>Sales/employees | Firm level |
| **Secondary** | Customer distribution | Share of customers located within village / settlement; share of online customers located outside village / settlement | Firm level |
| **Secondary** | Online sales | Proportion of sales undertaken online; | Firm level |
| **Secondary** | Online presence | Firm has a website; Firm has an active Facebook Business page; Number of Facebook likes; Completeness of Facebook page (index) | Firm level |

## 4. Literature Review

The study is related to three strands of literature: (i) impact of broadband/ICT on firms; (ii) impacts of business training; and (iii) approaches to targeting high-growth firms.

**Impact of broadband:** Growth accounting exercises (Inklaar, O'Mahony and Timmer, 2005) and cross-country regressions (Czernich et al., 2011) suggest that ICT and broadband are strongly associated with growth, although these studies face strong concerns of endogeneity and measurement error (see Cardona, Kretschmer and Strobel, 2013 for a review). Non-experimental studies exploiting variation in the roll-out of infrastructure to analyze the impact of broadband have in general found limited evidence of the impact of broadband on firm-level outcomes (Bertschek, Cerquera, and Klein 2011; and DeStefano, Kneller, and Timmis 2014). However, a recent study shows that internet access in African coastal cities lead to increases in labor demand for skilled workers and changes in occupational choices as ICT technology seems to be skilled-biased suggesting that the gains from ICT expansion may be heterogeneous. The best evidence to date indicates that broadband internet seems more likely to be adopted by firms with large capital and high-skilled labor. The evidence suggests the provision of broadband internet to different groups of firms could segment the labor market by clustering workers with different educational and skills background in occupations that require different tasks which could disadvantage smaller firms (Akerman et al. 2015). This mixed evidence from providing broadband services is at the heart of the WDR16 which posits that internet is not a sufficient condition for growth. Appropriate analog complements may be needed to ensure that internet services are translated into meaningful development impact.

**Business Training:** Training and skills development are some of the most ubiquitous development interventions in the world, with nearly $9 billion spent by the World Bank alone on skills training from 2002 to 2012[5]. Despite large investments being made, relatively little evidence existed on their effectiveness prior to 2009 (McKenzie, 2009). Since then a number of impact evaluations have shown mixed results. A recent review of training programs found limited effects on profits and turnover, but part of this mixed success is driven by the large heterogeneity in firms participating, program intensity and quality on the operational side, and small sample sizes combined with problematic data collection methods to capture key measures of profit and turnover on the evaluation design side (McKenzie and Woodruff, 2014). Some potentially promising approaches involve providing individualized training (Bruhn et al., 2013; Bloom et al, 2013). There are numerous behavioral and market-failure reasons why businesses may not invest in training even if it could benefit them, but the evidence to date is not able to provide guidance on who could most benefit from training, limiting the potential for ex ante targeting as a way to improve training effectiveness.

**Targeting high-growth firms:** Attempts to pre-emptively target high-growth firms have largely been unsuccessful in both developing and developed country settings whether investors are trying to identify promising venture capital opportunities (Scott *et al.*, 2016), or governments are trying to support high-growth firms. Fafchamps & Woodruff (2016) find that scores from an expert panel explain only 34% of the variance in firm's growth[6]. Nanda (2017) argues that, instead of attempting to pre-identify high-growth firms, governments should rather focus on providing the business climate necessary for good firms to grow, and use targeting to identify high growth-*potential* firms, which practically means removing the firms that are clearly unlikely to grow and providing space for the rest to excel with the understanding that only a small proportion of this subset actually will. Nanda suggests that 2 questions can help exclude the majority of non-growth-potential firms – how old is the firm, and how big is it? Old, small firms are the least likely to grow, but also constitute a large share of existing firms. Even if we were able to target firms with the highest potential, this still may not be the appropriate objective from a public policy perspective. In reality, instead of targeting "gazelles" a program like the one under consideration should be targeting firms that have a binding skills constraint but would most likely grow as a direct result of removing this constraint (i.e. targeting on potential impact rather than growth potential). Perhaps the most closely related interventions to our proposed approach in terms of selection come from business plan competitions that select firms to receive capital based on their performance in their proposals and possibly subsequent business pitches. McKenzie (2015) found that a business plan competition in Nigeria had large impacts on firm survival and growth, but the study does not attempt to distinguish the impacts that come from the capital injection itself versus the implicit targeting mechanism built into the program, other than to note that proposal scores and observable firm characteristics have little predictive power for future growth.

[5] https://chrisblattman.com/2015/06/25/dear-governments-and-aid-agencies-please-stop-hurting-poor-people-with-your-skills-training-programs/

[6] The authors show that panel score have lower predictive power of firm's growth than some survey questions summarizing entrepreneur's ability, firm's management practices and access to credit (34% vs. 36%).

This study will contribute to all three strands of literature to varying degrees. First, we will contribute to the estimates of impact from broadband expansion through our quasi-experimental study. The experimental evaluation, by exogenously varying firm's online participation will explore the mechanisms underlying the impact of increased broadband utilization on firms – in particular the potential labor redistribution that comes from active participation in e-commerce markets. On business training and targeting, the proposed intervention aims to address the challenge of limited impact of business training and difficulty in pre-identifying firms by targeting the training resources to firms with "realized potential" that successfully complete training-based tasks. It becomes important to benchmark this against more standard (untargeted) training since there is still a potential that this competitive task-based approach may still only help to provide resources to "gazelles" that may have been able to grow without intervention support.

## 5. Hypotheses and Evaluation Questions[7]

*Phase 1: Retrospective*

The main research questions and associated hypotheses that we aim to answer are:

**Q1.** What are the impacts of broadband availability on business growth (turnover and employment)?

**H1.** Broadband expansion increases aggregate firm growth

**Q2.** Are larger / more well-endowed firms able to better leverage broadband to generate impacts that smaller firms?

**H2.** Larger firms face less constraints to broadband utilization and are able to generate larger impacts than smaller firms.

**Q3.** Are ICT and skilled labor complementary inputs for firms? (where skilled labor is proxied for by wage)

**H3a.** Firms respond to broadband expansion by shifting towards more high-skilled over low-skilled workers

**H3b.** Wages of high-skilled workers increase in recognition of higher productivity.

*Phase 2: Prospective*

**Q1.** Can e-commerce training increase firms' participation in online markets and performance as measured by turnover and profit? Does this increase the demand for high skilled versus low skilled laborers?

[7] Sections 5, 6, 7, 8, and 9, related to the IE design, have been taken from DIME/i2i Concept Note template to ensure comparability across concept notes.

**H1a.** E-commerce training will increase the likelihood that firm invests in e-commerce activity (starting a web page, advertising online etc.). This in turn will expand the customer base and increase turnover.

**H1b.** Changes in number of employees working for the firm is ambiguous. We hypothesize that firms will increase demand for workers with ICT skills over low-skilled work that is more easily automated. The proportion of high-skilled to low-skilled workers will increase.

**Q2.** Can a competitive, task-based e-commerce training program that allocates proportionally more resources to high achievers have a larger impact on firm performance than a more standard training approach that allocates resources equally across firms?

**H2.** The direction of impact is ambiguous due to two competing hypotheses:

**H2a.** By channeling resources towards firms that are able to best absorb them, training resources are allocated more efficiently, improving firms' e-commerce investment decisions and resulting in larger impacts than in a standard training.

**H2b.** There will be no additionality from providing training resources to high-performing businesses since they would have invested without support. Low-performing firms are the ones facing the highest constraints to e-commerce participation and thus offer the highest potential additionality from the training. By ensuring resources are made available to low-performing firms, the standard training will yield higher overall additionality (and resulting impact) compared to the competitive training.

## 6. Evaluation Design and Sampling Strategy

**Evaluation Design**

We plan to answer the above questions using a two-phase design:

A) *Phase 1 : Retrospective*

In the first phase we utilize data from the National Telecom regulator on the expansion of broadband internet in Georgia to estimate the impact of the availability of broadband internet. Combining information on roll out with firm-level data on outcomes such as turnover, employment and wages, we use a difference-in-differences framework to estimate the 'intention to treat' (ITT) effect of broadband availability on firm performance.

We use a Fixed Effects specification to control for time-invariant temi-level factors and time variant factors common to the connected and unconnected settlements. In Georgia, temi's consist of a group of villages, or settlements, which are the lowest administrative unit in the country. We use temi rather than village-level fixed effects because the availability of data sources means that this is the lowest level of treatment aggregation that we are able to consider[8]. The validity of these estimates is conditional on the assumption

[8] While broadband expansion is known at the settlement level, the lowest geographical identification of the firm-level survey is the Temi level which means that matching is only possible at this level of aggregation. We also find

that the two groups would have exhibited the same trend in outcomes in the absence of the broadband rollout. As a proxy, we examine the pre-rollout levels and trends in the two groups over the variables of interest to test for parallel trends.

We will also use these data to improve our understanding of the heterogeneous impacts of broadband access on firms. For instance, we will test hypotheses like whether broadband has larger impacts on larger firms, and whether benefits accrue to firms that can access high-skilled labor.

*B) Phase 2: Prospective*

Working with the Georgian government we will first conduct a large promotional campaign in the Kakheti and Imereti regions of Georgia that have been identified as the sites for the pilot exercise on which the IE will be based. The objective will be to invite a large number of active businesses to a 3-hour "light" training session on broadband for business. This will take a seminar format of approximately 50 people/businesses per session and will include public "keynote" presenters aimed at attracting a wide range of firms with different levels of sophistication. During the event we will conduct a baseline survey of all participating firms. The data will be used as a baseline for the impact evaluation, but also as a tool to select participating control and treatment firms by removing firms that are clearly not at a level where they could benefit from e-commerce training. With the remaining businesses in our sample, we will randomize firms into three groups: (i) a pure control (access to standard internet services without any support except for the light introductory training); (ii) a group receiving the standard training modules and (iii) a group that will be entered into the competitive training program.

## Sample Size

A) *Phase 1: Retrospective*

The non-experimental data comes from both the National Statistics Agency (Geostat), and the Georgian National Communications Commission (GNCC), with the former being at firm level and the latter at temi level. Once merged, these two datasets provide information for 44, 822 firms across 954 temis. Since GNCC data is truncated at 2010, we do not have information on when temis recorded as connected at the beginning of 2010 were actually connected, and thus focus our attention in this study to temis connected from 2010.

The first set of temis connected (pre-2010) consist of all the major urban centers including Tbilisi, Kutaisi, and Batumi, and the rapid expansion post-2010 reflects expansion into smaller, more rural parts of the country. Thus, by excluding these originally-connected settlements, our analysis limits the interpretation of the impacts of broadband found here to locations outside of major urban areas, but also increases the likelihood that settlements may be somewhat similar within our sample. The final analysis sample includes 9,085 firms distributed across 819 temis. Among the final 9,085 firms, we also observe some migration -

that firm-level pre-intervention trends are not parallel, which justifies our use of Temi-aggregated outcomes (which do conform with necessary assumptions for a valid DID analysis).

75 firms relocated from unconnected to connected settlements and 133 vice-versa. These are well distributed across the outcomes distribution and were therefore included in the analysis[9].

*Table 1~~2~~: Geostat and GNCC Sample[10]*

| | Temis | Firms |
|---|---|---|
| Total Sample | 954 | 44,822 |
| *Tbilisi Region* | 12 | 19,454 |
| *Pre-2010 connections* | 35 | 16,545 |
| Final Analysis Sample | 819 | 9,085 |

*A) Phase 2: Prospective*

We are interested in being able to detect an impact with precision, and are aiming to have sufficient power to detect a 12% increase in firm revenues for T1 or T2 vs control at a 5 per cent confidence level (if we are powered to detect changes in turnover, then we expect to be powered for all other outcomes of interest). Using data from Geostat's annual firm surveys and focusing on the data on SMEs[11] for 2014, we estimate that to detect this level of difference in Turnover with one baseline and two follow up surveys, and assuming a correlation of 0.5 between follow-up measurements, we will need to have at least 320 firms taking up the offers in T1 and 115 firms take up the offer in T2[12] to achieve a power of 0.80 (vs. a comparable control value).

One important issue to consider is take-up and utilization of the training. We do not expect universal compliance, and so the number of firms that we are targeting are firms that have actually participated in the training. We mitigate this concern upfront by selecting only from firms that participated in the first open seminar and expressed interest in further training from the baseline survey conducted. We thus anticipate approximately an 80% take up. This would suggest that, for our intention-to-treat estimate, we will need approximately 1,500 firms for the same MDE split equally across the two treatments and control.

Although adding strata dummies will likely increase the power in our actual experiment, this exercise highlights the importance of ensuring a high level of take-up in our study. We will pilot the approach before rolling out to help ground-truth our assumptions.

## 7. Data

[9] Robustness checks were made by dropping this sub-sample of movers and did not affect our results.
[10] Observations can be cross-cutting between Tbilisi Region and the pre-2010 connections, hence the sum of the two rows not adding up to the final sample size.
[11] The cutoffs we use for Small and Medium enterprises are revenue of 100,000GEL or below and employment of 100 workers or below. See Bruhn and Loeprick (2013).
[12] Calculated in stata using the sampsi command and the parameters described.

### B) Phase 1: Retrospective

Data required for this part of the study will come from two sources- - the National Statistics Agency (Geostat), and the Georgian National Communications Commission (GNCC). Firm-level data on economic indicators such as sector of activity, turnover, profits and employment come from Geostat, which maintains a census of businesses in the country and surveys a sample of these businesses annually. These firms are randomly selected from Georgia's list of active businesses, respecting for geographical distribution (excluding conflict zones). We have data from these annual surveys for the period 2006 to 2014.

On average about 463 temis are visited each year for Geostat's firm survey. This implies that about 46 percent of the country's settlements are represented annually[13]. Focusing on the Broadband rollout for the temis observed in the non-experimental sample, we can see that it gradually increases across the 2010-2014 timeline, resulting in a smaller control group as we approach the end of our study period.

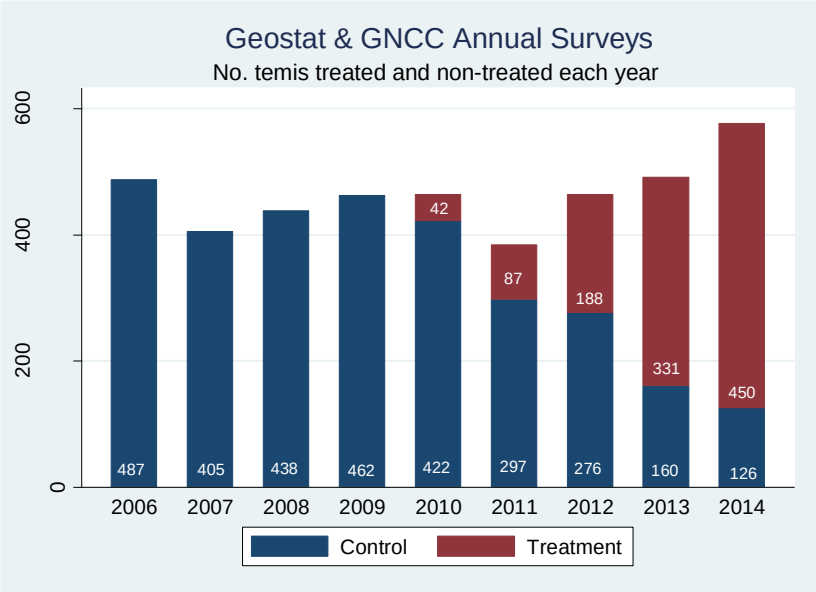


*Figure 45: Number of temis covered by the National Statistics Agency (Geostat) in their Annual Firm Survey*

Given the regularity of the surveys and relatively small population of formal firms in Georgia[14] temis and firms are often surveyed more than once in this period, resulting in an unbalanced panel of data. This allows us to compare changes over time within temis and to observe the number of firms that are on average surveyed within each temi annually.

[13] Geostat's 2014 Population Census
[14] Approximately 60,000 firms in the census maintained by Geostat.

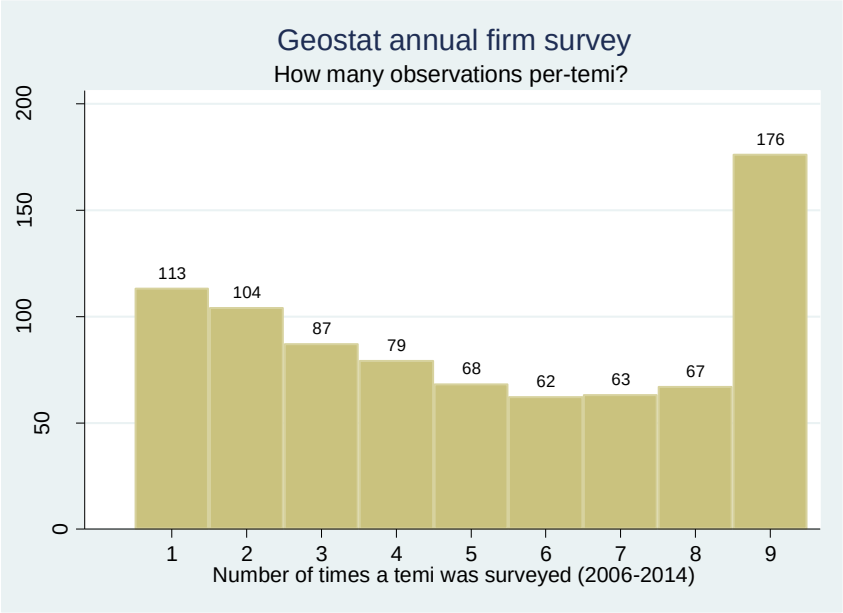


*Figure 5~~6~~: Number of temi appearances over survey period*

*Table 2: Average number of surveyed firms per temi each year*

| Year | No. Firms |
|---|---|
| 2006 | 2.64 |
| 2007 | 2.03 |
| 2008 | 2.22 |
| 2009 | 1.85 |
| 2010 | 1.9 |
| 2011 | 2.03 |
| 2012 | 2 |
| 2013 | 2.2 |
| 2014 | 2.8 |

The outcomes we are interested in are the temi-level aggregated real turnover, real wages (2010 based CPI), and the labor force size. The means for the pre-intervention period are higher for turnover in control temis, while average wages, which we consider a proxy for high-skilled labor, are larger in treatment settlements. On the other hand, employment seems to vary little across both groups.

*Table 3: Treatment and control temi profiles pre-2010 intervention*

| Outcome | Obs | Mean | Sd |
|---|---|---|---|
| *Control* | | | |
| **Turnover** | 158 | 541,209 | 1,605,399 |
| **Wages** | 230 | 86,834 | 181,545 |
| **Employees** | 119 | 6 | 11 |
| *Treatment* | | | |
| **Turnover** | 487 | 476,741 | 1,398,229 |
| **Wages** | 589 | 108,040 | 587,022 |
| **Employees** | 411 | 6 | 12 |

From January 2010 onwards, GNCC has carried out a comprehensive survey of Internet Service Providers (ISP) in Georgia each month for information on the internet packages they offer in each settlement. This includes information on the speed of the internet package, the number of subscribers and the price of the package for each ISP for each settlement. This data, except the price of the package, which is confidential, is published monthly on the GNCC website. It is possible, therefore to learn the earliest date that any ISP began offering broadband internet in a settlement, for settlements where an ISP entered a settlement only after January 2010. As the figure below shows, there was a rapid expansion in ISP presence in Georgia in this period. The two datasets overlap for the period 2010-2014, which we dub our 'study period'. The settlements connected over this period form our 'treatment' group, with the 'treatment' (availability of broadband) being administered in phases each year. We will estimate an 'Intention to treat' effect since we have information on broadband availability and not the individual adoption decisions using the specifications defined in the next section.

*C) <u>Phase 2: Prospective</u>*

An open invitation will be made to firms in the Imereti and Kakheti regions to participate in a series of high-level training seminars that will take place across the regions. This will take the format of 3-hour seminars of approximately 50 people each. We anticipate running 40 such events, attracting approximately 2,000 businesses. During the training our survey team of 10 enumerators will rotate firms such that each firm completes a 30 minute face-to-face questionnaire during the seminar. The survey instrument will include 3 things: (i) basic descriptive information about each business including baseline outcomes of interest for the study; (ii) a module assessing the basic readiness of the firm to participate in e-commerce training (e.g. have they ever used a computer, do they have access to internet, do they possess basic digital literacy, etc.); and (iii) questions assessing their interest and availability to participate in a more in-depth e-commerce training program. From the 2,000 firms we expect to be able to exclude 25% of firms from the impact evaluation sample.

We will then invite firms to participate in the competitive and standard training sessions. In both programs we will include satisfaction surveys asking firms which aspects of the training they found most useful and how they rated the training overall. We will also keep administrative records on how successful each firm was in completing the tasks assigned to them during the training (did they start a facebook page, how

many Likes did they get, how many orders and what was the total value of orders received etc.). In the competitive training task-completion scores will be set to 0 for firms that have not successfully made it to the respective training level. This will allow for direct comparison of training results across all firms in competitive vs. standard training.

We will then include a short exit survey that will be done at the end of the training, asking firms to provide details about whether and to what extent they plan to invest further in e-commerce (and why not if they choose not to).

We also plan to implement a midline and an endline survey to control and treatment businesses. These surveys will collect data about a variety of firm outcomes that are of interest such as revenues, profits, number of employees and employees' skills (occupation and human capital). Contact information collected at baseline will allow us to keep track of firms in control and treatment groups and run standard face-to-face firm surveys.

We do not foresee any nonstandard ethical challenges. The training will be limited due to the resource constraints of the project and so the fairest way to allocate them would be to randomize, which will generate important learning for the rest of the program scale up. The research will be run through the Internal Review Board at the University of Illinois, the academic home of one of the team members and all research members will have undertaken standard ethics training courses and hold relevant certificates. There are otherwise no specific research permits or IRB requirements in Georgia.

## 8. Data Analysis

### *A) Phase 1: Retrospective*

The data on the roll-out of broadband access from the GNCC allows us to identify which month and year each settlement received broadband access. Using this variation in the timing of roll-out of broadband access and information on firm performance in each of these settlements, the team is able to produce a DID estimate of the ITT effect of broadband availability on firm performance

We use a fixed effects specification to control for time-invariant settlement level factors, and use a time dummy to account for time variant factors common to the connected and unconnected settlements. The validity of these estimates is conditional on the assumption that firms in treated and control temis would have exhibited the same time trend in outcomes in the absence of the broadband rollout. We examine the pre-rollout levels and trends in the two groups of temis over the variables of interest to compare them for similarity. To test for the plausibility of the parallel trend assumption, we use time dummies interacted with the treatment indicator between 2006 and 2013, where the treatment indicator takes the value of 1 if a temi received broadband internet between 2010 and 2014, and 0 otherwise.

The data on the roll-out of broadband access from the GNCC allows us to identify which year each settlement received broadband access. Using this variation in the timing of roll-out of broadband access

and information on firm performance in each of these settlements, the ITT effect of the broadband internet on firm performance will be estimated as follows:

$$\overline{y_{st}} = \alpha + c_s + \mu_i + \sum_{t=2}^{T} \gamma_t \delta_t + \beta Treat_{st} Post + \varepsilon_{st} \qquad (2)$$

where $\overline{y_{st}}$ is the mean value of outcome variable in settlement *s* in year *t*, $TreatPost$ is a dummy variable that takes the value of 1 for when broadband internet was made available in settlement $s$, $\delta_t$ are time dummies, $c_s$ are settlement fixed-effects, and $\varepsilon_{st}$ is the error term.

The parameter of interest $\beta$ corresponds to the intention-to-treat (ITT), that is, the effect of broadband availability on the mean value of outcome of interest *y*. Standard errors are clustered at settlement level to account for serial correlation in the error term.

The primary threat to our analysis is the endogeneity of the broadband roll-out. For instance, it may be the case that the Internet Service Providers (ISP) intentionally rolled out to settlements that they thought would benefit more from broadband access than others and perhaps more likely to be on a high-growth path. If this were the case then our estimates would be upwardly biased. Our assumption is that those factors at settlement level that might have driven the program's rollout are time-invariant. Another related concern is about endogeneity of firm placement – i.e. if firms move to settlements in anticipation of broadband availability becoming available. Given that we can observe if a firm in our dataset moved between surveys, we are able to identify the movers and check whether they affect our main findings.

Another potential confounder could be spillover effects, which could lead us to underestimate the impacts if broadband access in one settlement improves outcomes for firms in other settlements. This seems unlikely to us given that we observe very few firms by temi and analyses are carried out at the temi level.

One final potential threat to our identification strategy has to do with endogeneity of firm births during the study period. We do not observe firm's birthdate in our dataset but we do not believe that this would have a meaningful effect in our estimates.

*B) <u>Phase 2: Prospective</u>*

In case of perfect compliance, a simple difference in means will inform the average treatment effect on the treated (ATT)[15]. Our main specification will pool the two rounds of post-intervention data collection and estimate one ATT for each intervention. We call this the 'pooled' model.

$$Y_{it} = \alpha + \theta Y_{i0} + \beta_1 T_{i1} + \beta_2 T_{i2} + Post_2 + \rho S_s + \varepsilon_{it} \qquad (2)\_$$

Where $Y_{it}$ is the outcome of interest of firm i in time t, $Y_{i0}$ is the outcome value at the baseline, $Post_2$ is a time dummy that takes the value of 1 at the endline and zero otherwise, and $S_s$ is a vector of dummies for each stratum *s*. The parameters of interest are $\beta_1$, and $\beta_2$, the ATT of each treatment. In (2) we control for the baseline value of the outcome variable to improve precision (McKenzie 2014), and fixed effects for the levels of stratification that we choose after the baseline survey but prior to randomization.

[15] In an experiment with perfected compliance, all treatment units receive the treatment and nobody in the control receives the intervention. In this case, the average treatment effect (ATE) is identical to the average treatment effect on the treated (ATT). See Gerber and Green (2012).

With take-up most likely lower than 100 percent, we can use the random assignment as an instrument to recover the local average treatment effect (LATE) of each intervention[16]. In this case, the LATE will be estimated in two-stages as follows:

First Stage: $T_{ij} = \alpha + \pi Z_{ij} + u_i$ , for j=1, 2. (3)

where $Z_{ij}$ is a dummy that is equal to 1 if firm i is assigned to treatment *j* and 0 if assigned to the pure control group.

Second Stage: $Y_{it} = \alpha + \theta Y_{i0} + \gamma_1 \widehat{T_{1i}} + \gamma_2 \widehat{T_{2i}} + Post_2 + \varepsilon_{it}$ (4)

where $\widehat{T_{ji}}$ is the predicted take-up into each treatment that explained exclusively by the assignment variable $Z_i$ and $\gamma_1$, and $\gamma_2$ are the LATE of each intervention. As before, ITT estimates can be obtained replacing the treatment dummies $T_{ji}$ by the assignment dummies, $Z_{ij}$ in (4).

If we have sufficient power, we will also estimate a fully interactive model to inform on the short and longer run effects of each intervention. Equation (2) will be re-specified as follows:

$$Y_{it} = \alpha + \theta Y_{i0} + \beta_1 T_{i1} + \beta_2 T_{i2} + \beta_4 T_{i1} Post_2 + \beta_5 T_{i2} Post_2 + Post_2 + \varepsilon_{it}$$

With this specification, $\beta_1$, and $\beta_2$ will provide the impact of each treatment at the midline and are $\beta_4$, and $\beta_5$ will inform whether the impact of each intervention changed at the endline compared to the midline. In case of imperfect compliance, ITT estimates can be obtained replacing

To maximize power for our first question (the impact of e-commerce training on firm performance and demand for high-skilled labor) we will also pool T1 an T2 and estimate our impact using Equation 2, but rather combining $\beta_1$, and $\beta_2$.

Since we are interested in the relative impacts of the two training approaches we will additionally use a variation of Equation 2 to directly compare T1 with T2. However, this will only tell us whether one approach has a larger impact than another, abstracting from cost-effectiveness. To create the appropriate benchmark for the competitive training (T1) to improve upon, we need to ask what proportion of firms the standard training (T2) can support relative to T1 and scaling the impacts accordingly. We'll do this in the following way:

1. After both trainings have been completed, calculate the average *per capita* costs of each training program and find the cost ratio. For example, if it cost 50% more to do standard training on the same number of firms as the number that enter into the competitive training then we have a cost ratio of 1.5 (by definition the cost ratio should be greater than or equal to one since training somebody on all modules should always be less than training them on the expected number of modules they'll competitively reach).

[16] With imperfect one-sided compliance where take-up is different from 100 percent among the treated, the LATE is equivalent to the ATT. See Duflo et al. (2008) and Gerber and Green (2012).

2. We can interpret the above in a budget constrained world as equivalent to the equalized-budget choice between offering two thirds of firms (1/1.5) the standard training and providing nothing to the remaining third, or alternatively providing all firms with the competitive training.
3. Therefore, for direct comparison across groups, we can "dilute" the standard training impact by including the number of non-treated firms equivalent to the cost ratio. This can be drawn from our control group.

A practical example using our current sample size estimates is as follows

1. Estimate cost ratio to be 1.5
2. With a sample of 500 for the standard training, this means that the same budget could have provided 750 firms with the competitive training.
3. Randomly draw 250 firms from the control group and include in the standard training treatment to create T2`
4. Compare T1 to T2` using a variation of Equation 2 to estimate the cost efficiency of using the competitive approach to the standard training approach across the outcomes of interest.

The benefit of this approach is that we will not need to estimate cost ratios between the two training programs prior to intervention rollout to determine sample size. As long as the cost ratio is less than 2, there will be enough control sample to conduct the analysis described above[17].

***Threats to validity***

There are at least two important threats to validity in the experimental design: (i) spillovers and (ii) differential selection into training treatments.

*Spillovers:* If helping a firm become more active in e-commerce provides it with a competitive advantage over other firms, this may lead to a form of market-stealing. This would be a displacement effect eading us to overestimate the impacts of the programs. Training and "learning through observation" spillovers may also occur, where untreated firms learn the activities taught to treatment firms by observing what they do, or having the learning content actively shared among firms. This would be a positive externality that leads us to underestimate the program impact. As such, the direction of bias created by spillovers is ambiguous. The first form of spillover is likely to be most prevalent within sectors or business products/services. The second form of spillover is likely to be most prevalent within geographical clusters. Thus, to avoid both spillover threats we would need to cluster at both the business product/service and geographic level which will not be practical from a sample size perspective. Instead we address the market-stealing concern through a careful review of the data, and the knowledge spillover concern through a careful design of the intervention.

Our prior is that this intervention will have very small if any market stealing effects. Since the firms we are dealing with are mostly small scale businesses and even if they grow substantially, they are always likely

[17] A cost ratio of 2 means we would need an equal number of control observations as T2 observations to "dilute" T2's effect, which is what we currently have in the proposed sampling plan. We would not have a large enough control group for appropriate dilution if the ratio is greater than 2.

to be price takers and unlikely to influence demand through their supply. This would be particularly true for sales outside of their locality (which few businesses at baseline are likely to be doing anyway). As such, our impact measures on sales will be broken down by location (local, regional, national, international), where we anticipate sales other than local sales to be unaffected by supply shocks. We may be concerned at the local level since, in cases of limited demand and few suppliers, we may more easily imagine improved supply from trained firms to directly affect demand for non-trained firms goods and services. However, the value of e-commerce training is precisely to expand the customer base outside of firms' local areas.

For the potential spillover of training, we are designing the intervention to be focused primarily on a "learning-by-doing" approach where firms get assigned activities and then get feedback on their particular efforts in a more individualized way than a simple transfer of information. As such, the training benefits are expected to come through the interaction with skilled trainers able to address particular challenges the firm faces in completing their task or starting a new one. The sessions will be interactive and computer-based. This makes it unlikely that a treated firm could transfer knowledge to a control firm in a meaningful way. We will also ensure that, through the first "light training" to select firms into our group, all control firms will be provided with the basic information that will be taught in the in-depth training, but without the hands-on support. This light training will be designed to have the content that could reasonably be transferred from one business to another within a locality as a knowledge spillover.

*Differential take up:* The second threat is that although we will randomize groups into T1 and T2, because of imperfect takeup, we may find differential overall take up in one group over another, or possibly differential composition of takeup if different types of firms are interested in the standard vs. competitive training. For instance, firms opting out of the competitive training may be more risk averse or have lower ability than those that opt out of the standard training. This would not affect the validity of our results, but could influence their interpretation. For instance, it could be that all of the differential impact is driven by initial self-selection into the training programs rather than the format of the training itself which may confound some of the hypothesized mechanisms. We will start by formally testing for differential selection by collecting baseline data that we hypothesize could explain selection – risk aversion and perceived ability. If we find strong selection in some observable characteristics, we will then include these as baseline covariates when estimating point estimates in Equation 2 to assess whether treatment is mediated by these factors or not and, by doing so, better explain the potential mechanism for impact (whether or not it is partly driven by initial selection into the training among those assigned).

## 9. Study Limitations and Risks

There are 4 important risks: (i) project risk; (ii) heterogeneity in treatment and treatment quality; (iii) take up; and (iv) internal validity risks (namely spillovers). The internal validity risks have been described at length in the previous section.

*Project risk:* The project has undergone significant changes over the past year, necessitating changes to the concept note and overall design. This is in part to do with a shifting demand from the Georgian

Government to ensure the program is aligned with other government programs. Georgia has recently held elections which means that the current administration is expected to provide some political certainty over the duration of this impact evaluation moving forward. One particular risk is that the budget being approved for release within the Government is lower than what the World Bank project had anticipated. This affects the impact evaluation by only being able to implement the "light training" during this calendar year, with the remaining funds for the in-depth training only being released next year. While this generates some uncertainty, the team is confident it will move forward as planned.

*Heterogeneity in treatment and treatment quality:* Since this is a training activity, it comes with more heterogeneity and reliance on delivery modes than other more standardized interventions like financial transfers. To mitigate this concern, all trainers will be trained in a common location and we will develop monitoring tools to assess the training quality (e.g. from participant feedback). Since this is an effectiveness intervention, we believe the variation in treatment quality across locations is part of what should be evaluated, since we are interested in seeing what type of impact can be achieved in a real setting. However, by having more detailed monitoring / implementation quality data we will be able to better contextualize results.

*Take up:* We take careful steps to address this by filtering out uninterested firms through the light training event . We also include 2 rounds of post-intervention survey data to increase precision given the setting of having a fixed number of treatment firms to use for the pilot experiment.

## 10. Policy Relevance and Impact

Given that the broader IE team consists of World Bank project team members and Government counterparts, we expect the work will feed continuously into operational decision making, starting with the *ex post* evaluation, and followed by lessons from the baseline and early-stage take up and overall impact evaluation results. The lack of evidence in the area, and high priority that the Georgian government has placed on fostering innovation also helps to ensure that the value of the evidence will reach beyond project-level learning. We expect the work will influence the following 3 dimensions:

**Project-level influence:**
The impact evaluation is being designed as a pilot study of the larger expansion of the "Broadband for Development" program that will reach 3000 MSMEs. The IE is being integrated into the project planning from the start to ensure that evidence that is generated is timely and relevant. Evidence from the first stage *ex post* study will provide evidence on the aggregate impacts of broadband availability and whether there are heterogeneous impacts, larger on some firms than on others. The early-stage evidence of the prospective IE will provide important operational and empirical lessons: the IE team will work closely with operations to ensure a smooth rollout of the program so that future rollout mitigates implementation challenges, and the lessons learnt on initial take up (proportion of firms actually induced into taking on new ICT investments) will provide evidence to the project team to the design of the program if appropriate. A number of similar programs are also being planned in the region with support of the WBG

(e.g. Western Balkans). The evidence will help inform lending operations and facilitate policy dialog in these projects and countries.

**National policy influence:**
Final results will then provide broader relevance outside of the specific project. As GITA establishes itself further and begins to identify the value in its various activities aimed at improving innovation, they will be faced with decisions about where to focus their support. The evidence from this work will provide evidence on (i) the impact of broadband availability on firm growth, (ii) whether providing e-commerce training and increasing firms' online presence enables them to find new buyers and grow; and (iii) whether training approaches that incorporate a competitive element to allocating resources can be more effective than more standard approaches.. As OpenNet expands to the remaining 2000 unconnected settlements in the coming years, GITA will be armed with evidence to support and guide their investment decisions in these previously under-served areas. In so doing, the program of work will feed directly into Georgia's National Innovation Strategy.

**Global research influence:**
Beyond local stakeholders, the evidence generated will be useful as a direct empirical address to the WDR16 recommendations. The marginal value of the evidence for the WDR and broader ICT for Development community is likely to be high given that there is currently no experimental evidence on the effect of broadband access and the benefits of providing targeted support to reduce search and screening costs as a way to enable firms to access new markets. Finally, the work will complement an ongoing ESW that explores the link between jobs and technology.

## 11. Dissemination Plan

**In-country dissemination**

Work on the impact evaluation is expected to provide inputs into the design of the specific Broadband for Development component of the joint GITA-WB GeNIE project and also have implications for other components of the GeNIE. Consequently, the impact evaluation and project teams will organize dissemination workshops for the implementing partners GITA, OpenNet and the Ministry of Sustainable Development of Georgia corresponding to each milestone of the Impact Evaluation. A total of five local workshops are planned. A first dissemination workshop with implementing agencies will be planned at the end of the first-stage ex-post study in order to share the results from the study and the implications for the intervention and the design of the second-stage RCT. Following development of the design of the intervention and evaluation, another dissemination event will be planned prior to implementation to get agreement and build capacity on the implementation of the intervention. At the end of the implementation period, a workshop will be planned with information on the intervention and to share results from the baseline data collection exercise. One more workshop is planned for dissemination of short term results after the conclusion of the first follow-up data collection exercises. The Impact Evaluation team and project team will also organize a final workshop at the end of the second follow-up data collection exercise, corresponding to the end of the impact evaluation with a broader audience

including other relevant ministries and national agencies such as the Georgia National Communications Agency, regional and local governments and regional agencies, and with relevant members of the private sector, such as national and regional internet service providers.

**Global dissemination**

Since the results of the Impact Evaluation also carry useful lessons for the World Bank and the larger 'ICT for development' forum, including organization such as the International Telecommunications Union. Four dissemination events are planned for such fora at the end of the Impact Evaluation. Within the World Bank, BBLs and/or working sessions are planned for internal dissemination after each milestone with the Trade and Competitiveness Global Practice, the ICT Global Practice and the Development Economics Research Group. In addition, dissemination events are planned at academic institutions and academic conferences in order to ensure wider dissemination into research. Finally, the initial work will be presented at a conference for e-commerce and jobs planned for end 2016, at which point the first stage results will be shared and inputs for the second stage will be gathered.

## 12. Evaluation Team

**Project Team**

| Position | Name | Institution | Email |
|---|---|---|---|
| Project TTL | Tom Haven | WBG | thaven@worldbank.org |
| Project Co-TTL | Siddhartha Raja | WBG | sraja2@worldbank.org |
| Team Member | Nikola Kojucharov | WBG | nkojucharov@worldbank.org |
| ICT Technical lead | Natalija Gelvanovska | WBG | ngelvanovska@worldbank.org |
| Co-PI/Researcher/IE TTL | Aidan Coville | WBG | acoville@worldbank.org |
| Co-PI/Researcher | Caio Piza | WBG | caiopiza@worldbank.org |
| Co-PI/Researcher | Adam Osman | University of Illinois | aosman@illinois.edu |
| Research Assistant | Chloe Fernandez | WBG | cfernandez2@worldbank.org |

| | | | |
|---|---|---|---|
| Impact evaluation field coordinator<br><br>Head of International Relations Department | Natalia Tsavidze<br><br>Mariam Lashkhi | WBG<br><br>Georgia's Innovation and Technology Agency | ntsavidze@worldbank.org<br><br>mlaskhi@gita.gove.ge |
| GenIE BfD project coordinator<br><br>GenIE Program Coordinator<br><br>Monitoring & Evaluation Specialist | Tornike Jobava<br><br>Besarion Abuladze<br><br>Maka Dakhundaridze | GeNIE PMU<br><br>GeNIE PMU<br><br>Georgia's Innovation and Technology Agency | tjobava@gita.gov.ge<br><br>babuladze@gita.gov.ge<br><br>mdakhundaridze@gita.gov.ge |

## 13.Milestones, Deliverables, and Timeline

| Milestones | Deliverables | Completion Date |
|---|---|---|
| **Milestones** | **Deliverables** | **Completion Date** |
| Concept Note | Note (including budget and timeline) | Feb 2017 |
| Ex-post Study | Data, do files<br><br>Data analysis Note | Feb 2017 |
| Program pilot | Take up assessment<br><br>Update of training modules<br><br>Update of awareness campaign | April/May 2017 |
| Light training and baseline data collection | Survey firm terms of reference<br><br>Questionnaire and surveyor's manual | July - Dec 2017 |

| | | |
|---|---|---|
| | Field procedures<br><br>Data protocols<br><br>Randomized selection of firms | |
| Baseline analysis | Database file and Do files<br><br>Data analysis note (baseline report)<br><br>Baseline dissemination conference and ppt | Feb 2018 |
| Intervention monitoring (in-depth competitive and standard training) | Rollout plan<br><br>Monitoring reports verifying treatment and control status<br><br>Implementation report<br><br>Implementation conference and ppt | Jan - Dec 2018 |
| First follow-up data collection | Survey firm terms of reference<br><br>Questionnaire and surveyor's manual<br><br>Field procedures<br><br>Data protocols | Dec 2018 |
| Follow-up analysis | Database file and Do files<br><br>Data analysis note (baseline report)<br><br>midline dissemination conference and ppt | April 2019 |
| Second follow-up data collection | Survey firm terms of reference<br><br>Questionnaire and surveyor's manual<br><br>Field procedures<br><br>Data protocols | Oct 2019 |
| Final analysis | Data analysis note<br><br>Policy note, including cost-effectiveness of arms<br><br>Data file and Do files | Dec 2019 |

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| | final dissemination conference and ppt | |

## 14. References

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