



How are Development Interventions in Agriculture Value Chains Financed?

An Exploration of Macro and Meso Level Factors

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List of Acronyms

DAC	Development Assistance Committee
DANIDA	Danish International Development Agency
EBRD	European Bank for Reconstruction and Development
ECA	Eastern Europe and Central Asia
EDB	Ease of Doing Business
FAO	(United Nations) Food and Agriculture Organization
GCI	Global Competitiveness Index
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ISS	Institute of Social Studies
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
SAP	Structural Adjustment Program
SDC	Swiss Agency for Development Cooperation
SHF	Small Holder Farmer
SIDA	Swedish International Development Cooperation Agency
SPSS	Statistical Product and Service Solutions (formally Statistical Package for Social Sciences)
USAID	United States Agency for International Development
VC	Value Chain
VCF	Value Chain Finance

Abstract

This paper develops and tests hypotheses that influence the choice of financing instruments that are used in agricultural value chain development interventions. Using data from ninety-four agricultural value chain interventions in developing countries, the research explores macro-economic variables, namely financial market sophistication, business regulatory environment and level of economic development. As well, as variables at the meso-economic level such as type of upgrade, stage of intervention, main intervener, source of funds, end market, institutional structure, the next process that the product feeds into, type of product and time of the intervention.

The study focuses on exploring the underlying conditions of the value chains to establish whether an association exists with different financing modalities, that is, the use of asset based finance, group collateral based finance and grants/subsidies. Evidence from these ninety-four value chains showed minimal influence of macro level factors, possibly due to a long relationship link. Instead, select meso-economic factors showed association with the finance instruments, especially with grants and subsidies. These findings suggest that innovative and heterogeneous forms of value chain finance, especially asset based finance, are more adaptable to a range of external and internal value chain conditions.

Relevance to Development Studies

As financial flows to agriculture in developing countries have seen a gradual decline following Structural Adjustment Programmes and dwindling donor assistance, the question of finding alternative sources of agriculture finance has gained more significance.

This exploratory study identifies potential explanatory factors for the variation in the use of value chain finance instruments. It is a step towards understanding conditions under which value chain finance instruments are used based on empirical evidence.

The findings therefore contribute to identifying factors that may be considered when making decisions about financing of value chain interventions. The implication of these findings for designing value chain interventions is that the value chain approach, with its networks and innovative finance, may be able to circumvent some of the conditional requirements thus enabling small holder farmers to access finance.

Ultimately this paper makes a contribution to discussions on increasing financial flows to the agriculture sector in developing countries.

Keywords

Value chain, value chain finance, asset based finance, group collateral financing, grants and subsidies.

1 Introduction

Since the 1990s, agricultural value chains have risen in prominence as an effective tool to increase the competitiveness of otherwise fragmented, small holder farmers (SHF) in a sector that is increasingly dominated by large agribusinesses (Barry and Robison 2001, Miller and Jones 2010). Coinciding with, and perhaps facilitating, the growth of agricultural value chains was an increasing demand for high value products such as fruits and vegetables from developing countries in both domestic and export markets (Swinnen and Maertens 2010).

Because the agricultural sector employs the bulk of poor people worldwide (Harriss-White 2010, Miller and Jones 2010, Wenner et al. 2007), agricultural value chains are therefore an important support to economic development. Agriculture employs 60% of Sub-Saharan Africa's workforce and one third of the world's total workforce (FAO 2012).

If one agrees that the biggest problem for small-scale actors in agriculture is not being small but being isolated, then the importance of networks that are formed under the value chain approach becomes more evident. Kaplinsky and Morris (2001:4) describe a value chain as:

“...the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use.”

One of these activities involves financing the value adding processes at each stage of the chain and is the focus of this paper.

1.1 Greater Access to Finance through Value Chain Connections

Investment in agriculture is critical given its relevance to the welfare of the poor. However, government spending as well as Official Development Assistance (ODA) on agriculture in developing countries has shown a downward trend since the 1980's (FAO 2012).

It is within this context that innovative value chain finance is designed to overcome the funding gaps that are identified with the agriculture sector. The use of orthodox financing combined with non-conventional risk management techniques comprises the special classification of value chain finance (VCF). The viability of the entire chain is considered when sourcing funds from chain members (direct finance) or from non-chain actors (indirect finance) such as financial institutes (Miller and Jones 2010, Johnston and Meyer 2008). The comprehensive VCF approach is thus distinguished from conventional agriculture finance which is mainly concerned with the credit worthiness of an individual farmer or agribusiness.

Studies highlight small holder farmers' improved access to finance by virtue of belonging to a value chain and hence tapping into the chain's networks. For example, in a Central American context, Gonzalez-Vega et al. (2007) found that linkages with supermarkets gave SHFs a guaranteed market which improved their perceived and real credit worthiness. Additional spill-overs for the farmers included stable cash payments at predictable intervals which enhanced their cash-flow. This greater attractiveness in turn facilitated their access to finance from formal financial service providers (Swinnen and Maertens 2010).

A drawback of VCF points to the channelling of finance only to activities pertaining to the chain's product while neglecting funds that are needed for non-farm activities. However, some evidence indicates that farmers who are part of a value chain may also access microloans for critical personal needs. For instance, in a value chain supplying breweries in Sierra Leone, microloans of between USD10 to USD30 were disbursed to sorghum SHFs to help them survive the 'hungry season'- the time just before harvest and selling of their farm produce (personal communication Henk Knipscheer, EU Cord).

Moreover, farmers connected to value chains overcome barriers to accessing finance such as the lack of adequate collateral and credit history. In fact, in a sample of regulated financial institutes in Latin America, thirty-nine percent insisted on their clients' membership in a value chain as a condition for receiving a loan (Wenner et al. 2007). Likewise, in Senegal horticulture farmers who had export contracts attained more than double the amount of credit from importers than stand-alone farmers did from formal and informal sources of funding (Maertens et al. 2007).

Hence, on the whole there is general recognition of the benefits of increased access to direct and indirect finance for SHFs who are connected to value chains. However, less is known about the factors that influence the type of financing that is eventually used in value chain interventions. What conditions influence the type of finance instruments used? This paper presents a hypothesis that there are variables that determine the use of a VCF instrument and therefore seeks to identify them.

1.2 Research Objective and Questions

Qualitative studies provide insight into factors that influence the type of finance that is used in value chains. In Uganda, Johnston and Meyer (2008) concluded that a hierarchically governed chain provided favourable conditions for lead firms to offer credit to their suppliers. Such arrangements are also featured in "captive chains"- so called because the costs of switching to new buyers are high enough to deter producers from doing so (Gereffi et al. 2005).

Equally important was the type of product. Sugar cane processing is a specialized activity hence the few sugar processors had tighter control over the chain. The problem of side selling- that is farmers selling to traders other than their contracted buyer- was therefore avoided making it attractive for the lead firm to offer credit. And so a combination of differentiated product and hierarchical governance structure was amenable to direct VCF.

Expanding focus from direct finance to also include indirect finance and covering a bigger geographic area, Winn et al. (2009) found that the type of finance used in East Europe and Central Asian (ECA) countries that were in transition from command to market economies was correlated to the level of economic development of the country. Consequently, more sophisticated forms of finance were found in ECA countries that had a higher Gross Domestic Product (GDP) per capita.

As a result, the objective of this paper is to advance this knowledge by exploring both macro-economic and meso-economic determinants of agricultural VCF over a wider geographic area- in developing countries. With aid and government funding to agriculture dwindling, it is pertinent to find alternative sources of funding. Hence, this research contributes towards steps of understanding the conditions, if any, that determine the use of value chain finance instruments.

The main research question was:

1. What factors determine the type of finance that is used in value chain interventions?

The following sub-questions helped to answer the main question:

- a) What financing instruments were used in value chain interventions?
- b) Is there a statistically significant association between the finance instruments that were used and the chain's internal conditions, specifically institutional arrangement, end market, type of product, type of intervener, stage of intervention, type of upgrade, source of funds or the time the intervention occurred?
- c) Is there a statistically significant association between the finance instruments that were used and macro-economic variables, namely the level of economic development, financial sector sophistication and the business environment?

The rest of the paper is arranged as follows:

Chapter 2 begins with a background to the decline of both governments' role in agriculture and that of donor funds to developing countries and the subsequent creation of a financing gap. An analysis of the conditions, as they are presented in literature, for value chain finance instruments together with the expected role of identified factors on determining the use of VCF instruments follows. The chapter concludes with a discussion of the subsequent implications for designing value chain interventions.

Chapter 3 outlines the methodology that was used in this three-part study. Firstly, the internet was used as a source of data on value chain interventions and their financing mechanisms because of its wide geographic and temporal coverage. Then interviews were conducted with value chain practitioners to augment information from websites and to capture the factors that influenced their decision to use a type of finance. Explanatory variables were formulated from these perspectives and from the complementary conditions identified in

literature (chapter 2). Finally, these variables were then tested for a statistically significant relationship with VCF instruments using Pearson's chi square test.

Findings from case studies of ninety-four value chain interventions covering forty-three countries are presented in Chapter 4 showing that macro-economic variables largely had limited association with the VCF instruments that were used. Instead, meso-economic variables were more influential and largely on the use of grants and subsidies. Hence analysis and reflection upon the findings as presented in Chapter 5 leads to a hypothesis that innovative value chain finance may be able to circumvent some conditions with internal or sector conditions being relatively more influential on the type of financing that is used.

1.3 Limitations

A caveat in this study stems from the complexity of inter relatedness, that is, nothing occurs in isolation. Although the variables are presented and tested separately, they may in fact act simultaneously with their synergies producing a different effect. Similarly value chain finance instruments are not necessarily used exclusively. Nonetheless this abstract approach simplified analysis while also noting this limitation.

It was anticipated that finance may be considered a confidential matter and would therefore not be detailed on the public websites. Hence, challenges in obtaining sufficient financing information, either from the organizations' websites or interviews, meant that some value chains could not be included in this study.

Furthermore, the lack of a database of the full population of value chain interventions meant it was impossible to ascertain an appropriate sample size. Hence although the final sample of 94 value chains is not comprehensive and may not be representative, it is nonetheless illustrative. And the extensive search on the internet may provide some justification for cautious extrapolation of the findings (external validity).

In addition, variables that were tested were not exhaustive but were nonetheless useful.

Also, the term 'value chain' is sometimes used interchangeably with 'supply chain'. Hence while this study selected projects that identified themselves under 'value chains', an error of omission may exist as some 'supply chain' projects that in fact practised the value chain approach were excluded.

Finally, this study focused on identifying the existence of a relationship between value chain finance instruments and the conditions under which they were used. A further study would be needed to establish the direction and magnitude of that relationship and thereby measure which variables have greater or less influence on value chain financing modalities.

2 The role of Macro- and Meso-economic factors in Agricultural Value Chain Financing

2.1 From state-centred finance to a vacuum

Prior to Structural Adjustment Programmes (SAP) that began in the 1980's in developing countries (Yumkella 2011), the state dominated credit provision to the agriculture sector in the form of cash and subsidized inputs such as fertilizer and seed (Ruotsi 2003). In addition, state run marketing boards consolidated and exported agricultural produce from the individual farmers. Producers were assured of a buyer in the form of the state and correspondingly, the state benefited by setting local prices for agricultural commodities and thus profiting from the export price differential.

Whereas the state had successfully created a hierarchically integrated agricultural value chain, occasionally it was unfortunately used by politicians to gain votes by cancelling farmers' debt with the result of discouraging a culture of credit repayment. Jessop et al. (2012) report incidents of debt forgiveness as a part of election campaigns in Albania, Senegal, Thailand, India and Pakistan amongst other countries. This, together with heavy subsidies for farm inputs inevitably led to losses that drained fiscal budgets (Bookstein and Lawson 2002, Fries and Akin 2004).

Nonetheless, the timely but excessively rapid withdrawal of this sometimes inefficient institutional arrangement, also inadvertently resulted in a critical gap in agriculture financing (Jessop et al. 2012, Johnston and Meyer 2008, Ruotsi 2003). In Mozambique, credit to the agricultural sector fell by more than two-thirds to less than \$50 million between 1990 and 1995 even as input costs were also rising (Bookstein and Lawson 2002).

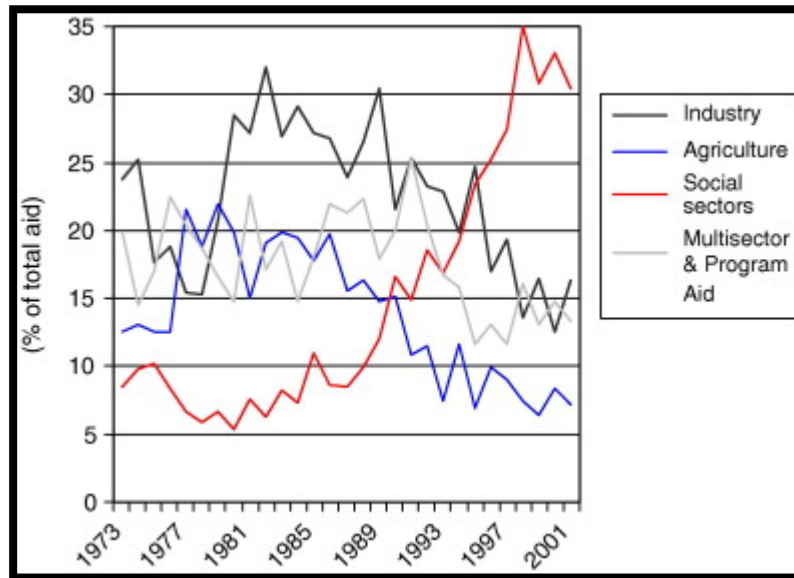
Compounding the situation has been the gradual decline in donor funding for development and to agriculture in particular. According to the Organization for Economic Cooperation and Development (OECD) (2009), Development Assistance Committee (DAC) member countries reduced aid to agriculture in real terms from 17% of total official development assistance in the 1980's to only 6% by 2007-2008.

In his paper assessing aid for agriculture in Africa, Carl Eicher (2003) plausibly attributes part of the decline in aid to Non-Governmental Organizations (NGO) calling for a change in focus from sector specific aid to general and more "people orientated" community development aid programs. In addition, the inefficiencies and consequent negative image of state-run agriculture alluded to above did not favour increasing aid to the sector.

Furthermore, in the development discourse there was also a change of emphasis away from economic development to social development under the influence of human development thinking and subsequently the Millennium Development Goals (Bezemer and Headey 2008).

So education, health and community development competed successfully for a greater donor share (Figure 2-1). Ultimately the importance of agriculture was downgraded and with it funding for its development.

Figure 2-1 Composition of Foreign Aid, all countries: 1973-2001



Source: (Bezemer and Headey 2008: 1351)

The shortage of agricultural financing became more pronounced as the private sector failed to provide the expected investment in agricultural extension, credit and marketing services (Miller and Jones 2010, Swinnen and Maertens 2010). What is more, banks requested collateral that SHFs did not have.

Johnston and Meyer (2008) rightly point out that SAP and the accompanying financial market liberalization in developing countries have not satisfactorily expanded rural agricultural financial services. Moreover, in spite of SAP there was little expansion of the private banking sector.

Likewise, the end of the centrally planned economies in the former Soviet Union states and the shift to a market system actually reduced agricultural financing instead of the expectation to increase it (Winn, et al. 2009). In the Kyrgyz Republic, for example, the Food and Agriculture Organization (FAO) and the European Bank for Reconstruction and Development (EBRD) (as cited in Winn, et al. 2009:9) found that market failure in rural credit and input markets hindered the provision of finance.

Similarly, microfinance providers proved inadequate because of their relatively limited product range of small and short term loans that did not meet the diverse needs of farmers and agribusinesses. For instance mismatches occurred between the time of loan maturity and seasonal incomes of farmers (Miller and Jones 2010, van Empel 2010). And similar to banks, their outreach was disappointingly more urban than rural market focused (Fries and Akin 2004).

Hence, paradoxically, the state-run system, despite its shortcomings, partially illustrated its potential usefulness for the provision of finance to numerous

SHFs. But, this is not to advocate that the agriculture sector return to the state led arrangement. Besides markets having changed significantly since the 1980s, under that system, it appears that the state took on much more costly risk from produce failure and the subsequent inability of farmers to repay loans than it could afford and certainly more than the private sector is willing or able to take.

These risks and costs associated with agriculture discourage financial investments in the sector. In developing countries covariate risks such as adverse weather or disease are not easily covered and so do not seem profitable to insurance companies (Fries and Akin 2004, Wenner et al. 2007). Also, additional costs are incurred when serving several SHFs who conduct many small transactions. The remote location of SHFs and poor infrastructure add to the costs of setting up branches in rural areas. As well, SHFs lack both collateral and a credit history. Hence, all this points to the neglect of agriculture by financial service providers (Jessop et al. 2012, Quirós 2006).

Instead, this paper emphasizes that the value chain approach significantly reduces the risks and costs of financing agricultural investments by connecting all the actors into a ‘supply and demand’ interlink. Therefore, under this arrangement, SHFs can be expected to utilise these connections with more credit-worthy chain members in order to access finance. Furthermore assured demand from buyers, for example under contract farming arrangements, gives predictable cash flows which can be used to leverage access to credit.

Hence, although the private sector has not delivered on increasing the outreach of finance, it has provided innovative financing. Also private sector actors appear to be better skilled to specialize in developing innovative finance instruments since they have better knowledge of their business than the government. A range of innovative finance has been developed whereas government appears to have only offered a limited product range of cash and input advances.

Having established the importance of a ‘supply and demand’ value chain approach, two questions emerge. What innovative financing instruments are used in value chains? And under what conditions are the different instruments used? Understanding the operating environment of the innovative VCF instruments is ultimately expected to increase the flow of finance to rural agriculture, hence the relevance of this study.

This chapter proceeds with a discussion on the requirements for using the various value chain finance instruments (presented in order of increasing sophistication as measured by their need for legislation, infrastructure and specialist service providers). An assessment of the role of macro and meso-economic factors on VCF follows. The chapter concludes with an analysis of the subsequent implications of these conditions for value chain interventions.

2.2 Conditions for Agricultural Value Chain Finance Instruments

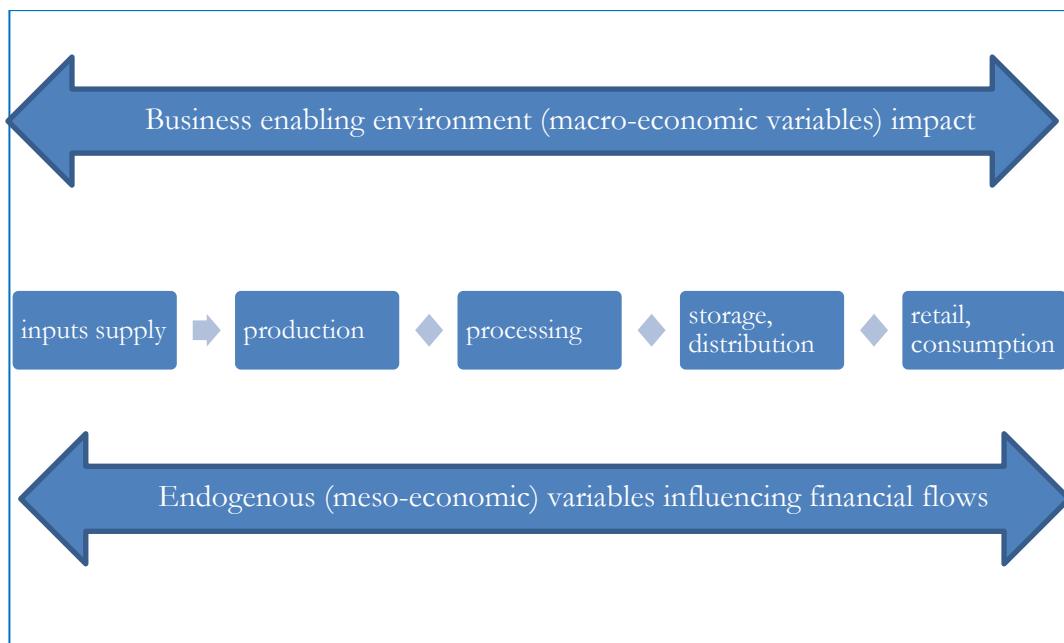
Value chain finance (VCF) includes financial products and services that come from within the chain-direct finance- and those that flow from non-chain actors- indirect finance (Fries 2007). Funds for the various value adding steps

along the chain are made available by virtue of being part of the value chain (Gonzalez-Vega et al. 2007).

Value chain finance takes a demand-led approach since the financial flows are structured (structured finance) to the needs of the chain actors (Winn, et al. 2009). In comparison, Miller (2008) notes that conventional bank finance is less adaptable and supplies only a rigid portfolio of products. Therefore because of its greater flexibility, VCF potentially offers more financing packages for SHFs than traditional financing.

Also value chain finance emphasizes the performance of processes across the whole chain instead of the characteristics of individual actors (Figure 2-2). Hence, risks are shared, with weaker actors such as small holder farmers (SHF) piggy-backing on their more creditworthy partners, such as processors or retailers (Miller and Da Silva 2007, Winn, et al. 2009).

Figure 2-2 Financial Flows along the Value Chain Processes



Source: Adapted from (Miller and Da Silva 2007: 97)

Another strength of VCF especially in the context of SHFs is its use of current assets, such as purchase contracts from reputable buyers, as collateral in place of land which SHFs usually own communally or not at all. Besides this, land being more suited for long term investment financing, may not be an efficient form of collateral to use in the first place for the kind of short term credit that SHFs frequently need for inputs and hiring seasonal labour. Therefore, VCF gives SHFs access to finance when they need it and that matches the resources that they have available for collateral.

Whilst the different value chain finance instruments are well documented (see for example: Miller and Jones 2010, Jessop et al. 2012), less has been studied about explanatory factors for the variation in the types of instruments that are used.

This paper begins with an assumption that there are determining factors which influence the type of financing instruments that are used in value chains (Figure 2-2) and that they must be in place to support the use of a financing instrument. A case in point is legislation as was illustrated by Bulgarian banks' insistence on fixed collateral from farmers despite the government's efforts to introduce crop output as an alternative form of collateral. Lack of supporting legislation hindered the government's effort (Swinnen and Gow 1999). Therefore when supportive regulation only follows after practice, it may delay the uptake of innovations. But are pre-conditions as important in the case of value chains with their cooperative relationships and interlinks that reduce risks and costs?

The following classification is adapted from Miller and Jones (2010).

2.2.1 Product Financing (Relationship based)

Strong links within the chain are vital for financing that is relationship based, namely input supplier credit, producer credit and marketing company credit (Miller and Jones 2010). These most basic financing mechanisms rely mainly on trust, informal agreements and mutual benefits between the buyers and sellers and can therefore be expected even in less sophisticated financial systems.

Input suppliers provide VCF when they opt for delayed payments in order to secure a market for their goods. Even though farmers may pay a higher price, they are nevertheless able to access inputs even when their cash is low.

Producers also provide credit by agreeing to receive delayed payments from processors or traders in order to secure a market for their produce. Traders and processors in turn usually have better knowledge about and access to final markets than farmers who are located in remote areas.

Credit from marketing companies is closely linked to producer credit wherein producers and traders build a mutually beneficial relationship. Marketing companies may have better access to bank finance than farmers. In a system of interlinked credit, they pass this credit on to farmers who in turn repay in kind or by accepting delayed payments. The price of goods is consequently set in relation to the cost of credit (Casaburi and Reed 2013).

A slightly more sophisticated form of relationship based finance involves a more formal relationship through contract farming. Using its own reserves or credit from formal financial institutes, a lead firm may extend credit to its contracted SHFs. For example, in order to secure supply of a critical ingredient-black soybeans- Unilever Indonesia provided its contract farmers with a full package of training, technical assistance and inputs (Clay 2005).

Whereas informal relationships rely on trust, the state of the legal environment is important to enforce formal contracts to prevent side selling before the sponsoring lead firm has earned a return on investments made on the farmers (Winn, et al. 2009). Contract enforcement is also necessary to protect the farmers. In Uganda, Johnston and Meyer (2008) found that when a buyer reneged on buying the produce, farmers not only lost a market but also financing was disrupted.

However, it remains difficult to take legal action against SHFs (Winn, et al. 2009). Swinnen and Maertens (2010) note that developing countries especially face the problem of enforcing contracts due to weak institutions.

On the whole relationship based finance can be expected even in countries with less developed financial markets due to its relatively fewer and less stringent requirements. It assumes that (self-) selection in establishing relationships is effective in screening out potentially bad debts.

2.2.2 Receivables based Financing

Confirmed future cash flows are the basis of receivables financing. Emphasis is placed on the buyer's solvency and credit history and therefore ability and willingness to pay for the goods. Receivables can be used in three ways namely purchase order finance, factoring or forfaiting (Miller and Jones 2010).

A purchase order from a creditworthy buyer may be used as collateral for a working capital loan. The prerequisite for purchase order collateral is legislation that gives the lender permission to self-liquidate the loan as a risk mitigating measure. In addition, the lender needs rights to access financial accounts in order to assess a buyer's creditworthiness (USAID. 2009).

In contrast to attaining a loan, an agri-business such as a processor may sell its accounts receivables at a discount but with immediate payment from a factor agency that will then collect the receivables directly from the debtor when they are due. The introduction of the factor, a specialised financing company, adds complexity to this form of financing.

However, counter intuitively, factoring can be used in relatively less developed legal environments than other asset based finance instruments since receivables are sold and not used for loans. Therefore, it appears that it does not require additional special laws than are required for the basic functioning and regulation of a financial system except to allow buying and selling of receivables and to prevent fraud such as selling of fake receivables. Also, factors should have a legal right to access information about buyers' creditworthiness (Strauss 2005).

Reverse factoring is a stricter variation of ordinary factoring in which only receivables from highly credible buyers are sold. Electronic reverse factoring used by Mexico's State Development Bank- Nacional Financiera (Nafin) improves the speed and efficiency of the process. Its supportive legislation includes Electronic Signature and Security laws that recognize electronic data and transactions equally as physical documents (USAID. 2009, Winn, et al. 2009).

Forfaiting is a similar process of selling receivables that is used by exporters in place of factoring. A specialized forfaiting agency purchases the complex receivables such as letters of credit and bills of exchange (Winn, et al. 2009).

In sum, receivables require a legal environment that enables access to information about the creditworthiness of a buyer. Factoring and forfaiting also require a specialised third party that intermediates between the buyer and seller.

2.2.3 Physical Goods Collateralization

Whereas formal and informal relationships between buyers and sellers, and future cash flows from credible buyers are used to access VCF in product and

receivables financing respectively, physical goods can also be used as collateral to secure loans under leases, repurchase agreements and warehouse receipts (Miller and Jones 2010).

Miller and Jones (2010) note that in financial lease purchasing, the physical good such as machinery or a vehicle, remains in the possession of the lessor until the lessee has paid all instalments. In that way it can be repossessed if the lessee defaults on payments. Meanwhile the lessee carries all maintenance costs but benefits from using the asset without having to make a huge once-off purchase. Jessop et al. (2012) note that a legal environment that facilitates repossession is key as well as a second hand market for the goods.

With repurchase agreements, a supplier sells a commodity but commits to buy it back later at a pre-set price. A credible futures market increases the transparency of repurchase agreements as futures prices may be used in the agreement. On infrastructural requirements, commodities must be stored in secure and credible warehouses.

Similarly, warehouse receipting requires licenced warehouses that are capable of inspecting and grading the goods accurately so that loans are priced according to the appropriate value of the goods (USAID. 2009). Farmers can then use the warehouse receipts, which are proof of stored goods, as collateral for loans.

Fries and Akin (2004) note that for the system to be credible, the legal environment must recognize warehouse receipts as valid collateral. One of the most comprehensive legal frameworks for warehouse receipts is found in the United States of America (USA). The Warehousing Act of 1916, and subsequent amendments, stipulates key criteria that must be followed such as grading of goods to US standards, the state of physical facilities, insurance and bonding cover and prevention of fraudulent receipts (Coulter 2009).

A second benefit of warehouse receipts is that they are particularly useful for farmers to avoid selling when prices are low such as when there is abundant supply at harvest time. Instead, the farmer retains ownership of his stored produce while he waits for a better price. Hence warehouse receipts work well in an efficient spot market that allows price fluctuations with accessible and transparent market information.

Briefly, investment in infrastructure in order to provide secure warehouses is a pre-requisite for warehouse receipts and repurchase agreements as is a well-functioning spot market. Supportive legislation is important for all three physical goods finance instruments.

2.2.4 Risk Mitigation Financing

Risks in VCF may be covered through loan guarantee funds, weather indexed insurance, forward contracts and futures (Miller and Jones 2010).

Governments or private organizations may guarantee loans as an incentive for financial institutes to lend to farmers. In that way risks due to default for the funding institutes are reduced potentially resulting in more finance flowing to the agriculture sector.

Crop and weather insurance hinges on a credible weather station with equipment to accurately predict weather patterns. Weather indexed insurance

saves costs of assessing damage that is due to covariate risks for each farm. But, in developing countries it is limited by insufficient equipment for determining when the threshold level of damage has been reached so as to trigger payments.

Forward contracts and futures require sophisticated financial systems and so may be expected in higher income countries.

A farmer is protected from falling prices and likewise the buyer is protected from rising prices by locking the price of produce through a forward contract. In this arrangement the buyer and seller have an obligation to buy and sell at an agreed time and price in the future. Similarly to repurchase agreements, a futures market is also useful in setting the price.

Futures are a form of forward contract with a right but not an obligation to buy or sell an asset in the future. Futures can also be traded on the futures exchanges. However, they are used by large agro companies for hedging, being too complex for small holder farmers to use.

In sum, risk mitigation financial instruments are generally sophisticated and require an enabling environment such as a futures market and infrastructural investments in credible weather stations. Therefore it is not expected that they are often used in developing countries for financing SHFs.

2.2.5 Financial Enhancements

In place of debt finance, funders may buy shares of an agribusiness in a joint venture arrangement. Joint ventures are especially useful for bringing in technical skills and knowledge of the shareholders especially for a start-up that has not yet accrued enough capital to make investments in the business. A business enabling environment is key (Miller and Jones 2010).

In possibly the most sophisticated arrangement, streams of cash producing assets, such as interest from loans, can be pooled together and sold on to investors. However, more caution is taken with such securitization techniques since the subprime crisis. This form of financing requires a sophisticated financial market and experienced investors hence it is not expected to be found often in value chains in developing countries (Miller and Jones 2010). For that reason it is not considered further in this paper.

Table 2:1 overleaf summarizes the most important requirements for VCF instruments. Warehouse receipts, factoring, forfaiting, weather indexed insurance, futures and forward contracts are quite sophisticated, having more complex requirements.

Table 2-1 Main requirements of financing instruments

Financing Instruments	Instru-	Pre-requisite conditions		
		Special Legislation	Infrastructure	Third party specialist
Product based finance (relationships based)				
Input supplier				
Producer credit				
Marketing company				
Lead firm contracting		Contract Enforcement		
Physical goods based				
Repurchase agreement		Enforcement of agreements		
Leasing		Repossession rights		Lessor
Warehouse receipt (WHR)		Recognition of WHR as collateral	Secure, clean warehouse	Warehouse management
Receivables based (financial assets)				
Purchase order		Recognition of purchase order as collateral		
Factoring		Prevention of fraudulent receivable receipts		Factor Agency
Forfaiting		Prevention of fraudulent receivable receipts		Forfaiting Agency
Risk mitigation				
Loan guarantee				Loan Guarantor
Forward contract		Contract Enforcement		
Futures		Securities management		Futures Exchange
Indexed Insurance			Weather station	Risk modelling agency
Financial enhancements				
Joint venture		Registration of joint ventures		

Source: Adapted from (Miller and Jones 2010:56-57, Winn, et al. 2009: 60-61)

On the whole, an enabling legal environment comprising of both legislation and the means to enforce the laws appears to be an overarching requirement for the majority of value chain financing instruments (Table 2:1).

Having identified the pre-requisite conditions for VCF instruments, the following section pinpoints the role that macro and meso-economic variables have on VCF.

2.3 Macro-economic Factors

In light of the above discussions, it seems be appropriate to distinguish between macro-economic and meso-economic level variables. As was illustrated in Figure 2-2 macro- and meso-economic variables may influence financial flows to and within the value chain (Miller and Da Silva 2007).

2.3.1 Macroeconomic Environment

According to Trzeciak-Duval (2003), a stable macroeconomic environment as exemplified by a stable currency, controlled inflation and enabling institutions is essential both for the development of the financial system as well as for long term investments. In a qualitative study of optimal conditions for structured finance in value chains, Winn et al. (2009) concluded that the availability and subsequent use of structured finance in agricultural value chains of former Soviet Union countries of Eastern Europe and Central Asia (ECA) was correlated to the level of economic development of each country. Validating this finding was the higher use of receivables finance in the most advanced ECA countries such as The Czech Republic, Hungary, Slovenia, Estonia and Latvia when compared to the then lower income countries such as Romania, Albania and Macedonia (Winn, et al. 2009).

2.4 Meso-level Factors

While the macroeconomic environment is important as noted above, factors at the sector level may be more significant in the case of value chains because of their networks and relationships.

2.4.1 Profitable Agricultural Sector

A viable agriculture sector and efficient value chains signal an ability to repay loans which in turn may attract lenders. Conversely, even though some ECA countries such as Tajikistan and Uzbekistan experienced fast growing economies, they still had poorly performing agriculture systems. Subsequently because of these weak value chains, the use of innovative financing instruments remained low (Winn, et al. 2009).

2.4.2 Governance Structure

Another study examined the dynamics within value chains and how their governance structures and related power relations influenced the availability of VCF for SHFs. In the comparative study of three value chains in Uganda, Johnston and Meyer (2008) found greater availability of direct finance in the lead firm controlled sugar cane value chain, than in the spot market relationships that characterised the maize and sunflower value chains.

At the same time, the specialised processing required for sugar cane established an oligopoly which meant that the lead firm had power to choose its contract suppliers and to enforce these contracts as well as to sanction non-compliance. Thus farmers had less room for side selling.

In addition, the lead firm had access to its suppliers' production data and could therefore easily assess their ability and willingness to repay allowing it to successfully provide its suppliers with credit. These hierarchical conditions reduced information asymmetry risks for the lead firm.

In contrast, in a more competitive market of value chains for undifferentiated products such as maize, the presence of many buyers and many suppliers negated a need for establishing long-term contract relationships (Johnston et al. 2007). For one thing, the many options for sellers made side-selling almost inevitable. Also, the buyers could easily secure supplies from the many producers. Thus direct value chain finance was not provided.

However, governance dynamics may be different at specific points in the value chain. Symbiotic relationships amongst traders- retailers and wholesalers- resulted in a balanced governance structure at the distribution node of the maize and sunflower value chains. Accordingly, trust that was built up in these relationships ensured the provision of VCF in pursuit of meeting mutually beneficial marketing goals.

In addition, the Uganda study found two other determining factors for the supply of finance within a value chain. Firstly, motives to secure consistent quantity and quality of critical inputs trigger buyers to provide finance to suppliers even when losses could be made. In such situations, incentives to meet production goals surpass small losses that may result from lending to SHFs (Johnston et al. 2007).

And secondly, in a related manner, lower transaction costs of lending to associated value chain members- actors with whom other transactions are already occurring- encouraged the flow of direct value chain finance to ensure a productive chain.

In sum, direct VCF has greater occurrence under a governance structure that gives a lead buyer more control of the chain. In contrast, less "captive" chains are more likely to feature arm's length sources of indirect funding.

2.4.3 The Product

The financing of products not only takes into account the risks that are inherent in the product's characteristics for example perishable versus durable products, but also risks in the product's market such as the price volatility of commodities compared to more stable niche market products (Winn, et al. 2009).

In the instance of ECA countries the following was observed:

- Malt barley- oligopoly of buyers, with a high prevalence of contract farming making it possible to access input credit and bank finance based on guaranteed payment from the buyer.
- The wheat market had more buyers, therefore less contract farming. But where it was there- for example in speciality types of wheat such as for the health industry- VCF was possible.
- Rape seed and maize- their demand was increasing for use in biofuels leading to greater contract farming and the accompanying VCF.

- Sugar beets- require specialised seed, storage and processing equipment- which buyers financed leading to vertically integrated chains and high use of VCF.

- Fruits and vegetables- perishable therefore could not be stored as collateral unlike durable grain. And the higher risks of product spoilage limited the buyers' involvement in the production phase. Instead buyers were mainly active at the marketing stage investing in immediate processing and cold chains.

Therefore the product's characteristics and market conditions appear to influence access to and the type of VCF that is available. For instance perishable or specialized products may limit or increase access to direct value chain finance respectively. Equally important is the product's market structure, with an oligopoly possibly being a conducive environment for direct value chain finance.

In sum, macro and meso-economic factors influence the type of value chain finance that is available. What then does this mean for designing value chain interventions?

2.5 Implications for Value Chain Interventions

As shown above, a buyer controlled value chain provided conditions for direct value chain finance which was enabled by contract farming arrangements. In such situations, value chain finance interventions may need to be directed at bolstering buyers' ability to provide finance to SHFs and to enforce contracts.

Contrastingly, in the case of a competitive market that is characterised by arm's length relationships, interventions focusing on supporting market sources of funds may be more useful. Therefore, efforts may be directed at assisting financial institutes to develop packages that take into account the types of collateral that SHFs have available.

Some key benefits of VCF are its adaptability to a value chain's financing needs (demand-led) and its innovative use of non-conventional collateral. Legislation is required for the use of new forms of collateral such as warehouse receipts.

One key gauge of the quality of a country's regulatory environment is the World Bank's Ease of Doing Business index. In 2006 the Ease of Doing Business (EDB) index ranked countries based on ten aspects of their business enabling and regulatory environment (The World Bank. 2006). These were starting and closing a business, licences, hiring or firing workers, registering property, getting credit, protecting investors, paying taxes, cross border trade and enforcing contracts.

The time and cost of contract enforcement procedures is an important factor that is measured in the EDB, with particular relevance to financing of agricultural value chains. As mentioned earlier, in value chains, buyers who invest in producers, need to be able to take measures against side selling. Likewise, producers need recourse when buyers renege on their promise to purchase their products at harvest time.

Furthermore, factors such as starting a business, licencing and tax levels may attract or deter financial institutions wanting to set up in a country. As a result, this may have a direct impact on the availability of financial services and financial market sophistication.

The World Economic Forum's (WEF) Global Competitiveness Index (GCI) is an informative indicator of financial market sophistication. The index ranking, first presented in 2006, grades countries considering micro and macro-economic factors, institutions and policies that determine their level of productivity (Sala-i-Martin et al. 2007).

The GCI currently encompasses twelve pillars that are subdivided into three main groups (Table 2:2) namely Basic Requirements, Efficiency Enhancers and Innovation and Sophistication factors (World Economic Forum 2013).

Table 2-2 Pillars of Competitiveness

Sub-index	Pillars of Competitiveness
Basic Requirements	<ul style="list-style-type: none"> ▪ Institutions ▪ Infrastructure ▪ Macroeconomic stability ▪ Health and primary education
Efficiency Enhancers	<ul style="list-style-type: none"> ▪ Higher education and training ▪ Goods market efficiency ▪ Labour market efficiency ▪ Financial market sophistication ▪ Technological readiness ▪ Market size
Innovation and Sophistication	<ul style="list-style-type: none"> ▪ Business sophistication ▪ Innovation

Source: (World Economic Forum 2013: 9)

As noted above, the level of economic development also influenced the type of finance in ECA countries. The World Bank's Gross National Income (GNI) per capita, is a key measure of an economy's level of economic development (The World Bank. 2013). Countries are categorized as follows:

- Low Income Countries (LIC): USD 1,035 or less
- Lower Middle Income Countries (LMIC): USD 1,036-4,085.
- Upper Middle Income Countries (UMIC): USD 4,086-12,615.
- High Income Countries (HIC): USD 12,616 or more.

Consequently, rankings in both the GCI and EDB indices as well as the GNI category can be expected to indicate the influence of the macro-economic environment on the type of finance that is not only available but is used in value chain interventions.

In sum, using evidence from individual value chains as discussed above, it appears that conditions such as supportive legislation are required for VCF even with the cooperative relationships and interlinks that are characteristic of value chains. But how do these indicators fair in a statistical analysis?

The following chapter gives the methodology for this study which sought to find empirical evidence of finance instruments that were used in value chain interventions and the conditions under which they were used.

3 Methodology

In-depth qualitative studies highlight conditions under which finance is available to SHFs who are part of value chains (Johnston and Meyer 2008, Winn, et al. 2009). Conversely, this paper takes a quantitative approach to explore the presence of an association between these conditions and the observed use of value chain finance instruments.

This research aims to assist decision making on financing of agricultural value chain interventions. More generally, it contributes to knowledge on expanding rural agricultural finance. Although the study is not prescriptive, lessons may be drawn from other interventions.

The study was conducted in three stages. First, a scan of value chain interventions was conducted on the internet noting the finance instruments that were used. Then interviews with value chain intervention practitioners and documents were used to augment information from websites which was often limited on the financing details. Finally independent variables were identified and tested for a significant relationship with the finance instruments.

3.1 Preliminary Internet Scan

The aim of the internet search was to compile a database of value chain development case studies and the financing instruments that were used. As such, inclusion criteria in this exploratory study aimed to incorporate as broad a spectrum of agriculture value chain interventions as is found empirically. Although a systematic review of each intervention's performance was not conducted as focus was on the financing mechanisms, some elements of the Campbell Collaboration (2013) for systematic reviews were followed in drawing up the search strategy.

3.1.1 Inclusion criteria

- Case studies- the intervention had to be described as a clearly defined case. Although value chains may span across geographic regions, a case was included if an intervention location was clearly identified. A location was restricted to country, city, town or locality. A specific location was necessary for assigning the relevant contextual conditions to each intervention.
- Only interventions that used the term “value chain” were considered. However, this may have left out interesting cases that carry out value chain interventions but label them differently.
- Agricultural value chains were selected.
- If information on financing of interventions from websites, project documents or interviews with practitioners was available in English.

3.1.2 Exclusion criteria

The exclusion criteria was relatively relaxed so as to explore the widest range of interventions but included the following:

- Regional interventions, for example in Sub-Saharan Africa, which did not distinguish the specific countries that were involved.
- General agriculture development programs that did not use a value chain approach.

Google was the preferred search engine to attain information on value chain interventions from websites of practitioner organizations. The first search was the broadest, consisting of the following search terms:

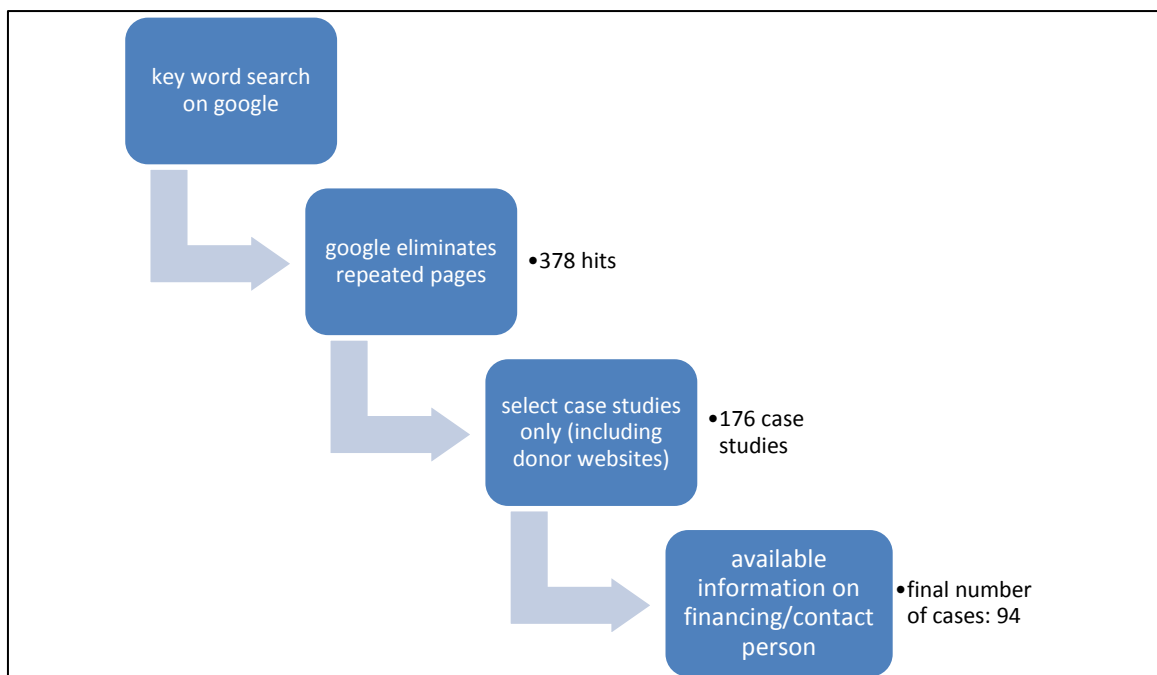
- “value chain intervention”- 89,000 hits;
- Then focusing the search more to: “value chain intervention” AND NOT “supply chain” produced 69,700 hits.
- Google reduced these to 174 hits by removing similar pages. Further searches within these websites were conducted, using the term (“value chain intervention “+”case study”).

The following searches were subsequently conducted:

- “value chain development” AND “case study”- 316,000 hits reduced to 204 hits less repeated pages on Google.
- (“value chain ”+“case study”) within websites of United States Agency for International Development (USAID), Danish International Development Agency (DANIDA), Swiss Agency for Development Cooperation (SDC), Swedish International Development Cooperation Agency (SIDA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

Final case selection is shown in Figure 3-1. In total 94 case studies provided sufficient information about the type of finance used to be included in the study.

Figure 3-1: Filtered Cases from Internet Scan



3.2 Interviews with Practitioners

The main purpose of interviews with practitioners was twofold. Firstly, since some websites provided only limited information on the financing modalities that were used, this information was obtained from the practitioners themselves.

Also, interviews provided an opportunity to learn the rationale behind the use of a particular finance instrument. Respondents were asked about the context in which they used a particular type of finance. It is noted that out of 69 emails sent soliciting for information, responses from 8 email respondents and 5 interviews were eventually incorporated in the study (Appendices 1 and 2).

Three main challenges were experienced when collecting data directly from practitioners. In the case of interventions funded by international organizations, the donors did not direct the way funds are disbursed, leaving that responsibility to practitioners. Hence the information chain grew longer to include contact persons who are in the field but were often too busy to respond to emails.

Second, some organizations did not appear to have kept a database of value chain projects that they had conducted. A related constraint was that some projects had been completed several years ago, hence recall was difficult at times and some practitioners had left the organizations.

Finally private sector interveners had the lowest response rate and in one instance, details of financing instruments were said to be proprietary information that could not be disclosed.

Nevertheless, since these constraints were expected, enough time was allocated for the process of data collection. Importantly, these responses informed the next stage of the study, that is, identification of the independent variables that were then tested for a significant relationship with financing instruments (Table 3:2).

3.3 Formulation of Variables

3.3.1 *Dependent Variables*

The dependent variables were the various types of finance instruments that were used in the value chain interventions. Following the collection of information on the finance instruments, they were grouped into three categories namely asset based, group collateral based and grant/subsidy finance. Categories were formulated based on the way the instruments were utilized in the interventions particularly in the context of this sample of value chains from developing countries and small holder farmers. Miller and Jones (2010) and Winn et al. (2009) also noted categorization of financing instruments based on their specific usage in a study sample without following a strict set of rules.

Miller and Jones' (2010) classification of finance instruments that was described in section 2.2 was not used in this study. The main reason for this decision is that it is silent on some instruments that as a result do not fit neatly into the classification. Premium price was one such value chain financing arrangement whereby producers did not receive credit. Instead they were financed by the premium price that buyers deliberately paid for a better quality product, for

example coffee in Guatemala¹, and pineapple in Ghana². In addition, grants and subsidies were also not classified but proved to be important in this study.

3.3.1.1 Asset based finance

In this study, the common feature of asset based finance instruments was their use of an underlying asset to attain funds. Physical goods assets were used with warehouse receipts- the physical product was used as collateral for credit (Table 3:1). Franchising depended on the franchisee providing premises (physical asset) in order for the franchisor to make milk chilling equipment (physical goods asset) available³.

Financial assets were used as collateral for credit or sold for immediate payment, for instance, purchase order finance or reverse factoring respectively.

Asset based instruments were therefore the most sophisticated, diverging the most from conventional finance.

3.3.1.2 Group Collateral

Several interventions partly focused on building or enhancing the capacity of farmers' groups⁴. Hence an interesting feature was the use of group membership as a form of collateral. These groups also facilitated easier administration of self-liquidating loans, thus reducing farmers' credit default- loans and payments from a buyer were channelled through the farmers' organization for example in the potatoes value chain with PepsiCo in India⁵. Also the sunflower value chain in Tanzania whereby farmers had a group savings account which was used as collateral⁶ and similarly for farmers supplying potatoes to Nandos in Uganda⁷.

Since it appears to have less pre-requisite conditions, group collateral may be expected in less sophisticated financial markets and lower levels of economic development than asset based finance. Also in Table 3-1, group collateral modalities appear to be less heterogeneous than asset based finance instruments.

3.3.1.3 Grants and Subsidies

Grants and subsidies were provided by both private and public actors. For example, BioRe- a cotton company in Tanzania pre-financed its suppliers using input subsidies⁸. Non-Governmental Organizations (NGO), for example World Vision, also provided beehives and protective clothing to beekeepers in Swaziland⁹. And in India, the government provided SHFs with a 50% subsidy for irrigation equipment¹⁰. Matching grants were also used for example in The Domini-

¹ <http://www.technoserve.org/project/strengthening-the-coffee-value-chain>

² www.technoserve.org/files/downloads/vcguidenov12-2007.pdf

³ www.kit.nl/net/KIT_Publicaties_output/showfile.aspx?e=1610

⁴ https://www.rabobank.com/en/rabo_development/advisory_projects/vietnam.html

⁵ <http://practicalaction.metapress.com/content/p856847546616864/?genre=article&id=doi%3a10.3362%2f1755-1986.2008.029>

⁶ http://www.kit.nl/net/KIT_Publicaties_output/showfile.aspx?e=885

⁷ www.kit.nl/net/KIT_Publicaties_output/showfile.aspx?e=885

⁸ www.kit.nl/net/KIT_Publicaties_output/showfile.aspx?e=1610

⁹ <http://www.technoserve.org/project/supporting-the-honey-value-chain>

¹⁰ <http://businessinnovationfacility.org/group/agribusiness/forum/topics/growing-business-with-smallholders-a-guide-to-inclusive-agribusin>

ca Republic¹¹ and Georgia¹². Unlike asset based and group collateral finance, grants and subsidies do not have a cost recovery mechanism and for this reason are expected to feature prominently in countries that are ranked bottom in macro-economic indicators.

Table 3-1: Categories of Finance Instruments

Asset Based Finance	Group Collateral	Grants or Subsidies
Warehouse receipt	Bank loan	Matching grant
Premium price	Microcredit	Full grant
Lease	Revolving loan fund	Input subsidy
Partial payment on delivery	Soft capital (low interest)	
Franchise	Interest free loan	
Repurchase agreement	Production loan from buyer	
Loan guarantee fund	Input credit	
Factoring/ reverse factoring	Advance payment	
Equity/ joint venture	Compulsory/ group saving	
Input insurance	Input voucher	
Farmers' bond		
Purchase order finance		

A note is made that since the value chain interventions in this sample involved training and technical support to project recipients, these services were viewed as a universal factor. Hence they were excluded from classification under any of the categories.

¹¹ <http://abtassociates.com/PDFS/DR-RED-profile.aspx>

¹² <http://www.cnfa.org/core-capabilities/>

3.3.2 Independent Variables

Variables that may influence the type of finance used were formulated from the responses by practitioners as summarized in Table 3:2. This being an exploratory study, other independent variables were also considered including the type of product, the year of intervention, type of upgrade, institutional arrangement, the stage of intervention, main intervener, source of funds and the end market.

Table 3-2: Formulation of Independent Variables

Factors identified by practitioners as influencing their selection of financing mechanism	Relevant indicators
Availability of type of finance, skilled financial service providers	Country income level; Global competitiveness index (GCI) - financial market sophistication, infrastructure; Ease of doing business- regulatory environment.
Avoiding “cumbersome” instruments such as leasing that would divert focus of intervention to development of financiers not producers	GCI- financial market sophistication influences the type of finance instruments that are available. If leasing is limited, then the intervention would have to first establish leasing.
Financial risk	Ease of doing business- contract enforcement; Global Competitiveness Index- institutions
High loan default	Ease of doing business- contract enforcement
Post crisis- economic, political crises or natural disaster.	GCI- financial market sophistication; Ease of doing business.

The importance of legislation was revealed in section 2.2. The Ease of Doing Business (EDB) index measures the quality of a country’s regulatory environment.

Valid criticism of the EDB ranking highlights shortcomings in the methodology. For example, inter year comparisons may be inaccurate as some countries may rise or fall in rankings, without making any changes, but simply because other countries have done worse or better (Irwin 2013). Acknowledging this shortcoming, this study does not make inter year comparisons of the ranks, but uses rankings from one year. A simple normative comparison of the countries’ ranks gives a useful indication of the business enabling environment. Ranks for the pilot year of each intervention and inter-year comparisons of these were thus not made.

Since most interventions were carried out after 2000, it was chosen as the baseline year. However, EDB and GCI data were taken from 2005 and 2006 respectively, when ranking of countries began and tested with interventions that were carried out after 2005.

3.4 Chi-square Test for Significant Relationship

In order to examine statistically significant relationships, financing mechanisms of ninety-four value chain development case studies (Figure 3-1) were analysed using the Statistical Product and Service Solutions (SPSS) software. A two-tailed chi square test was used to verify relationships between finance instruments and independent variables. Although the chi square test is limited to indicating the presence of a relationship but neither the form nor extent of the relationship, it was considered useful for the purposes of this exploratory study.

Before carrying out the test, some data had to be placed in categories that were deemed to produce the most divergent groupings as was possible. Decisions were made to group similar countries as follows:

Table 3-3 Ease of Doing Business Categories (2005)

Ease of Doing Business Rank	Countries (territory)
1-31	Thailand
32-62	Nicaragua, Pakistan
63-93	Argentina, China, Ghana, Kenya, Kyrgyzstan, Mexico, Moldova, Papua New Guinea, Peru, Serbia, Uganda, Zambia
94-124	Bolivia, Brazil, Dominican Republic, Ecuador, Ethiopia, Georgia, Guatemala, Honduras, India, Indonesia, Malawi, Mozambique, Nigeria, Philippines, Vietnam
125-155	Benin, Burkina Faso, (Gaza), Ivory Coast, Madagascar, Mali, Rwanda, Sierra Leone, Tanzania, Zimbabwe

Source: (The World Bank. 2006)

The GCI was categorized as follows:

Table 3-4 Categorization of Global Competitiveness Index (2006)

Global Competitiveness Index	Countries
1-25	China
26-50	India, Thailand
51-75	Argentina, Brazil, Guatemala, Indonesia, Mexico, Philippines, Vietnam
76-100	Dominican Republic, Ecuador, Georgia, Guatemala, Honduras, Kenya, Moldova, Nicaragua, Nigeria, Pakistan, Peru, Serbia, Tajikistan
101-125	Benin, Bolivia, Burkina Faso, Ethiopia, Madagascar, Malawi, Mali, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe

Source: (Sala-i-Martin et al. 2007)

The World Bank's groupings for GNI per capita were used as follows:

Table 3-5 World Bank's Country Income Levels (2000)

Income Level	Countries (territory)
Low Income Countries	Benin, Burkina Faso, Ethiopia, Georgia, Ghana, India, Indonesia, Ivory Coast, Kenya, Kyrgyzstan, Liberia, Madagascar, Malawi, Mali, Moldova, Mozambique, Nicaragua, Nigeria, Pakistan, Rwanda, Sierra Leone, Tajikistan, Tanzania, Uganda, Vietnam, Zambia, Zimbabwe
Lower Middle Income Countries	Bolivia, China, Dominican Republic, Ecuador, (Gaza), Guatemala, Honduras, Papua New Guinea, Peru, Philippines, Swaziland, Thailand
Upper Middle Income Countries	Argentina, Brazil, Mexico

Source: (The World Bank. 2013)

It is interesting to note that some countries were ranked inconsistently in the above categories. For instance, India's financial market was highly sophisticated and yet its business regulatory environment ranked poorly. This anomaly will be discussed further in section 4.1.

The null hypothesis was that an independent variable had no significant influence on the financing mechanism.

List of null hypotheses (H0):

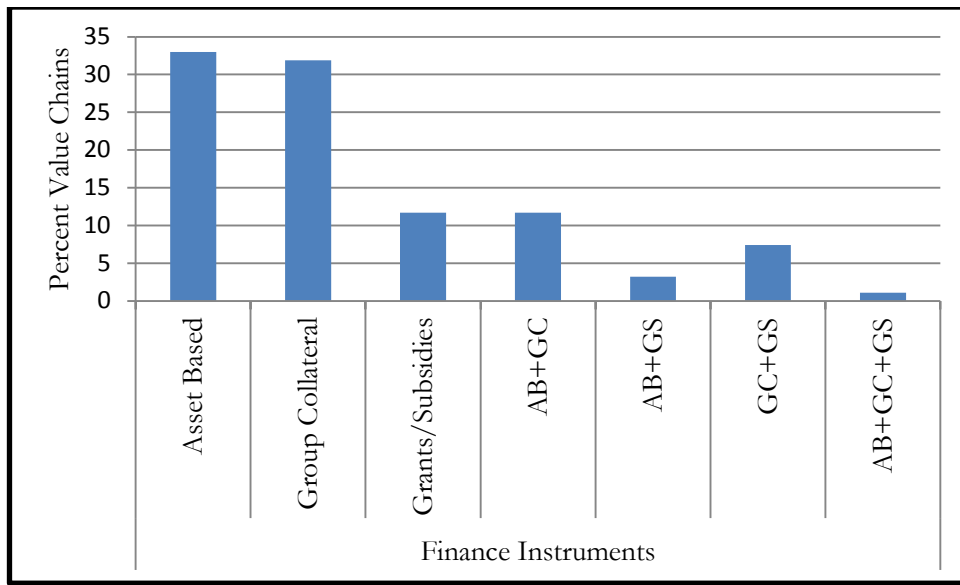
1. There is no relationship between type of finance and EDB.
2. There is no relationship between the type of finance and GCI
3. There is no relationship between type of finance and country income level.
4. There is no relationship between type of finance and type of upgrade.
5. There is no relationship between type of finance and stage of intervention (the intervened group).
6. There is no relationship between type of finance and the next stage in the chain- either processing or retail.
7. There is no relationship between type of finance and main intervener.
8. There is no relationship between type of finance and the source of funds.
9. There is no relationship between type of finance and end market.
10. There is no relationship between type of finance and the institutional structure.
11. There is no relationship between type of finance and product group.
12. There is no relationship between type of finance and characteristics of the product, specifically perishable versus durable products.
13. There is no relationship between type of finance and the year of the intervention.

Results with a p-value that was less than 0.10 indicated a statistically significant relationship between the independent and dependent variables thus rejecting the null hypothesis with a 90% level of confidence.

4 Findings

Ninety-four value chain interventions in forty-three countries were analysed. Appendix 3 provides descriptive statistics of these value chains namely, countries and financing instruments that were used for each product group.

Figure 4-1 Frequency of Value Chain Financing Instruments



As shown in Figure 4-1, asset based finance and group collateral financing were used most frequently (over 60% of value chains). Several value chains used a combination of financing instruments. Henceforth, the combinations are accounted for in analysis by using the 100% stacked column to depict proportions of the financing instruments.

Table 4:1 presents results of the chi-square test between macro- and meso-economic conditions and value chain finance (VCF) instruments with highlighted figures showing a significant relationship.

Table 4-1: Results of chi square test

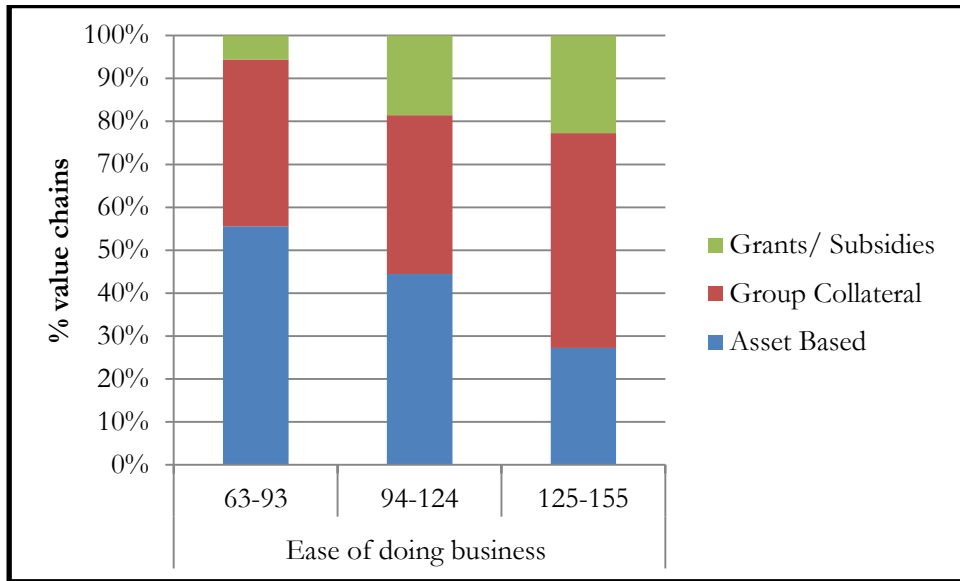
Independent Variables	Finance Instrument: p value of chi square test		
	Asset based	Group Collateral	Grants / Subsidies
Ease of Doing Business	0.116	0.341	0.268
Global Competitiveness Index	0.670	0.146	0.542
Country Income Level	0.125	0.052	0.181
Type of Upgrade	0.726	0.160	0.110
Stage of Intervention	0.202	0.601	0.001
Next stage-processing or retail	0.633	0.154	0.043
Main Intervener	0.594	0.218	0.053
Source of Funds	0.124	0.210	0.002
End Market	0.259	0.020	0.748
Institutional Structure	0.868	0.856	0.219
Product Group	0.853	0.085	0.087
Perishable/durable goods	0.488	0.670	0.079
Time- pre/post 2005	0.713	0.930	0.888

The rest of this chapter proceeds with a discussion of the results from testing independent variables at the macro-economic and then meso-economic levels.

4.1 Macro-economic Variables

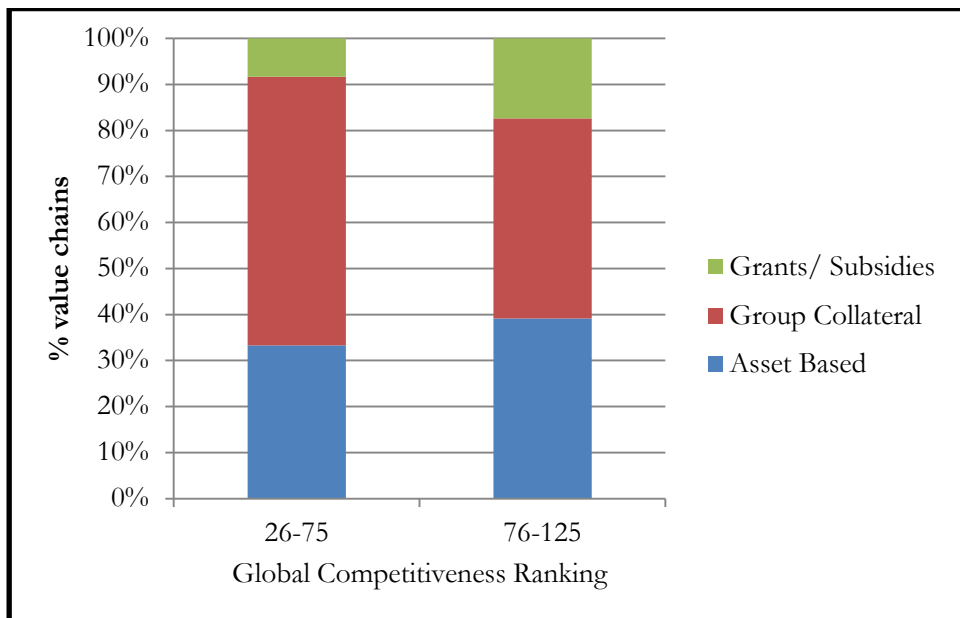
Legislation was largely expected to have an influence on the use of value chain finance instruments (Section 2.2). However, Ease of Doing Business (EDB) index rankings- an indicator of the business regulatory environment did not show a statistically significant association with financing instruments (Table 4:1). Nevertheless, asset based finance was used in greatest proportion in top ranked regulatory environments. Results showed an expected pattern of increasing share of less sophisticated finance in lower ranked EDB countries. Therefore, a greater proportion of value chains in countries in the bottom fifth of EDB rankings utilised group based collateral more often (Figure 4-2).

Figure 4-2 Business Environment and Financing Instruments



Similarly, financing instruments were unexpectedly not influenced by the financial market sophistication as indicated by Global Competitiveness Index rankings.

Figure 4-3 Finance Instruments used in Higher and Lower Financial Market Sophistication



However, it is noted that there was use of grants and subsidies even in the more competitive financial markets (Figure 4-3). Also in that category, unexpectedly the use of group collateral almost doubled that of the more sophisticated asset based finance. Value chains in countries in the tail end of GCI used a fairly even share of asset based and group collateral finance.

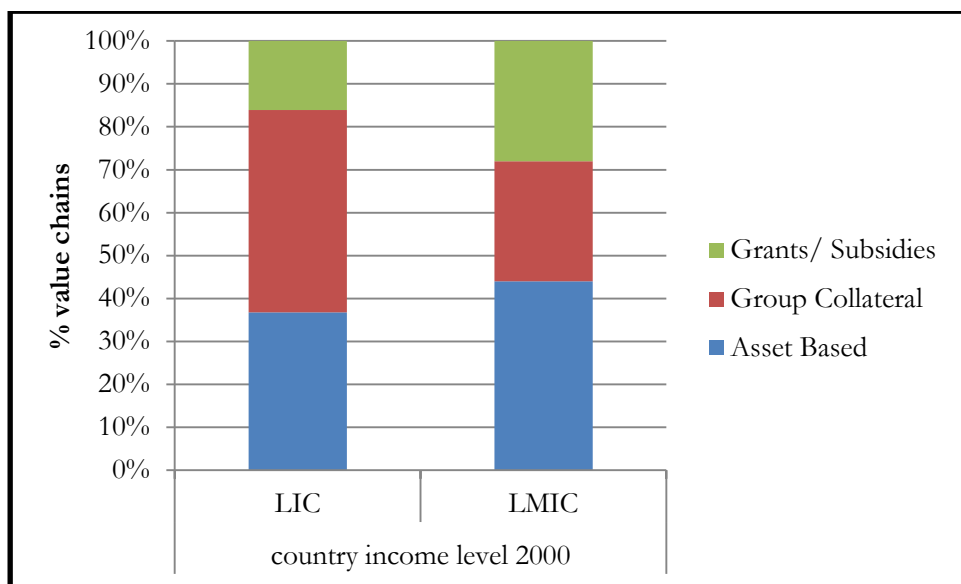
The conflicting results of EDB and GCI may perhaps reflect an inconsistency between business environment and financial market sophistication. One might rightly expect that countries with sophisticated financial systems to also have correspondingly advanced regulatory environments. But countries that performed better in the one index did not necessarily do so in the other indicator, for example India, Zambia and Uganda (section 3.4).

However, a significant relationship was found between Gross National Income per capita and group collateral financing. The share of group collateral based finance was higher in low income countries (LIC) than in lower middle income countries (LMIC) (Figure 4-4).

Furthermore, a greater proportion of value chains in LMICs used asset based finance than was found in LICs as shown in Figure 4-4. Although this matches expectations for sophisticated financing to be found in more developed countries based on findings by Winn et al. (2009) in ECA countries, this relationship was not statistically significant.

Also, unexpectedly grants and subsidies were used in a greater portion of value chains in LMICs than in LICs.

Figure 4-4 Frequency of financing instruments used with respect to Country Income Level



4.2 Meso-economic Factors

Examining variables at the meso-economic level, of note is that several variables had an influence on the use of group collateral and grants and subsidies whereas all test variables had a statistically insignificant relationship with asset based financing instruments.

Table 4-2 Financing of Value Chain Upgrades

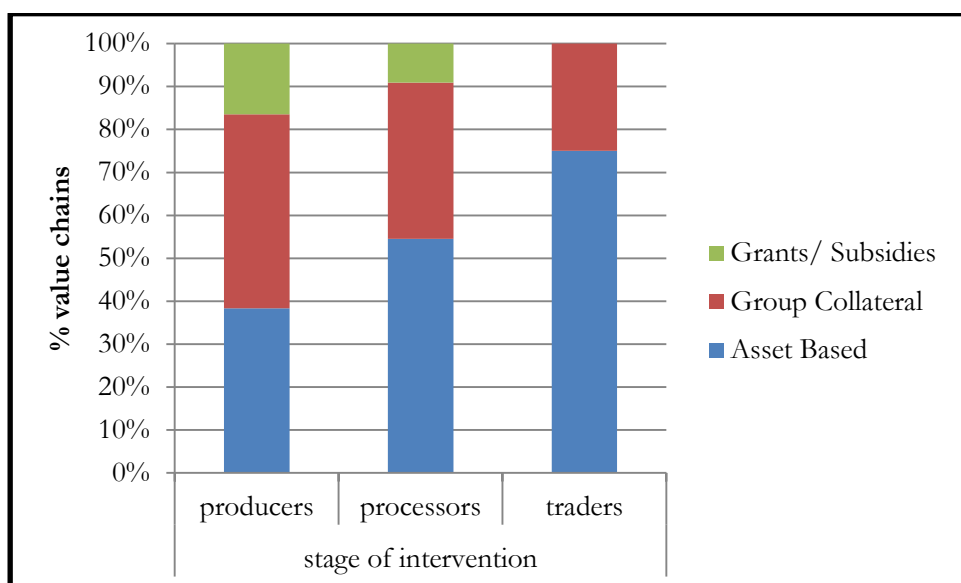
Type of Upgrade	% Chains using Type of Finance		
	Asset based Finance	Group Collateral	Grants/ Subsidies
product	39	45	16
process	33	58	8
functional	50	25	25
product and functional	47	29	24
product and process	17	33	50

Although there was no significant relationship between the type of upgrade and financing, a majority of value chains -62- conducted product upgrading (Table 4-2) with most interventions on producers. Product upgrades were mainly financed using group collateral.

The stage of intervention showed a significant association with the use of grants and subsidies which were utilised in interventions on producers and processors (Figure 4-5).

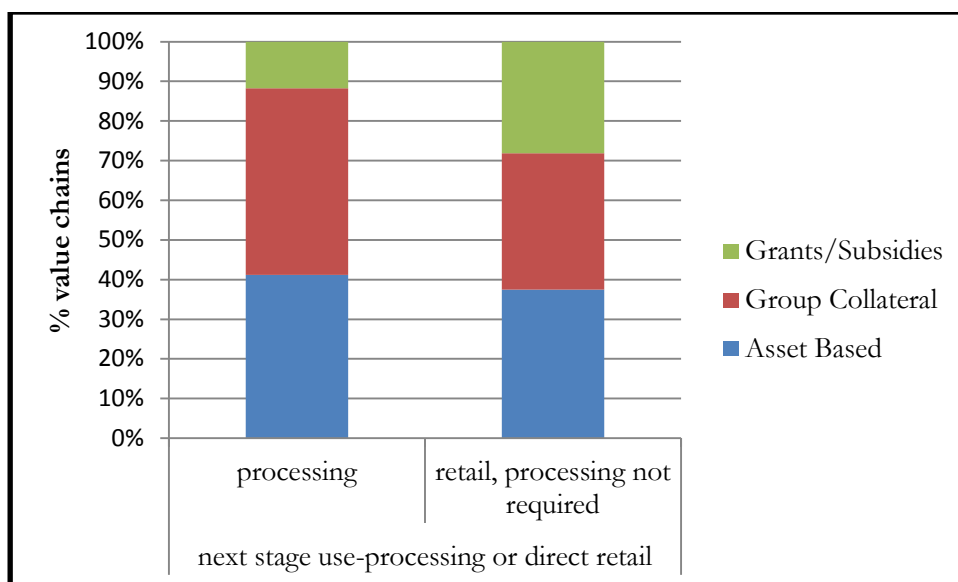
Also, since formation or strengthening of farmers' groups was part of many interventions, the share of group collateral used was unsurprisingly highest in interventions on producers (Figure 4-5), although this finding was not statistically significant.

Figure 4-5 Financing Mechanisms for each Stage of Value Chain Intervention



Products from 54 value chains were to be used in processing. Buyers and NGOs carried out most interventions in these chains (Appendix 4). Value chain interventions for these products were mostly financed through group based collateral with a fairly even spread of grants, group collateral and asset based financing being used in value chains for direct retail (Figure 4-6).

Figure 4-6 Financing of Produce to be used in Processing or Retail



The next stage that the product feeds into had a significant association with the use of grants and subsidies as did the main intervener (Table 4-3) and source of funds (Table 4-4).

In line with expectations of buyers wanting to secure the supply of critical inputs from producers (Johnston et al. 2007), buyers financed interventions on products for processing and facilitated access to finance from financial institutes (Appendix 5).

Table 4-3 Intervening Organizations and Financing Instruments Used

	% Value Chains using Finance Instruments		
	Asset Based	Group Collateral	Grants/ Subsidies
Public Organizations	56	39	22
Non-Governmental Organizations	41	47	35
Private Sector	51	63	15

Table 4-3 illustrates that private sector led interventions used the lowest share of grants and subsidies financing, instead using mainly group collateral.

Likewise, looking at sources of funds for the value chain development projects, of note is that buyers in the main did not provide grants and subsidies (ex-

ception of BioRe, note 5). Rather, grants and subsidies mostly came from public organizations and NGO funders (Appendix 7).

The majority- 52 value chains- produced goods for the export market. Trans National Corporations (TNCs) secured local supply of critical inputs in eight value chains.

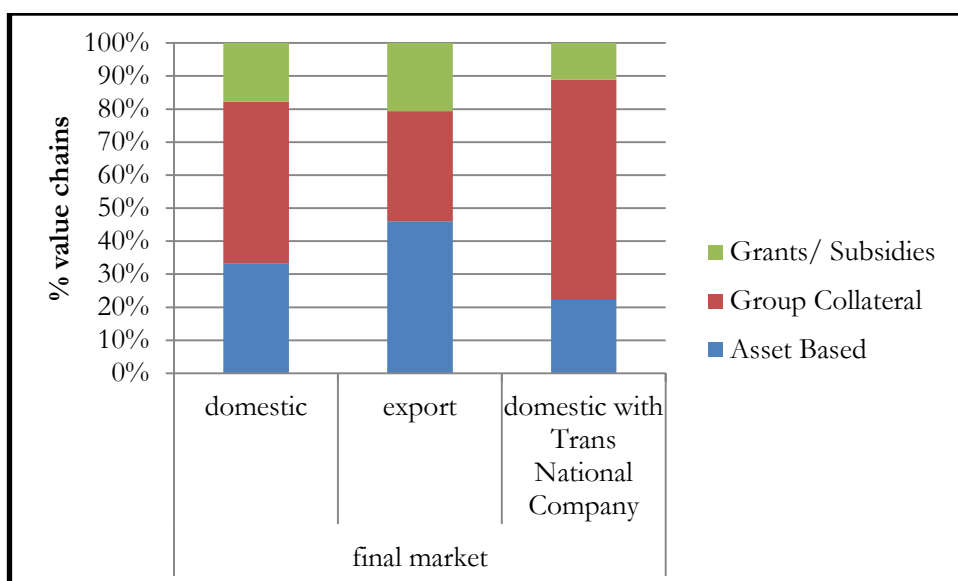
Table 4-4 Source of Funds and Final Market

direct source of funds to the intervened	% Value Chains Final Market		
	domestic	export	domestic with Trans National Company
Bilateral/ multilateral organization, Government	24	21	25
NGO, international co-operatives	9	13	0
Credit union, micro-finance institute, bank	52	37	50
Buyer	9	19	25
Farmers' organizations	6	4	0
Shareholders	0	6	0

The end market showed a statistically significant influence on the use of group collateral based finance. Group collateral financing was used most often in value chains that were focused on the domestic market (Figure 4-7) and indirect funds for the domestic market value chains were mainly sourced from financial institutes such as credit unions, banks and microfinance institutes (Table 4-4).

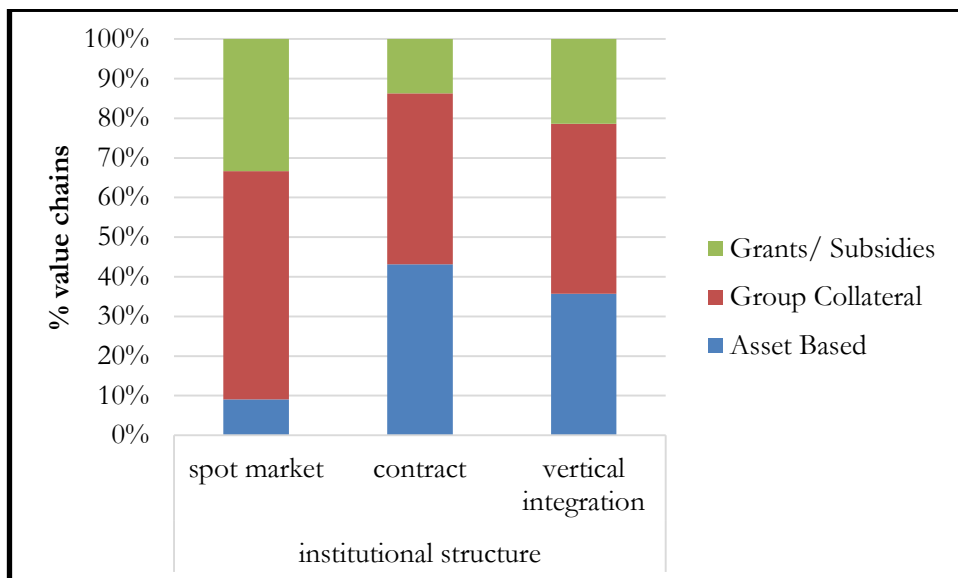
In contrast, the more sophisticated asset based type of financing was used more in export market oriented value chains (Figure 4-7) although this was not statistically significant.

Figure 4-7 Financing Instruments used for Domestic and Export Markets



It is interesting to note that institutional arrangements had an insignificant influence on value chain financing, contrary to expectations (section 2.4.2).

Figure 4-8 Use of VCF under different Institutional Arrangements

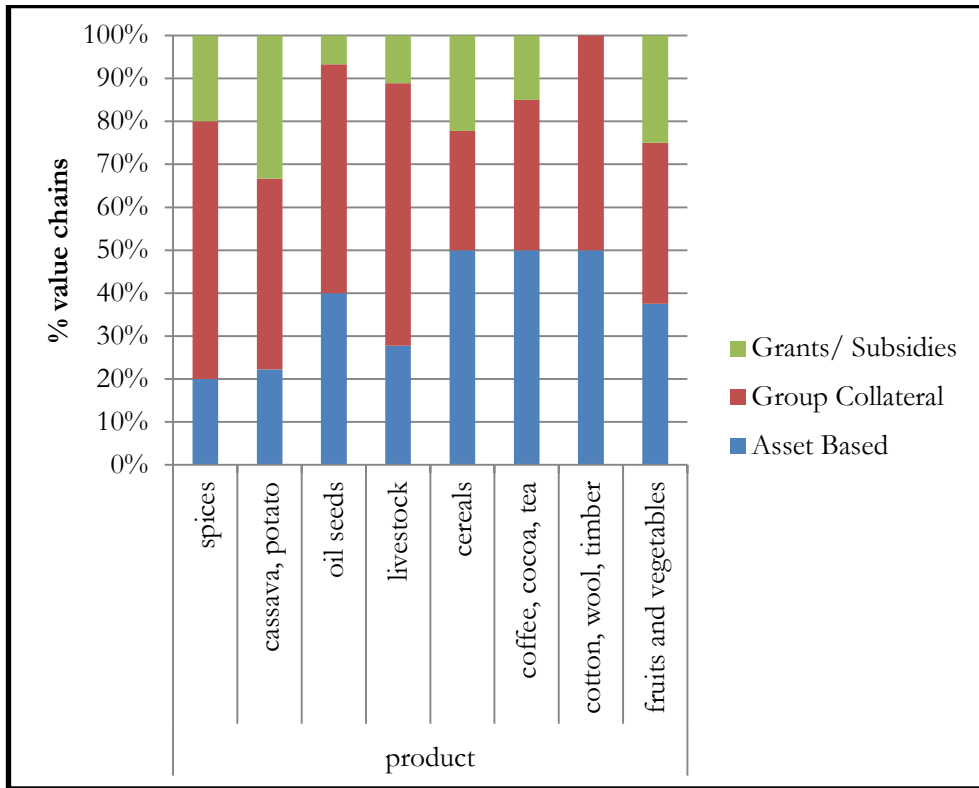


The institutional structure was expected to influence the type of finance used in value chains. Johnston and Meyer (2008) found that lead firm controlled value chains such as in this case of contract farming and vertically integrated chains, had high use of direct value chain finance. Although buyers provided direct finance in vertically integrated chains (Appendix 6), in this sample, the influence of institutional arrangements was statistically insignificant.

Contract farming was the most frequent arrangement- used in 43 value chains followed by the spot market arrangement used in 33 value chains. Also of note was the unexpectedly high proportion of grants and subsidies that were used in spot market arrangements in place of market based finance that is expected in arm's length relationships (Johnston and Meyer 2008).

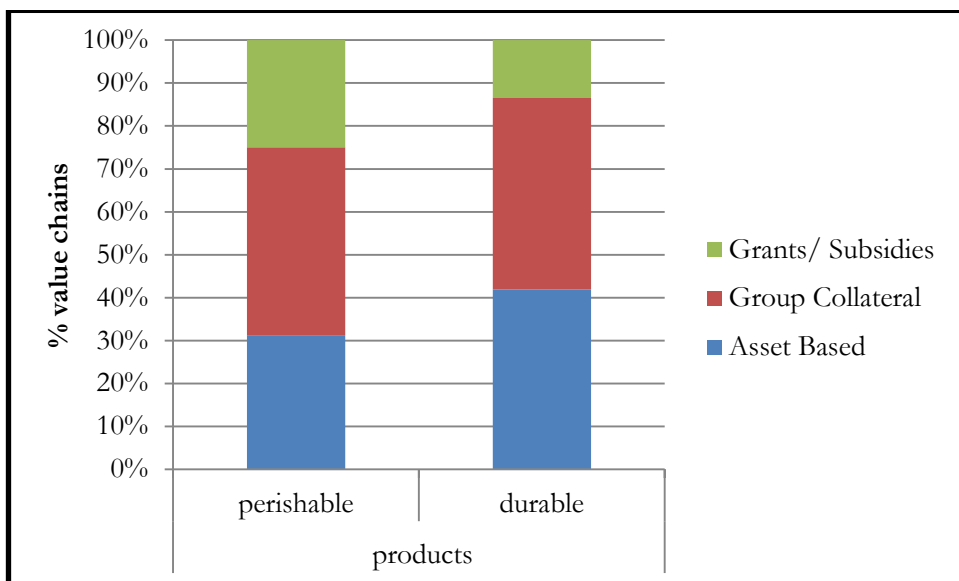
A combination of all the types of financing was used for most products (Figure 4-9).

Figure 4-9 Use of Value Chain Finance across Product Groups



A significant relationship was found between the product category and the use of group collateral and grants/subsidies finance. The highest share of group collateral was found in the livestock value chains. And grants and subsidies had a high share in the roots and tubers product category (Figure 4-9).

Figure 4-10 Comparison of VCF for Perishable and Non-perishable Products



Perishable and durable goods had a statistically significant relationship with the use of grants and subsidies. Perishable goods value chains used a higher proportion of grants and subsidies than durable goods (Figure 4-10).

Since most interventions occurred between the years 2000-2011, the year 2005 was selected as a mid-point to compare developments in the use of financing instruments. This was to test whether there was a temporal pattern in the type of instruments used. This study did not find a significant relationship between value chain developments carried out pre- or post-2005 and their financing instruments.

In sum, in this sample of 94 value chains, variables at the macro-economic level had a minimal influence on the type of financing modality of value chain interventions. An exception was GNI per capita that had an association with the use of group collateral. Instead, the type of finance used appears to have had greater association with meso-economic variables especially grants and subsidies. In contrast, asset based finance was not influenced by either sets of variables.

5 Analysis and Reflections

This paper has developed and tested conditioning factors for the use of value chain finance instruments. Three categories of value chain finance instruments were identified, specifically asset based, group collateral and grants or subsidies.

The study found that contrary to expectations, factors at the macro-economic level largely did not have a significant relationship with the type of finance that was used. Instead, more conditions at the meso-economic level were found to be influential on the financing modalities. This final chapter presents an analysis of these findings, beginning with macro-economic factors and then meso-economic variables. The chapter closes with final reflections on and implications of the findings.

5.1 Macro-economic factors

Contrary to expectations, Ease of Doing Business (EDB) and Global Competitiveness (GCI) did not have a statistically significant association with value chain finance instruments that were used. Therefore, although these factors may appear important in comparisons between individual value chains as found by Winn et al. (2009), this statistical analysis illustrated that the regulatory environment and financial market sophistication did not influence the type of finance instruments that were used.

A hypothesis that may be drawn from these findings is that the value chain approach with its cooperative relationships and interlinks resulting in risk sharing, may be sufficient to shield the actors from external conditions. However, comparisons would have to be made with non-value chain farmers who face the same conditions in order to ascertain this conclusion.

Instead, these findings may reflect inconsistency of financial market sophistication and the regulatory environment. Since some countries that performed well (or badly) in one indicator of these variables such as GCI did not necessarily perform consistently in the EDB indicator, this conflicting scenario may have resulted in cancelling out the impact of these factors. Further analysis with non-value chain farmers would again be needed to verify this assertion.

However, more plausibly, findings based on this study suggest that there may be a long relationship link between macro-economic level variables and financial instruments that were used at the value chain level. Thus this study was useful in identifying and eliminating these macro-level variables, paving way for less abstract factors to be tested in future research.

Also of note was the unexpected use of grants and subsidies in top ranked GCI and EDB countries as well as in Lower Middle Income Countries (LMIC). Further analysis showed that grants and subsidies were used mainly in interventions on producers (Figure 4-5). Therefore this possibly points to the presence of a rural credit market failure as far as small holder farmers were concerned in these countries resulting in a need for grants and subsidies as noted by the Food and Agriculture Organization (FAO) and the European Bank for Reconstruction and Development (EBRD) (as cited in Winn, et al. 2009:9).

The level of economic development had an influence on group collateral financing (Figure 4-4). The share of group collateral financing, less sophisticated instruments than asset based, declined with at the higher level of economic development as was expected (Winn, et al. 2009). Generally, value chains in Low Income Countries (LIC) used a higher proportion of group collateral finance and lower use of grants and subsidies than in Lower Middle Income Countries (LMIC). This may reflect a greater need for cost recovery mechanisms in the LICs' interventions.

The share of asset based finance- the most sophisticated of the three financing modalities- was higher in LMICs than LICs. However this association, and that of all other macro-economic level explanatory variables, was not statistically significant. It was especially expected that it would be influenced by financial market sophistication and/or legislation requirements as measured by the Global Competitiveness and Ease of Doing Business indices respectively.

Hence, the significance of this result may be that asset based value chain finance may overcome certain barriers of conditional factors. For example, the highly innovative and heterogeneous forms of collateral such as loan guarantee funds and purchase orders mean that it is more flexible and therefore can be more adaptable to various value chain conditions. Although sophisticated, its heterogeneous nature makes it a promising means of funding small holder farmers even in developing countries.

5.2 Meso-economic factors

The influence of meso-economic variables was found to be significant and particularly so for grants and subsidies. In line with analysis of macro-economic level factors, a shorter relationship link is expected between meso-level factors and value chains. Thus, unsurprisingly, financing modalities were more sensitive to factors at this level than the macro-level.

Group collateral had fewer influencing factors, with asset based finance circumventing all meso level factors. This may point to the flexibility of innovative finance in adapting to conditions in which the value chain operates in comparison to grants or subsidies.

Equally important were meso-level factors that did not show a statistically significant influence on finance instruments- namely the type of upgrade, institutional structure and temporal variation of the interventions.

On the one hand the stage of intervention, processing or direct retail product, the type of intervener, source of funds, product group and perishable or durable product qualities had an influence on the use of grants and subsidies.

On the other hand group collateral had an association with the end market and product group whereas all factors did not have an association with asset based finance.

Thus, it may seem plausible that asset based finance- having the most innovative and heterogeneous package of instruments – may be able to circumvent conditional barriers at the chain and sector levels better than group collateral financing.

5.3 Final Reflections

This paper began with a hypothesis that there are variables that influence the type of finance instruments that are used in value chain development projects. Understanding these conditions may help to design appropriate financing interventions and thus increase the flow of finance to the agriculture sector and to small holder farmers in particular.

Following dwindling investments in agriculture in developing countries, finding new forms of agriculture financing is pertinent. The value chain finance approach looks at the viability of the entire chain and not only that of individual farmers. Hence small holder farmers in value chains can leverage chain relationships with more creditworthy chain members to attract direct and/or indirect finance.

In this study, firstly three categories of value chain finance instruments were identified namely asset based, group collateral based finance as well as grants and subsidies. Next, influential conditions were identified through interviews with practitioners and from literature. Finally a chi square test was used to test the presence of a relationship between these conditions and financing modalities.

In conclusion, the paper ends with a hypothesis that innovative value chain finance may be able to circumvent some conditions such as the regulatory environment or a product's end market. This was exemplified by asset based finance- the most innovative of the finance groups. Asset based finance had the most heterogeneous package of financing instruments thus making it potentially the most adaptable to a range of both external and internal value chain conditions.

Implications for designing value chain development interventions are therefore that the identified factors may need to be taken into account when designing interventions. Further study is needed to determine the direction and extent of these influencing factors. In conclusion, a further implication is that asset based finance may have potential for expanding finance to small holder farmers in developing countries.

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Appendices

Appendix 1 Interview Respondents

Name	Why a particular finance instrument was used
Nicolaus Cromme Common fund for commodities, 14 August 2013	<ul style="list-style-type: none"> • Sheer availability of type of finance instrument depending on local financial institutions. • Function of trade-off between risk management and reduction of transaction costs. • CFC subcontracts executing agencies who then decide how to disburse funds. • Out-grower schemes are working best.
Professor Lateef Sanni Nigerian Institute of Food Science and Technology, 26 August 2013	<ul style="list-style-type: none"> • Grants used for West Africa (Benin, Nigeria, Sierra Leone) cassava project because of high loan defaults in previous projects. • Bank conditionality dissuades loan taking by project recipients. • Also using leases for example would target intervention at the financial institute level and not farmer-processors.
Henk Knipscheer EUCord and Winrock 30 August 2013	<ul style="list-style-type: none"> • Sorghum project in Ghana and Sierra Leone for local supply to Heineken and Guinness breweries. The two countries are very different. • Ghana has higher financial market sophistication. Hence farmers given loans of hundreds of dollars, and are paid via bank accounts (less loan repayment); venture funds based on purchasing contracts; credit in kind to input suppliers. • Sierra Leone, post war situation; credit to intermediary buyer so as to pay farmers cash; also microcredit- tens of dollars- to farmers for the 'hungry season' just before harvest. • Free training to farmers as they are not willing to pay, without first seeing the benefits of the training. • Women have very high credit repayment rate. • Nucleus farmers
Dun Grover ACIDI/VOCA 12 September 2013	<ul style="list-style-type: none"> • Nucleus farmers and large traders act as aggregators in the ADVANCE project in Ghana. • High demand from buyers wanting to secure supply of soy, maize and rice. But very poor farmers in the North. • Lead farmers use contract with buyers to get loan from Stanbic and Ecobank
Luud Clercx TASTE 16 September 2013	<ul style="list-style-type: none"> • Grants used in 'organic certified bananas' project in Senegal. • Actors are not yet bankable- APROVAC organizes the farmers but does not engage in commercial activities. • Arm's length relationship between farmers and buyers. • Dependent on aid for at least the next 2 years.

Appendix 2 Email Responses

Name	Why a particular finance instrument was used
John Riches Just Trading Scot- land October 2013	<ul style="list-style-type: none"> • Grants for machinery and farmers group. • Also Fair-trade premium price.
Samuel Ndonga Hivos East Africa 23 September 2013	<ul style="list-style-type: none"> • Warehouse receipts not well developed in East Africa, where they exist owners charge high prices to hold produce. • Loans and trade finance most common- financial markets still very traditional, no sophisticated products specifically for value chains. • Agriculture perceived as high risk, lack of professionalism of producer organizations • No free services
Soneni Ncube Hivos Zimbabwe 18 September 2013	<ul style="list-style-type: none"> ▪ Lack of funds in the financial system during crisis. Funds given to banks to on-lend to private companies who are supplied by small holders. ▪ Microcredit
Hung Hoeng Olam, 11 September 2013	<ul style="list-style-type: none"> • Working capital advances to secure supply.
Andre Vording ICCO 2 September 2013	<ul style="list-style-type: none"> ▪ Grants for capacity building; guarantees for loan and microcredit. ▪ Emerging chains in Madagascar (cloves), former Soviet Union, and after agrarian reform in Philippines.
Ravinder Chetty ICRISAT, India 26 August 2013	<ul style="list-style-type: none"> • Farmers in India lacked knowledge and access to loans- hence introduction of kisan credit card scheme. • In contrast, farmers in China and Thailand took bank loans.
Mandla Langwenya Technoserve Swazi- land 15 August 2013	<ul style="list-style-type: none"> ▪ Lead farmers train beekeepers ▪ Donors provide equipment- hives
Eduardo Ruata Technoserve Gua- temala 6 August 2013	<ul style="list-style-type: none"> • Inputs- seeds, fertilizer, fungicides at fair cost. Not free. • Buyers pay premium price.

Appendix 3 Finance for Products in Different Countries

Product Category	Type of Finance Per Country		
	Asset Based Finance	Group Collateral	Grants/ Subsidies
spices- chilli, peppers, vanilla, cloves, ginger	Kenya	Sierra Leone, Madagascar, Uganda,	Liberia
roots and tubers - cassava, potato	Sierra Leone, Uganda	Peru, India, Sierra Leone, Uganda	Benin, Nigeria, Sierra Leone
oil seeds- peanut, soybean, sunflower, Shea nut, coconut, cashew	India, Tanzania, Mozambique, Brazil, Indonesia, Malawi	Ethiopia, India, Kenya, Tanzania, Vietnam, Mozambique, Indonesia, Burkina Faso	Burkina Faso
livestock- cattle, beehives, chickens	Ethiopia, Bolivia, India, Kenya, Argentina	Ethiopia, Bolivia, India (3), Kenya (2), Zimbabwe, Serbia, Pakistan, Zambia	Swaziland, Serbia
cereals and cereal products- quinoa, sorghum, millet, rice	Bolivia, India, Kenya, Rwanda (2), Mali, Ghana (2), Philippines	Rwanda, Thailand, China, Zimbabwe, Uganda	Bolivia, Ghana, Sierra Leone, Malawi
stimulant crops and derived products- coffee, cocoa, tea	Ethiopia (2), Guatemala, Peru, Bolivia, Kenya, Tanzania, Rwanda, Uganda, Indonesia	Ethiopia, Guatemala, Kenya, Tanzania, Nicaragua, Vietnam, Ivory Coast	Tanzania, Nicaragua, Ecuador
fibres of vegetable and animal origin- cotton, wool, timber	Peru, India, Tajikistan, Papua New Guinea	Tanzania (2), Zambia, Papua New Guinea	
fruits and vegetables	Guatemala, Kenya, Ghana, Kyrgyzstan, Tajikistan, Honduras	India, Kenya, Ghana, Madagascar, Tajikistan, Philippines	Guatemala, India, Gaza, Philippines
combination of products	Georgia, Dominican Republic, Mexico	Tanzania	Tanzania, Georgia, Dominican Republic, Moldova

Source: Product Categories adapted from FAO Stats (FAO. 1994)

Appendix 4 Main Interveners of Processing or Retail Value Chains

Main intervener		Absolute number of value chains						Total
		bilateral organization, multilateral, government	NGO, international cooperatives	credit union, microfinance institute, bank	buyer	farmers' organizations	private	
next stage use-processing, direct retail	processing	11	15	5	15	2	6	54
	retail, processing not required	4	11	1	6	2	2	26
Total		15	26	6	21	4	8	80

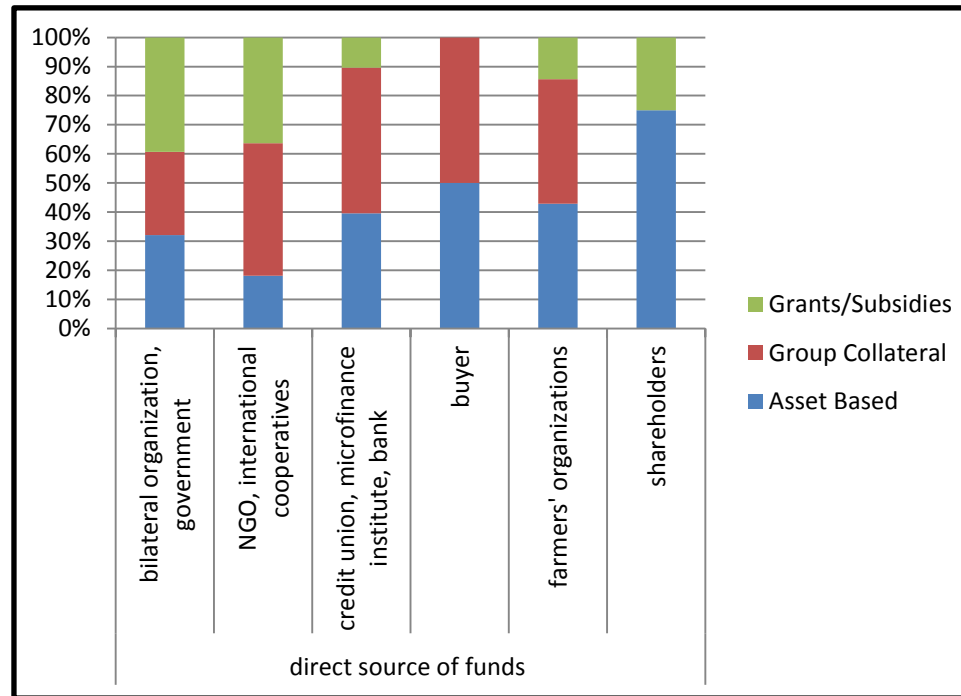
Appendix 5 Source of Funds for Processing or Retail Products

direct source of funds		Absolute number of value chains						Total
		Bilateral, multilateral organization, government	NGO, international cooperatives	credit union, microfinance institute, bank	buyer	farmers' organizations	Shareholders	
next stage use	processing	9	4	28	11	1	1	54
	retail, processing not required	7	5	6	3	3	2	26
Total		16	9	34	14	4	3	80

Appendix 6 Source of Funds and Institutional Arrangements

direct source of funds to the intervened		Absolute number of value chains					Total	
		Bilateral, multilateral organization, government	NGO, international cooperatives	credit union, micro-finance institute, bank	buyer	farmers' organizations	shareholders	
institutional structure	spot market	7	6	12	4	3	1	33
	contract	9	4	24	4	1	1	43
	vertical integration	3	0	1	7	0	0	11
Total		19	10	37	15	4	2	87

Appendix 7 Source of Funds and Type of finance used in Value Chain Interventions



Appendix 8 References for Dataset

Value Chain Product	URL Reference	Date accessed
dairy	http://www.iadb.org/intal/intalcdi/PE/2013/11193.pdf	05-Sep 13
cassava	http://www.common-fund.org/fileadmin/user_upload/Illustrations/Projects/CFC_Benin_Report.pdf ; http://www.common-fund.org/news-and-events/news/cfc-cassava-value-chain-development-in-west-africa/	22 Aug 13; 23 Aug 13
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