

**Sustainable, Inclusive Agriculture Sector Growth in Armenia:
Lessons from Recent Experience of Growth and Contraction**

Background Report for World Bank Systematic Country Diagnostic for Armenia

Final Report



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ACRONYMS

AMD	Armenian dram
CPI	Consumer Price Index
EEU	Eurasian Economic Union
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GFC	Global Financial Crisis
ILCS	Integrated Living Conditions Survey
MoA	Ministry of Agriculture
NSS	National Statistical Service of the Republic of Armenia
SCD	Systematic Country Diagnostic
SWC	State Water Committee
USAID	United States Agency for International Development

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EXECUTIVE SUMMARY

Key Messages:

- Agriculture is an important sector in the Armenian economy, with a contribution of 20% of the GDP, 35% of the employment, about a third of the total export in 2015.
- Small-scale, semi-subsistence farms predominate the sector, with 80% of the farms having less than 2 ha of land. Only 1% of farms have more than 10 ha, and these farms account for 15 % of agricultural land use. Irrigated land accounts for 30 and 45% of the total agricultural land and value of crop production, respectively.
- Agriculture has recorded strong growth during 2004-2015. It grew by 83% and accounted for a quarter of the 70% growth in the overall economy during this period. This growth has been driven largely by increased productivity of semi-subsistence farms through increased fertiliser and improved seed use. The growth has largely been inclusive of small scale farmers.
- Agricultural export more than quadrupled between 2004 and 2015. Yet, most of these exports (70% of the total agricultural export) come from the export of beverages and tobacco products, which do not draw significantly on Armenia's agricultural resource base.
- Agriculture has experienced improvements in access to credit, Foreign Direct Investment (FDI), and Government budget support during this period. Sector access to capital improved, both through commercial bank lending for agriculture and FDI in primary production and agro-processing. The agriculture budget increased modestly (4%) during 2012-2015. Yet, the budget support is not well targeted with a third of the total budget expenditure allocated to subsidies at the expense of essential public services that account for less than 2% of the budget support.
- The overall agricultural employment has declined by 18% while women employment increased by just 1% (men employment fell by 33%) between 2004 and 2015. Higher agricultural productivity and prices, as well as the fall in labor supply, contributed to higher agricultural wages, which increased by 126% from 2004-2015. Yet, agricultural wages remained at 65-70% of non-agricultural wages.
- The sector has been largely resilient against frequent shocks during the last decade. Factors that contributed to the resilience of the sector to shocks include its semi-subsistence nature, diverse farming systems, adoption of drought tolerant crops, and strong and stable base of public transfer systems.
- This study provides four hypotheses that can be used as bases to review the contribution of the agriculture sector to sustainable and inclusive growth in Armenia. These are: i) a new model, which focuses on medium-scale farms and commercialized farming, for agriculture sector growth; ii) a vibrant private sector driven by medium-scale farms and agri-business enterprises; iii) investment in knowledge transfer for farmers and agri-business and improved education and training for rural people; and iv) resilience in a modernized agriculture sector.

I. The Context for Agriculture Sector Analysis

The World Bank is preparing a Systematic Country Diagnostic (SCD) for Armenia, with the aim to identify key challenges and opportunities to advance the twin goals of ending absolute poverty and boosting shared prosperity. Preliminary analysis of Armenia's progress towards these goals suggests that preparation of the SCD should be guided by the following hypotheses:

- Armenia needs a new growth model and new drivers of growth to be sustainable;
- Support for firm productivity and a vibrant private sector are crucial for economic growth;
- Investment in productive individuals will be key for inclusive growth; and
- Building national resilience to vulnerabilities will bring sustainable growth.

These hypotheses provide the point of departure for the background studies implemented to inform preparation of the SCD, including this review of Armenia's agriculture sector.

With 20% of GDP, 35% of employment and 28% of exports in 2015, the agricultural sector has a major influence on Armenia's economy. It grew by 83% at constant prices from 2004-2015, versus 70% growth for the overall economy, and accounted for 24% of total growth. Rural poverty rates remained slightly lower than urban poverty rates (outside Yerevan) for most of this period and progress with rural poverty reduction has largely mirrored progress with urban poverty reduction.

Much of the country is a high, mountain plateau with a limited consequent area of arable land. Of the 2.05 million ha of agricultural land, around half is mountain pasture. Only 25% of agricultural land (505,000 ha) is suitable for intensive cropping, of which 446,700 ha is used for annual crops, and 57,700 ha for perennial crops. Permanent pastures account for a further 121,700 ha. Less than 30% of agricultural land is irrigated, with 110,000 ha reported by the State Water Committee and 92,200 ha reported in the Agricultural Census. Based on Census data, irrigated land accounts for around 45% of the total value of crop production. The climate is continental, with hot summers and cold winters. Rainfall is low, ranging from 250 mm in lower areas to more than 800 mm in the mountains. The limited area under irrigation is thus a major constraint, particularly in the drier, lowland areas where intensive agriculture is concentrated. This problem will deepen in response to climate change as the water supply for irrigation will fall and the demand for irrigation will increase.

Small-scale, semi-subsistence farms predominate. The Agricultural Census reports 345,875 farms with an average of 1.5 ha of agricultural land. Eighty percent of these farms have less than 2 ha. Only 1% of farms have more than 10 ha, and these farms account for 15% of agricultural land use. Traditional, mixed crop and livestock production systems predominate, with most land used for dryland cereal production for own consumption and livestock feed. A small herd of cattle and sheep provides milk and meat for own consumption and some cash income, supplemented by cash income from fruit and vegetables. The use of modern technology is low, with low consequent crop and livestock productivity.

Sector growth has had a modest impact on rural household income, as the combination of small farm size and low farm productivity keep farm incomes low. Rural households rely on a mix of farm and non-farm incomes for their livelihoods, with non-farm sources as the major component. Hence, while rural household incomes increased by 88% in real terms from 2004-2015, this increase was driven by rising non-farm income. Farm income's share of total income fell from 52% in 2004 to 26% in 2015.

II. Characteristics of Sector Growth – Strong but not Sustainable

While agriculture sector growth has been strong, closer examination shows that this growth is not sustainable. It has been driven largely by increased productivity of semi-subsistence farms rather than widespread adoption of improved technology and a shift to modern, commercial agriculture.

Increased Productivity....but Modest Changes to the Composition of Production

Productivity increases were the main drivers of observed agricultural sector growth. Land productivity (measured in constant prices) increased by 64% from 2004-2015, driven by a strong increase in crop yields and a modest increase in livestock numbers and livestock productivity. There was little increase in the area under cultivation and a minimal shift to higher value crops. Cattle and sheep numbers increased by around 20% and pig numbers by 67% (albeit from a very small base); while livestock productivity increased by 21% for milk production/cow and 28% for egg production/hen. Poultry numbers fell by 17%. Labor productivity increased by 122% from 2004-2015 -- almost twice the increase of land productivity. Most of this increase was due to a sharp reduction in the number of

people employed in agriculture, which resulted from underlying demographic trends, migration to Russia and a shift of agricultural labor to other sectors.

The semi-subsistence nature of agricultural production has not changed substantially since 2004. Within the crop sub-sector there was little change in the total area cultivated or the composition of production. The total area planted increased by only 9% (35,000 ha) from 2004-2015, despite government measures to reduce the amount of unused agricultural land. Low value cereal crops grown for household and livestock consumption continued to account for approximately 50% of the total area cultivated. The area sown to high value crops (vegetables, fruit, berries, grapes) increased by only 14% (15,600 ha), during a period of rising demand for fresh fruit and vegetables on domestic and export markets. Similarly, the modest changes in livestock numbers do not signal any real change in livestock production systems. Herds remain small, management systems remain very traditional and livestock productivity remains low. These are modest changes over such a long period, particularly given the extent of modernization in other parts of the economy.

The productivity increases achieved to date have thus been from a very low base, and without substantial change in the semi-subsistence orientation of most farmers. Further, sustainable increases in productivity are essential if sector growth is to continue, based on a shift from semi-subsistence to commercial agriculture.

Strong Export Growth....but Driven by Beverage and Tobacco Products

Agricultural exports have increased dramatically, from US\$81.6 million in 2004 to US\$389 million in 2015 – faster than the growth in total exports. Most of these exports, and most of the observed growth, derive from the export of beverages (particularly alcoholic beverages) and tobacco products (particularly cigarettes). While these two commodity groups accounted for over 70% of total agricultural exports during the period of analysis, neither group draws significantly on Armenia's agricultural resource base. Wine grapes, the raw material for Armenia's internationally renowned wines and spirits, are grown on approximately 10,000 ha – 3% of cultivable land. Cigarettes are manufactured from imported tobacco. And most of the benefits of growth in these exports have accrued to large, sophisticated corporate enterprises rather than to Armenia's farmers.

The export of crop and livestock commodities, which draw much more widely on the agriculture resource base, grew from US\$20.0 million in 2004 to US\$107.9 million in 2015. Most of this growth occurred after the global financial crisis, from 2010-2013 in response to strong demand in Russia – Armenia's traditional export market for agricultural products. Closer analysis of these commodity groups shows that these exports are dominated by fresh fruit and vegetables, fish products, dairy products and processed fruits and vegetables.

Russia is the major export market for beverages and crop and livestock commodities, with more than 70% of exports by value. This high dependence on Russian markets makes the agriculture sector highly vulnerable to the volatility of the Russian economy. The European Union (EU) receives less than 5% of the value of exports for these two commodity groups.

Increased Access to Credit and Foreign Direct Investment....but Uncertain Impact

Sector access to capital improved significantly during the period of analysis, both through commercial bank lending for agriculture and FDI in primary production and agro-processing. Commercial bank lending to agriculture rose 10-fold in real terms. On the supply side this increase was facilitated by expansion of the Armenian banking system and a consequent increase in lending to all sectors of the

economy – not just agriculture. Donor credit lines of US\$40 million for rural finance from 2012-2015 further boosted credit for agriculture.

Demand for credit was increased by an interest subsidy program introduced by the Ministry of Agriculture (MoA) in 2011. Designed to support Armenia's smallest farms, this program reduced interest rates on agricultural loans by commercial banks from 10%-12% to 4%-6%, on loans of up to 3 million drams. The impact of this subsidised credit program is unclear. There has been no monitoring of the use of the credit under this program and consequent scepticism of the extent to which it was used for legitimate investment in agriculture. This scepticism derives from the program's focus on very small farmers, the absence of any requirement for borrowers to make an equity contribution to the investment, and the minimal observed shift from semi-subsistence to commercial farming.

Foreign direct investment in the agriculture sector averaged US\$44 million for the period 2008-2015. Of this amount, approximately 60% was for beverage processing, 33% for crop and livestock production and 7% for food processing. FDI into crop and livestock production and food processing has been largely driven by Armenian diaspora investors resident in Russia. Hence, while providing a welcome source of private sector capital, this investment has not helped to diversify export markets or to introduce advanced western technology and management experience.

Increased Budget Support....But Not Well Targeted

Budget expenditure on agriculture is low, both as a proportion of total budget expenditure (2.2%-2.6%) and as a proportion of agriculture GDP (3.1%-3.6%). Analysis for 2012-2015 shows that approximately half of the budget expenditure for agriculture is allocated to the MoA for programs and services for crop and livestock production, 40%-45% to the SWC for irrigation and the remaining 4%-5% is used for forestry, fishing and hunting. The agriculture budget increased by only 4% in real-terms during this period, much lower than for total budget expenditure.

Of the expenditure by the MoA, direct subsidies for fertiliser, improved seed, agricultural chemicals, fuel and interest rates account for a high one-third of total expenditure. In contrast, an essential public service such as agricultural extension accounts for only 2%. The allocation of one-third of the total budget expenditure to subsidies at the expense of essential public services is questionable when budget resources are so limited and the resultant capacity to deliver these services effectively is so restricted. This misallocation is even more questionable when the focus of these subsidy programs is suspect. Subsidies are designed to benefit the sector's smallest farmers, with a low limit on the maximum loan size for interest subsidies; and eligibility for fuel, fertiliser, chemical and seed subsidies limited to farms of less than 3 ha. Not only are smaller farmers less likely to invest in and expand their farms, the subsidies discourage them from increasing farm size as they lose their eligibility for support.

The key driver of sector modernization is an effective institutional base for delivering knowledge to farmers. The extension system has tried to fill this need but has only partially succeeded due to lack of resources. Annual budget expenditure on Armenia's severely under-resourced agricultural extension system averaged US\$780,000 from 2012-2015, versus US\$10.1 million for direct subsidies. The recent decision to scale down the public extension system will further weaken the institutional base for knowledge transfer, which is so critical for the transition to modern, commercial agriculture.

SWC supplies water, through the public Water Supply Agency (WSA), to Water User Associations (WUAs) who distribute it to around 110,000 ha and 180,000 farmers. Much of the infrastructure is in poor condition, despite considerable donor investment, which results in high water losses and inefficient water delivery. With donor support, the SWC is working to improve infrastructure, reduce the reliance on high-cost pump irrigation, and build an institutional

infrastructure based on farm-level water management by WUAs. The current cost of water delivery is estimated at 22-24 drams/cu3, of which farmers pay 11 drams/cu3, and the balance is paid through subsidies from the SWC to the WSA and WUAs.

Medium-term objectives include a technical audit of the entire irrigation system as the basis for identifying priorities for rationalization of the current system and further investment, and the introduction of more sophisticated water management systems. A law on Irrigation Water Use will be enacted to increase government's capacity to control water use (levels of water use, types of crops, night versus day irrigation, etc.) and the capacity of WUAs to enforce payment of water use fees. These improvements, and a consequent improvement in the quality of water delivery, will provide a more equitable basis for an eventual increase in water use fees and the reduction of SWC subsidies. The gradual conversion from pumped to gravity irrigation will also lower the costs of water delivery.

III. Agriculture Sector Growth and Employment Generation

Agricultural employment fell from 461,500 in 2004 to 379,000 in 2015 – a decline of 18%. While this decline contributed to increased labor productivity, it also reduced the sector's contribution to overall employment. Women's employment in agriculture increased by 1% (2,200 people) during the same period, however, and agricultural wages rose by 126% in real terms.

Not all of the fall in agricultural employment is due to out-migration. Closer analysis suggests that it is also due to underlying demographic trends and a shift of farm labor to non-farm jobs. Armenia's low fertility rates mean that population is inherently falling, because natural population increase is not sufficient to offset mortality. Out-migration exacerbates this trend, particularly within the economically active population, as most migrants are part of this category. Analysis of migration for the period 2012-2015 suggests that around 50% of out-migration from rural areas may be seasonal. Gross out-migration flows may thus exaggerate the impact of migration on agricultural employment. Rural migrants tend to have low education and vocational skills – limiting their employment opportunities to temporary, unskilled work.

There is also evidence of a shift from farm to non-farm employment in rural areas. Public services, manufacturing, trade/services and transport are all important sources of rural employment and employment in these sectors has grown. This highlights the diversity of non-farm employment opportunities in rural areas, and the consequent need for broad-based education and vocational training to improve access to all of these opportunities. But the net gain of non-farm rural employment from 2010-2015 has not been sufficient to offset the loss of agricultural employment.

Within agriculture there has been a marked shift in the gender composition of agriculture. The number of men employed fell by 84,800 (33%) from 2004-2015. Female employment increased by 1% during the same period. Women's share of total agricultural employment thus increased from 44% in 2004 to 54% in 2015. While this gender shift has improved the prospects for female employment in agriculture, it has undoubtedly also increased the overall labor burden on rural women.

Agricultural wages increased by 126% in real-terms from 2004-2015, in response to higher returns from agriculture, the falling supply of labor and increasing wages in other sectors. Wages for women in agriculture increased by 148% and for men by 121%. Agricultural wages remained at 65%-70% of non-agricultural wages, nevertheless. The impact of this wage increase on agricultural sector incomes was probably minimal, however, as wage employees account for only 3% of agricultural employment.

IV. Inclusive Agriculture Sector Growth

There is reasonable indirect support for the inclusiveness of agriculture sector growth. First, the small size of most of Armenia's farms means that agriculture sector growth inherently benefits smaller, poorer households. Eighty percent of Armenia's 345,875 farms are less than 2 ha. Second, the productivity increases and public investments that have driven sector growth are scale neutral and so readily accessible by small-scale farmers. The yield increases that have driven increased crop production are the result of increased fertiliser use and wider use of improved seed -- simple, low cost technologies that most farmers use and understand. Access to fertiliser and seed has also improved in response to government subsidy programs. Similarly, increased livestock production has been driven by increased livestock numbers -- the easiest and least costly way to increase livestock output. Public investment has focused on irrigation, development of the extension system, measures to strengthen WUAs and support for farmer cooperatives and producer associations as a means to improve the economies of scale needed to engage more profitably in agricultural markets. All farms -- large and small - benefit from these investments. Third, subsidies from the MoA explicitly target small farms and there is no lower limit on eligibility for these subsidy programs.

V. The Strong Underlying Resilience of Agriculture

The agriculture sector is inherently resilient due to: its low vulnerability to exogenous shocks, the low variability of rural household incomes and the capacity to recover rapidly from exogenous shocks.

Low Vulnerability to Exogenous Shocks

Sector growth slowed in response to the Global Finance Crisis (GFC) in 2009 and the Russian recession in 2013-2014, but even these events did not lead to sector contraction. The only contraction from 2004-2015 was due to a severe drought in 2010, which resulted in a sharp fall in real agriculture GDP. The sector's innate capacity to withstand shocks derives from its semi-subsistence nature -- with most production grown for own consumption; and the highly, diversified crop and livestock production base of most farms. Exposure to climatic shocks remains, nevertheless, due to Armenia's low rainfall agro-climatic conditions and the limited area under irrigation. The high current reliance on drought tolerant cereal crops mitigates this risk to some extent; but severe droughts, although infrequent, can take their toll.

The modernization and commercialization of agriculture, and associated emphasis on high value export crops will increase the sector's exposure to economic and climatic shocks. High value crops are vulnerable to drought and increased exports will raise the exposure to price and exchange rate risks. Climate change will further exacerbate the sector's exposure to climatic risks and increase the volatility of international markets.

Low Variability of Rural Household Income

There was no major contraction of real rural household income from 2004-2015, and minimal inter-annual income variability. This strong household level resilience derives from the highly-diversified nature of household income. Significantly, non-farm incomes have become the major source of rural household incomes (approximately 70%), the major driver of household income growth and the major source of household income stability. This includes public pensions and other welfare payments, which rose strongly in real-terms from 2004 -2009, and now account for 20% of total income. Such public transfers, together with private transfers (remittances), provide a critical buffer in times of difficulty. These public and private transfers ensured that real incomes for rural households remained relatively stable from 2008-2011, in the face of successive shocks from the GFC and then from drought.

Rapid Recovery from Exogenous Shocks

Resilience denotes not only the ability to withstand shocks, but also the capacity to recover quickly from shocks when they do occur. The highly-diversified income base of rural households not only mitigates the impact of exogenous climatic shocks, it also facilitates access to the financial resources needed to recover from such shocks. This capacity for rapid recovery is evident at both sector and household level. At sector level, aggregate growth recovered very quickly after the 2010 drought, with annual growth of 14% in real-terms in 2011. At household level, the capacity to recover from severe, successive shocks in 2009 and 2010, was facilitated by an increase in private transfers, a strong and stable base of public transfers and the stability of most other sources of rural household income.

VI. Implications for the SCD and Future Agriculture Policy

The four hypotheses used as the basis for review of the contribution of the agriculture sector to sustainable, inclusive growth are considered below, with associated recommendations on the kinds of policies and programs needed to support their underlying objectives.

1. A New Model for Agriculture Sector Growth

The current model for agriculture sector growth is not sustainable. Although sector growth has been significant and inclusive, it has not led to the structural transformation needed to build a modern agriculture sector or the institutional infrastructure needed to transfer the knowledge that modern agriculture requires. Growth has been achieved by improving the productivity of small-scale farms that continue to use the semi-subsistence production systems initiated in the late 1990s. Armenia's capacity to produce and export high value crop and livestock products has yet to be fully exploited. By focusing on input subsidies for the smallest farms rather than facilitating farm enlargement and building the institutional infrastructure for knowledge transfer, Government has preserved this structure rather than driving its transformation.

The suggested building blocks for a new model for agriculture sector growth are as follows:

- ***A focus on medium-scale farms, and farmers willing to invest in modern farming technology and the knowledge needed to use this technology effectively.*** In addition to setting minimum and maximum size thresholds for eligibility for public support programs, beneficiaries of future public support programs for investment should also be required to make a significant equity contribution to any investments supported. This approach, which would introduce a strong element of self-targeting, is conspicuously lacking in current government support programs. While the focus on medium-scale farms and progressive farmers will inevitably limit the number of farms supported, these are the farms and farmers with the resources and incentives to drive the transformation to a modern, competitive agriculture sector. This approach is conducive to inclusive sector growth. Farms of 3-10 ha, the potential range for targeting, are small in absolute terms and a high proportion will be among the bottom 40%.
- ***A broad-based medium term program to facilitate farm enlargement through the land market.*** The deep-seated constraints to modernization posed by Armenia's small, fragmented farms are currently being addressed through support for cooperative activity. While effective in some contexts, this approach does not address the long-term need to resolve this issue through land markets. Average farm size has changed little in 20 years. The following initiatives will accelerate progress in the next 20 years:

- Land consolidation programs;
 - Strengthen the public institutions responsible for land surveying, land registration and land conveyancing;
 - Strengthen the private institutions responsible for rural land valuation and the sale of rural real estate;
 - Review the role of land taxes as a way to improve the efficiency of agricultural land use; and
 - Incentives to encourage older farmers to lease or sell their land to younger farmers (e.g. land tax exemptions, public transfers, etc.).
- ***High levels of public and private investment in knowledge transfer systems for farmers and agri-business (discussed further below)***
 - ***Continued government and donor support to develop and strengthen value chains as the basis for increased commercialization of agriculture and increased agricultural exports.***
 - ***Increased engagement by the ministries of health, education, social welfare and employment in measures to improve rural livelihoods.*** The livelihoods of most rural people depend more on non-farm activities than on farming. With its limited human and financial resources the MoA should focus on measures to strengthen agriculture and so farm income; and not try to serve as the major source of public support for all rural people. The ministries listed above should share this mandate. Rural people need education and training systems that prepare them for alternative, non-farm employment opportunities – wherever they find them. And good access to health and welfare services will improve the livelihoods of those who choose to stay.

2. A Vibrant Private Sector driven by Medium-Scale Farms and Agri-Business Enterprises

Agriculture is a largely private sector activity. Its lack of “vibrancy” reflects the limited incentives of many rural households to invest in their farms when non-farm investments offer better opportunities; the small size of most farms and limited consequent ability to commercialize and compete; and the small number of larger agri-business enterprises that distort the playing field for competition. Measures to promote medium-sized farms and agri-business enterprises are needed to strengthen the “missing middle” between very small, semi-subsistence farms and large agri-business enterprises. A stronger, broad-based presence of these medium scale farms and agri-business enterprises will create a more level playing field and strengthen competition – so increasing the vibrancy of private sector activity. The productivity increases needed for these medium-scale farms and agri-business enterprises to be sustainable will come from ongoing support for value chain development.

3. Investment in Knowledge Transfer for Farmers and Agri-Business and Improved Education and Training for Rural People

There are two compelling reasons to prioritize investment in knowledge transfer, training and education in rural areas. First, the transformation of agriculture from semi-subsistence to modern farming systems will not succeed if farmers and agri-business enterprises are unable to use this technology effectively. By improving understanding of these technologies, an effective agricultural extension system also increases the incentives to make these investments and reduces the risks that investment will fail. Second, the rural people leaving agriculture need a strong, broad-based education and access to a range of vocational training programs if they are to find employment elsewhere. Non-farm employment opportunities in rural areas exist across the whole spectrum of economic activity, including employment in public services.

4. Resilience in a Modernized Agriculture Sector

The shift to a modern agricultural economy will inevitably increase the vulnerability of the sector and its farmers to exogenous economic and climatic shocks. The current high resilience conferred by a diversified production base, semi-subsistence production systems that rely on drought tolerant cereal and livestock commodities, and the mixed farm and non-farm income sources of rural households will inevitably diminish. A greater emphasis on commercialization and exports will increase exposure to the vagaries of domestic and export markets, and greater reliance on high value fruit and vegetable crops will increase vulnerability to climatic shocks.

Continued recognition of the benefits of diversified production systems will help to mitigate these risks, together with improved access to and use of irrigation. Improved access to credit and insurance will also be important, together with better access to market information. But ultimately the best protection against these risks is good management, and this comes from effective knowledge transfer.

I The Context for Agriculture Sector Analysis

1.1 Background

The World Bank is preparing a Systematic Country Diagnostic (SCD) for Armenia, with the aim to identify key challenges and opportunities to advance the twin goals of ending absolute poverty and boosting shared prosperity. Preliminary analysis of Armenia's progress towards these goals suggests that preparation of the SCD should be guided by the following hypotheses:

- Armenia needs a new growth model and new drivers of growth to be sustainable;
- Support for firm productivity and a vibrant private sector are crucial for economic growth;
- Investment in productive individuals will be key for inclusive growth; and
- Building national resilience to vulnerabilities will bring sustainable growth.

These hypotheses provide the point of departure for the various background studies now being implemented to inform preparation of the SCD.

This review of Armenia's agriculture sector forms part of this background material. Following an overview of the sector's major characteristics, the study analyses the determinants of agriculture sector growth from 2004-2015 -- a period characterized by both expansion and contraction. The links between this growth and employment creation are then considered, followed by review of the inclusiveness of observed sector growth. Agriculture sector resilience to exogenous shocks is also examined, at both sector and household level. The study concludes by assessing the implications of the analysis for the four original hypotheses.

1.2 Agriculture Sector Characteristics

Armenia is a lower-middle income country with GDP per capita of US\$3,489 in 2015 -- up from US\$1,182 in 2004. The smallest of the Caucasus countries, it has a population of 3.02 million people and an area of 29,743 km². Entirely landlocked, it is bounded by Georgia to the north, Turkey to the west, Azerbaijan to the east and Iran to the south. Road access to Russia, Armenia's main export market, is erratic and expensive because of this geographical location.

With 20% of GDP, 35% of employment and 28% of exports in 2015, the agricultural sector has a major influence on Armenia's economy. It grew by 83% at constant prices from 2004-2015, versus 70% growth for the overall economy, and accounted for 24% of total growth (World Bank Development Indicators). Agriculture sector growth also contributes to rural poverty reduction, although the magnitude of this contribution is unclear as most rural households rely on a combination of farm and non-farm income. Rural poverty rates remained slightly lower than urban poverty rates¹ (outside Yerevan) for most of the period from 2004-2015 and progress with rural poverty reduction has largely mirrored progress with urban poverty reduction. Both urban and rural poverty increased sharply after the GFC, however, indicating the fragility of this progress. Recent evidence suggests that Armenia's progress with poverty reduction since the GFC has been slower than its peers (World Bank, 2015b). Much of the country is a high, mountain plateau, with an area of lower, flatter land along the western border with Turkey. The land base for agriculture is correspondingly rugged and diverse, with a limited

¹ Both urban and rural areas have a poverty rate of around 30%, but most poverty is in the urban areas outside Yerevan (World Bank, 2015b).

area of arable land and large areas that are not economic to farm. Of the 2.05 million ha of agricultural land, around half (1.05 million ha) is mountain pasture. Only 25% of agricultural land (505,000 ha) is suitable for intensive cropping, of which 446,700 ha is used for annual crops, and 57,700 ha for perennial crops (orchards, berries, grapes). Permanent pastures account for a further 121,700 ha. A high 19% of agricultural land (392,200 ha) is unused due to low soil quality, lack of water or isolation from markets and population centres.

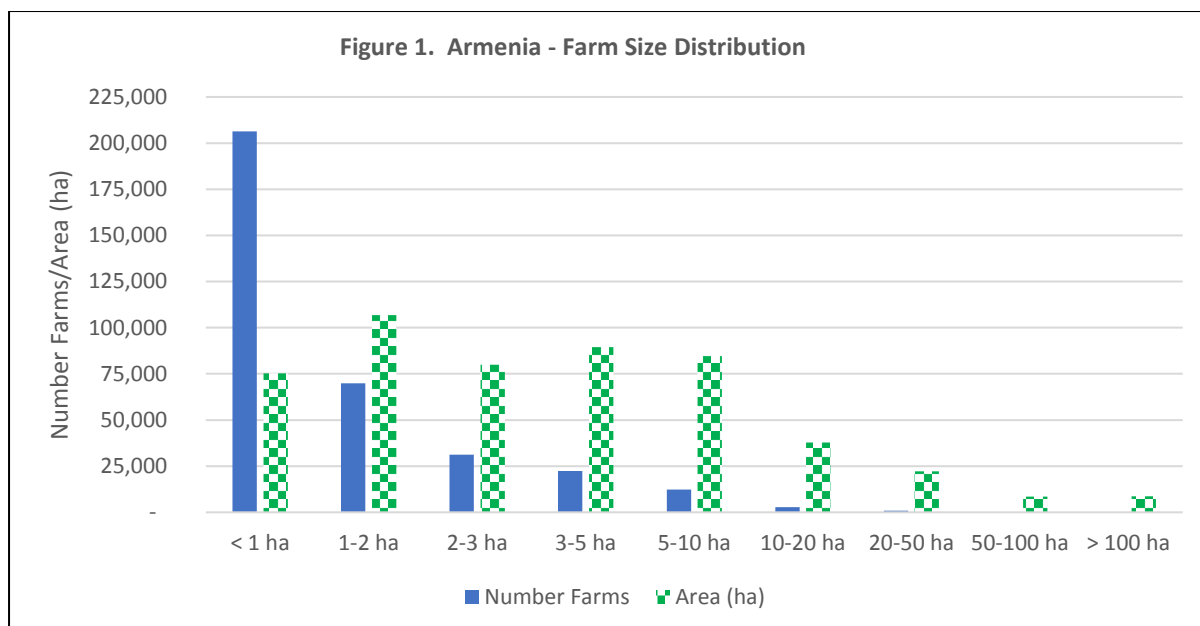
Official statistics report an irrigated area of 154,700 ha (State Committee of Real Estate Cadastre), equivalent to 30% of the land suited to annual and perennial crop production. The actual irrigated area is much less than this, however, with 110,000 ha reported by the SWC and 92,200 ha reported in the 2014 Agricultural Census. Based on Agriculture Census data, irrigated land accounts for around 45% of the total value of production from annual and perennial crops².

The climate is continental, with hot summers and cold winters. Summer temperatures range from 15°C to 30°C and winter temperatures from 0°C to -15°C, with more extreme conditions in the mountain areas. Rainfall is low, with average precipitation ranging from 250 mm in the lower Araks river valley to more than 800 mm in the mountain areas. The limited area under irrigation is thus a major impediment to crop production, particularly in the drier, lowland areas where more intensive agriculture is concentrated. Recent analysis of the impact of climate change on Armenian agriculture shows that this problem will deepen. The water supply for irrigation will fall and the demand for irrigation will increase. Without better access to irrigation, crop yields will fall significantly (World Bank, 2014). Considerable further investment is needed to rehabilitate existing irrigation infrastructure, extend the network of reservoirs that supply irrigation water and increase the efficiency of water use through technologies such as drip and sprinkler irrigation.

Small-scale, semi-subsistence farms dominate the sector, of which most lack the resources or incentives to move from semi-subsistence to commercial agriculture. The recent Agricultural Census (2014) reports that there are 345,875 farms with an average size of 1.5 ha of agricultural land. Sixty percent of these farms have less than 1 ha, and 80% have less than 2 ha (Figure 1). Farms with less than 2 ha account for 35% of total agricultural land in production. At the other extreme only 1% of farms have more than 10 ha, and these farms account for 15% of agricultural land use.

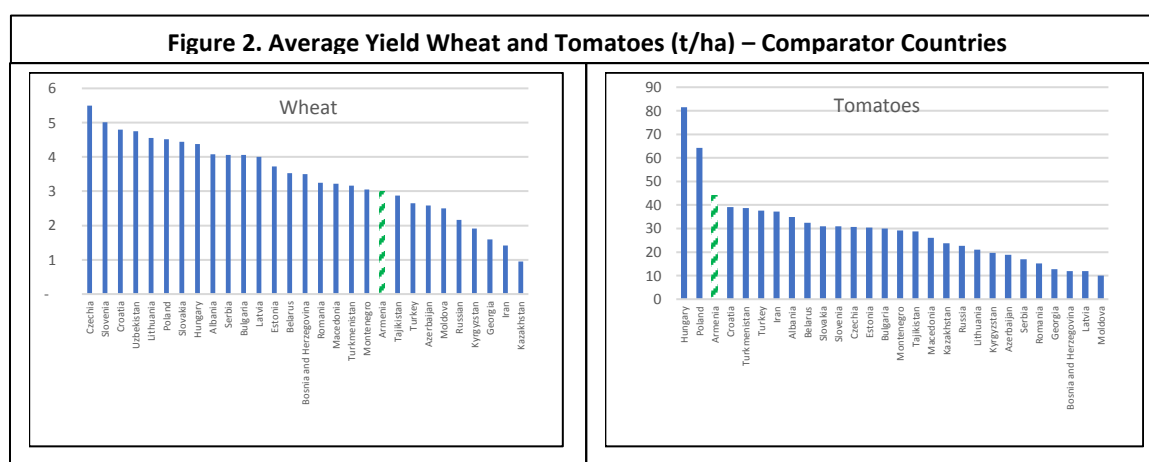
Traditionally, mixed crop and livestock production systems predominate. Farm households use most of their land for dryland cereal production for own-consumption and for livestock feed. A small herd of cattle and sheep provides each household with milk and meat for own-consumption and some cash income, supplemented by cash income from fruit and vegetables. The use of modern technology and modern management systems is low for a lower-middle income country. Only 30% of farmers use agricultural machinery and 37% use mineral fertiliser (Agricultural Census, 2014).

² A figure of 80% of the value of crop production from irrigated land is widely reported but it could not be verified and may reflect the situation prior to independence.

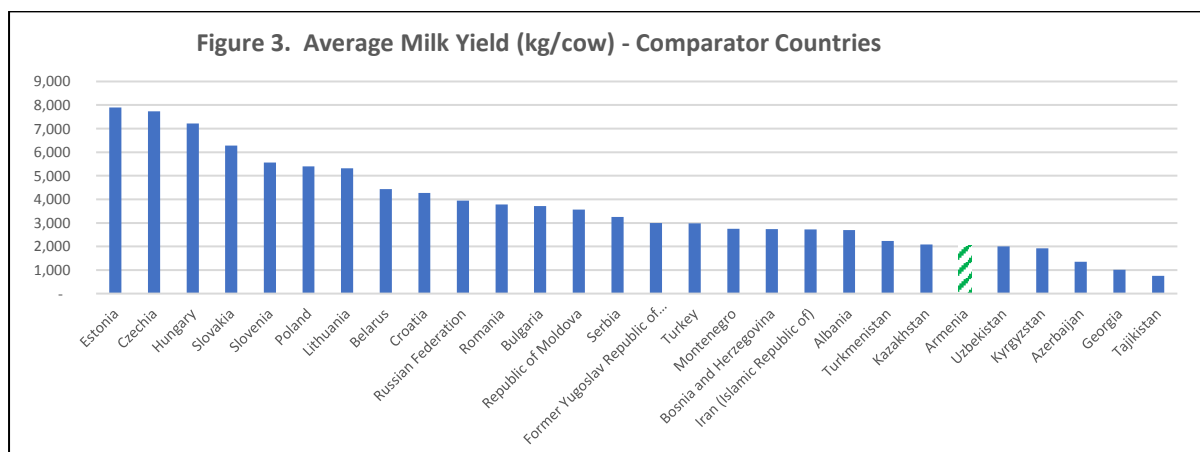


Source: Agricultural Census of the Republic of Armenia, 2014

Crop and livestock productivity is low as a result, both in absolute terms and relative to comparator countries (Figure 2 and Figure 3). However the disparity in productivity is much wider for livestock production and rain-fed crops such as wheat, than it is for irrigated crops such as tomatoes.



Source: FAOSTAT; average for 2012-2014.



Source: FAOSTAT; average for 2012-2014.

Despite the underlying constraints to development, the sector has grown steadily since independence in the early 1990s. For the period of analysis (2004-2015), agricultural GDP increased by 83% in real terms, and agricultural exports increased from US\$81.6 million to US\$389 million. The characteristics and determinants of this growth, and the limits to future growth are discussed in detail in the remainder of the report.

Available evidence suggests that agriculture sector growth has had a modest impact on rural household income. For most rural households' the combination of small farm size and low farm productivity means that agricultural incomes are low in absolute terms. They thus rely on a mix of farm and non-farm incomes for their livelihoods, with non-farm sources as the major component of total household income. Evidence from the Integrated Living Conditions Survey (ILCS) shows that rural household incomes increased by 88% in real terms from 2004-2015. But most of this increase was driven by increasing non-farm income (Table 1), particularly from rising wage earnings, public pensions and public benefits. Farm income (both from sales and consumption of own-produced food) remained fairly constant in real-terms, and its share of total rural household income fell from 52% in 2004 to 26% in 2015.

Table 1. Level and Composition of Real Rural Household Income^a (drams/capita)				
	2004	2008	2012	2015
Non-Farm Income	9,848	18,228	24,149	28,489
Farm Income	10,494	11,536	10,768	9,817
Total Household Income	20,343	29,764	34,917	38,306
Percent Composition				
Non-Farm Income	48%	61%	69%	74%
Wage Employment	20%	30%	29%	38%
Self-Employment	5%	4%	3%	7%
Public pensions and benefits	13%	17%	18%	17%
Private transfers (incl. remittances)	5%	7%	10%	8%
Other	6%	3%	9%	5%
Farm Income	52%	39%	31%	26%
Sale of crop and livestock products	25%	18%	15%	14%
Consumption of own produced food	27%	21%	15%	12%
Total Household Income	100%	100%	100%	100%

Source: Integrated Living Conditions Survey (National Statistical Services)

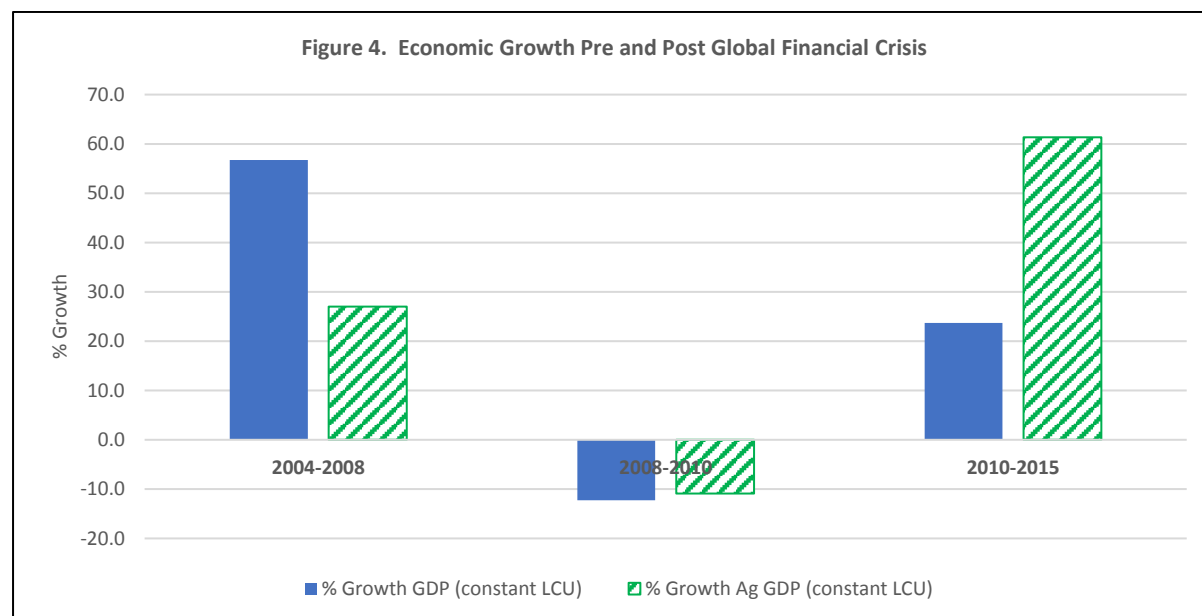
^aNominal income deflated by Consumer Price Index (2010=100)

1.3 Trends Before and After the Global Financial Crisis

The GFC of 2008-2009 ruptured a 14-year period of sustained growth in Armenia, exposed the fragility of this growth and prompted a reassessment of the foundations for future growth. Recent analysis has also highlighted the extent to which economic shocks can set back poverty reduction (World Bank, 2015b), and provided useful insight into the factors that condition growth and recovery in different sectors.

The pattern of growth in the agriculture sector, before and after the GFC, differed from the growth observed for the economy as a whole (Figure 4). Armenia's strong growth prior to the GFC was driven by expansion of the construction sector, which led to increases in both consumption and investment (IMF, 2011). Previous, wide ranging structural reform in the late 1990s enhanced the impact of this economic expansion and made it highly inclusive – with a significant fall in poverty and unemployment. The agriculture sector also benefitted from structural reform, particularly land privatization and market liberalization, which substantially improved the incentives to raise

production and productivity; and from rising domestic demand for agricultural commodities. Agriculture sector growth was slower than overall economic growth, however, due to continued structural constraints. While the transformation from collective farming to small-scale, semi-subsistence farming significantly improved incentives, it did not create a farm structure conducive to the adoption of modern, high technology agricultural production.



Source: World Bank Development Indicators

Investment in agriculture was also much lower than for the economy as a whole. Gross-fixed capital formation in agriculture averaged 9% of agriculture value added for 2004-2008 (FAOSTAT), versus 33% for the economy as a whole (World Bank Development Indicators). Hence, while observed agricultural growth was strong from 2004-2008, (real average annual growth of 7.9%), it was the result of growth from a low base, of a low productivity structure of agriculture. Agricultural production and agro-processing grew nevertheless, along with exports.

The GFC had a much lower impact on agriculture than the economy as a whole. Growth in agriculture GDP slowed from 2008-2009, due to a fall in producer prices, but the sector did not contract. Crop and livestock production changed little. Total agricultural exports fell, but this was due to a sharp fall in beverage exports. In contrast, total GDP fell by 14.9% in real-terms from 2008-2009. Agriculture GDP fell significantly in 2010, (by 15.9%) but this was due to a severe drought rather than the impact of the GFC. The limited impact of the GFC on agriculture is attributed to the sector's semi-subsistence orientation. Farm household production of crop and livestock products for own-consumption was unchanged by the economic shock. The sale of surplus production generated less cash because of lower prices, but this surplus is small and few households rely heavily on this source of income. Hence, while this type of agriculture is not a sustainable driver of future growth, it does provide a powerful buffer for rural people against economic shocks.

Agriculture recovered quickly after the 2010 drought and has grown steadily since. Indeed, together with mining and services it has become one of the main drivers of post-GFC economic growth. Overall, economic growth post-GFC has slowed due to the severe contraction of the construction industry, a marked fall in public and private investment and weak growth in the Russian economy and the European Union (EU). Contraction of the construction industry has reduced both private investment and employment. Public investment has also fallen as the Government has been obliged to reduce public spending to offset the fiscal consequences of increased public expenditure from 2009-2010 to

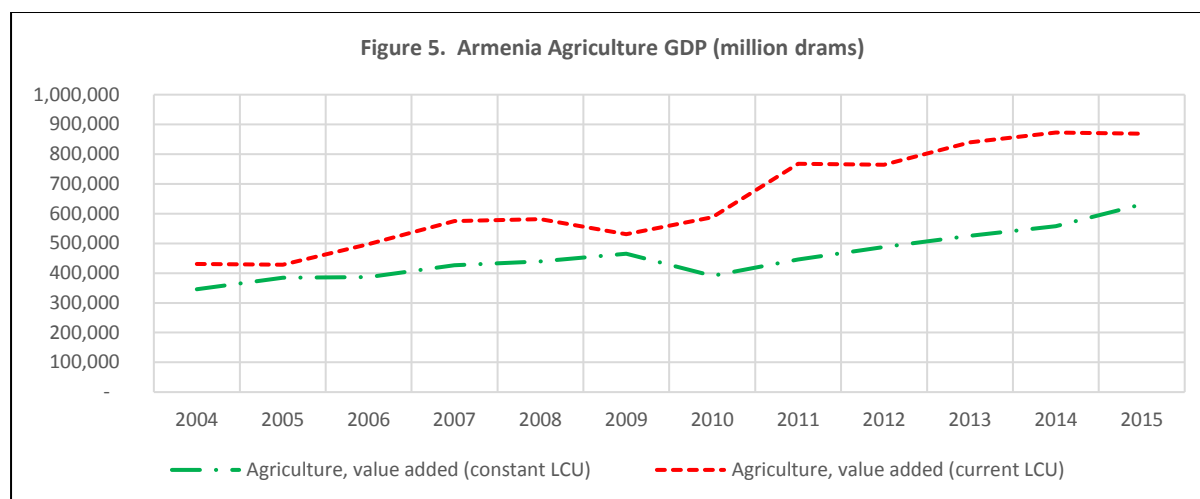
counteract the adverse social impact of the GFC (IMF, 2015). Weaker conditions in Russia have reduced remittances and the demand for exports, and has resulted in a depreciation of the rouble. External conditions have thus played a much bigger role in Armenia's economic path since the GFC, than they did before the GFC.

The agriculture sector recovered quickly from the impact of the GFC and subsequent drought, with average annual growth of 10% in real-terms from 2011-2015. Continued donor investment and FDI in the sector have compensated for the fall in government investment, export growth has accelerated and producer prices have increased. Agricultural exports to Russia have also benefitted from Russia's embargo on agricultural imports from the EU in 2014. This combination of continued investment and rising demands for exports has helped to maintain the incentives to raise output and productivity.

II Characteristics and Determinants of Agriculture Sector Growth (2004-2015)

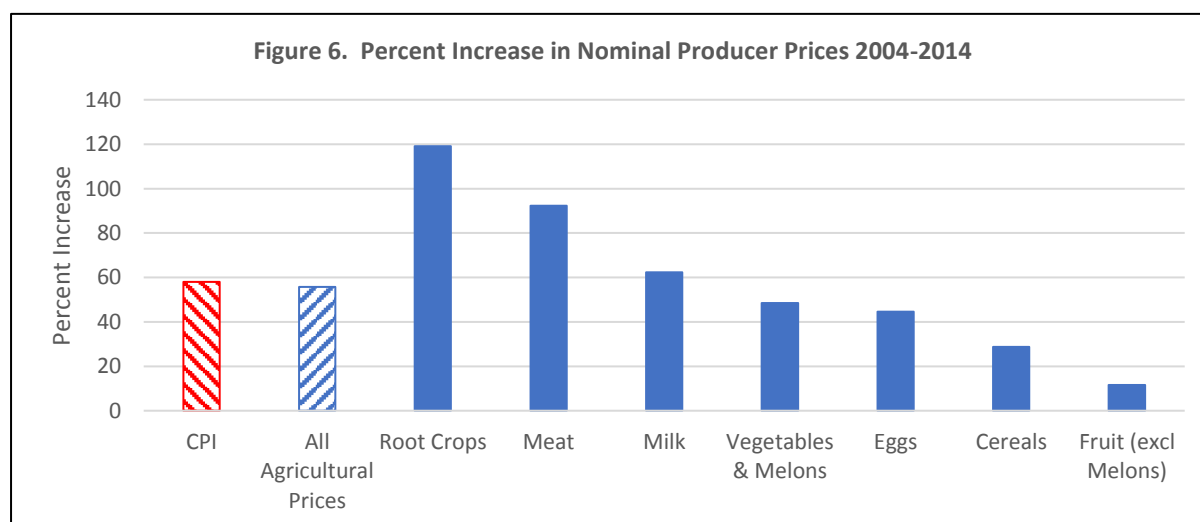
2.1 Aggregate Trends – Increasing Output and Productivity

Growth in agriculture GDP shows differing trends in constant (real) versus current (nominal) prices (Figure 5). A much steadier growth trajectory is evident when measured in real prices, punctuated only by the impact of drought in 2010, with growth of 83% from 2004-2015 in real terms. Underlying production did not fall during the GFC. Trends in nominal prices show a more a variable trajectory, with the sector contracting (in nominal terms) in response to the GFC. No contraction occurred in response to the drought in 2010 as lower production was offset by increased (nominal) prices.



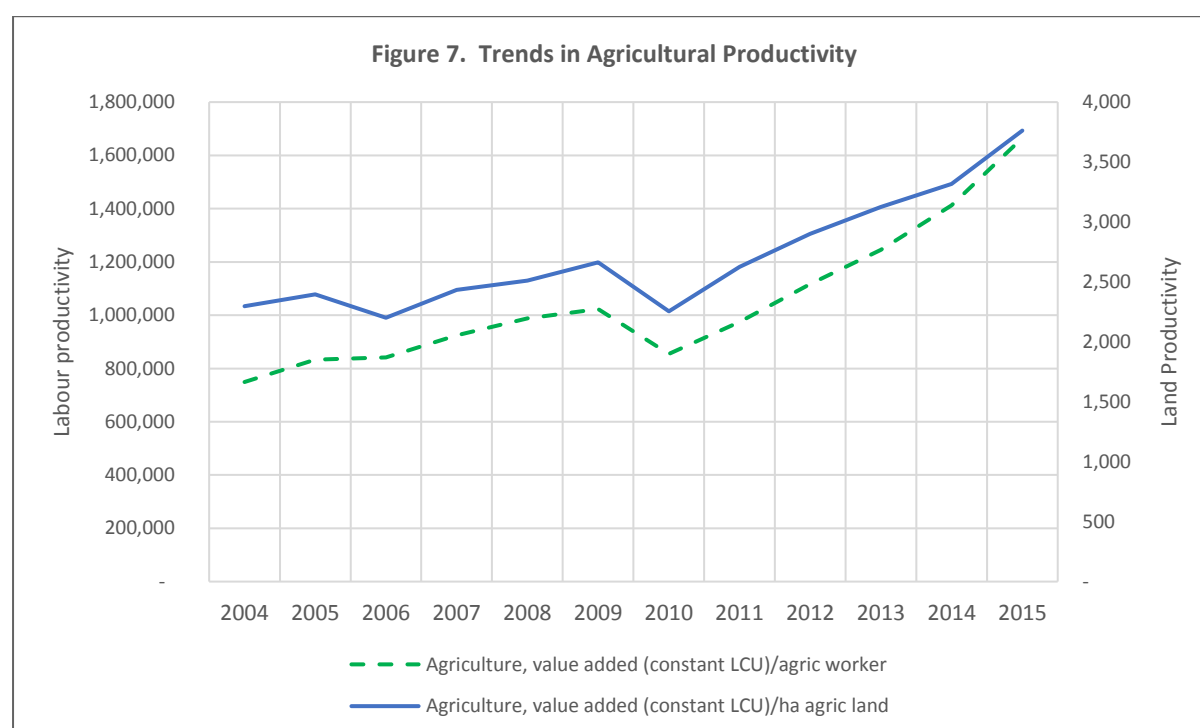
Source: World Bank Development Indicators

Producer prices did not increase overall in real-terms for the period of analysis (Figure 6). The index of agriculture producer prices (FAOSTAT) increased by 56% from 2004-2015, while the World Bank Development Indicators (CPI) increased by 58%. Trends in producer prices varied between commodity groups, however, with increases for meat and root crops exceeding the increase in the CPI, while price increases for other commodities were either similar to, or less than the increase in the CPI. Timewise, producer prices increased in line with the CPI from 2004-2008, fell sharply in response to the GFC, and then increased faster than the CPI from 2009-2012. Since 2012 they have increased more slowly than the CPI, in response to the global economic slowdown and the contraction of the Russian economy.



Sources: FAOSTAT Producer Price Indices, World Bank Development Indicators (CPI)

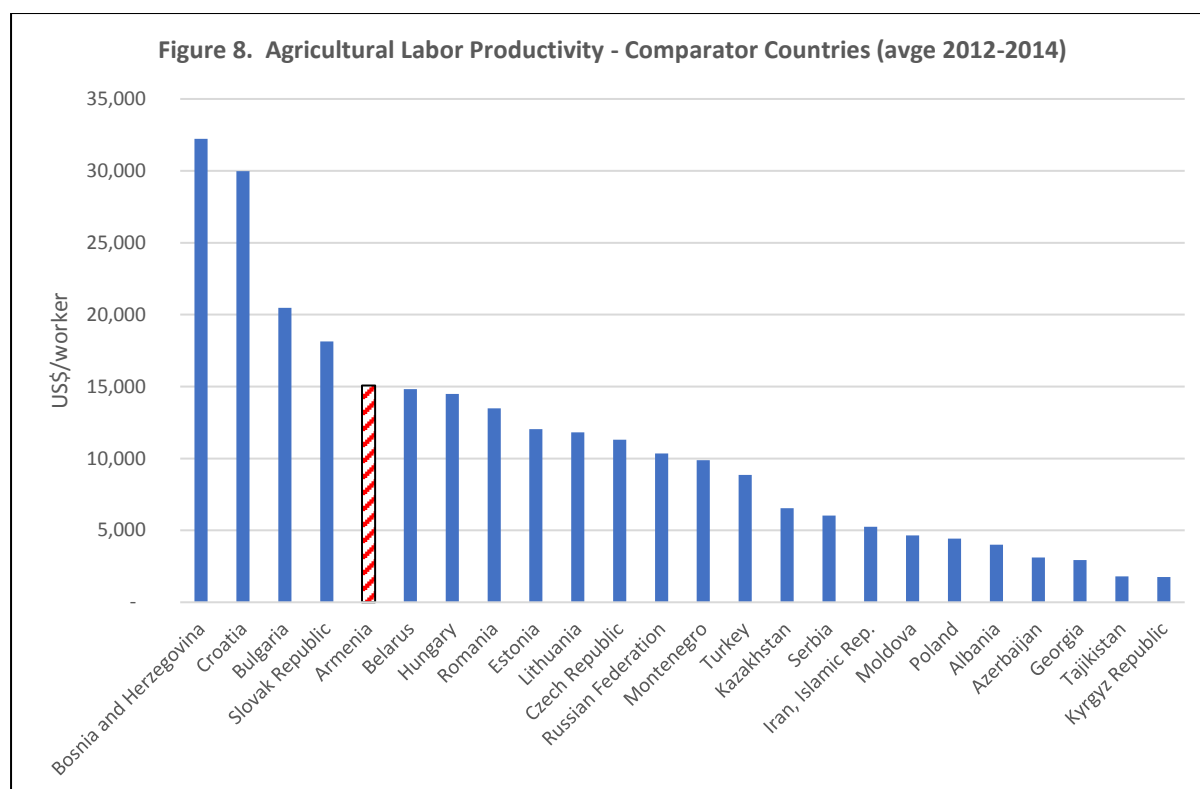
These trends suggest that underlying productivity increases were the main drivers of agricultural sector growth. Closer analysis shows differing trends between land and labor productivity (Figure 7). Land productivity (measured in constant prices) increased by 64% from 2004-2015, an average increase of 5.3% per annum. This increase was driven by a strong increase in crop yields and a modest increase in livestock numbers and livestock productivity. On average, crop yields increased by around 40%. There was little increase in the area of crop land under cultivation and a minimal shift to higher value crops. Cattle and sheep numbers increased by around 20% and pig numbers by 67% (albeit from a very small base); while livestock productivity increased by 21% for milk production/cow and 28% for egg production/hen). Poultry numbers fell by 17%.



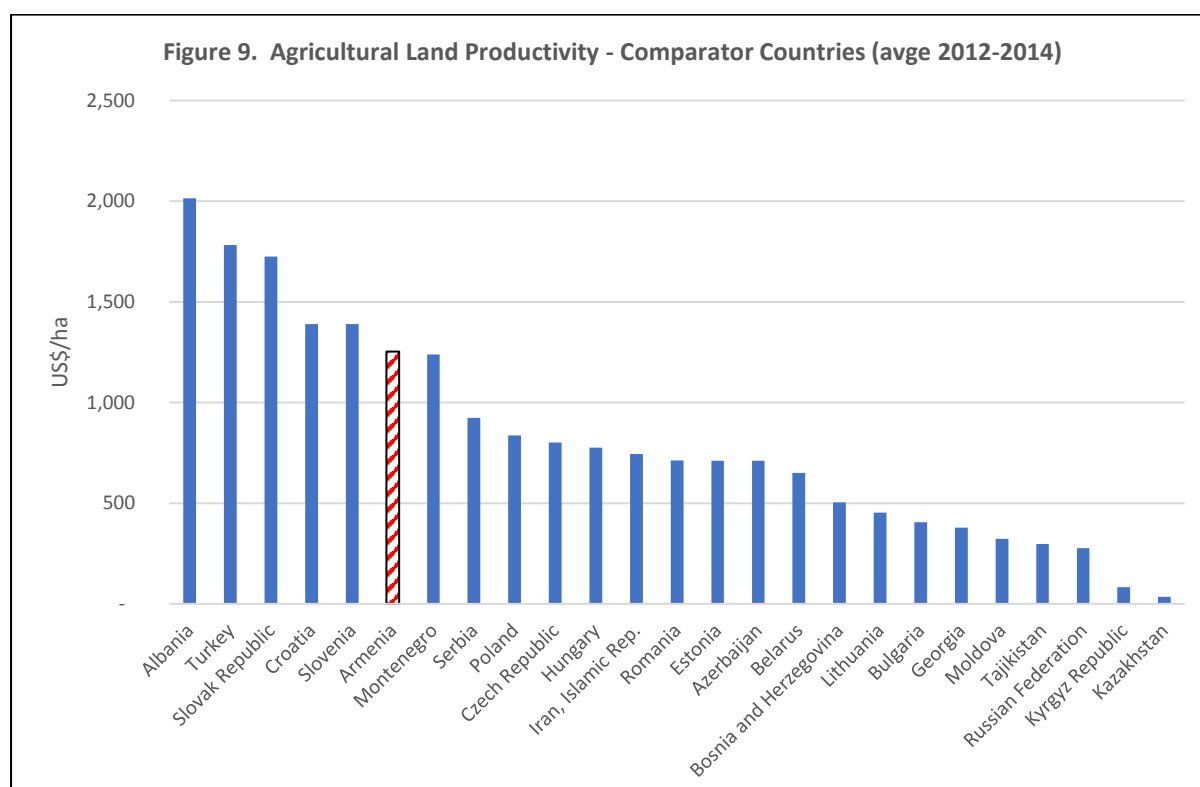
Source: World Bank Development Indicators; National Statistical Services (NSS).

Labor productivity increased by 122% from 2004-2015, equivalent to an average annual growth of 10.1% per annum -- almost twice the increase of land productivity. Only one-third of this increase was the result of increased production, however, with the remaining two-thirds due to a sharp reduction in the number of people employed in agriculture. Most of this reduction in agricultural labor occurred after 2011, when agricultural employment fell from 457,400 to 379,000 (NSS). As discussed in chapter IV, this reduction appears to be the result of migration to Russia and a shift of agricultural labor to other sectors.

As a result of this progress Armenia's agricultural productivity is now quite high relative to its comparator countries (Figure 8 and Figure 9). There is no room for complacency, however, if the agriculture sector is to continue growing and become more export oriented. The productivity increases achieved to date have been from a very low base, and without substantial change in the semi-subsistence orientation of most farmers. They have been relatively easy increases to achieve. Further, sustainable increases in productivity are essential if sector growth is to continue, based on a transformation from semi-subsistence to commercial agriculture.



Source: World Bank Development Indicators



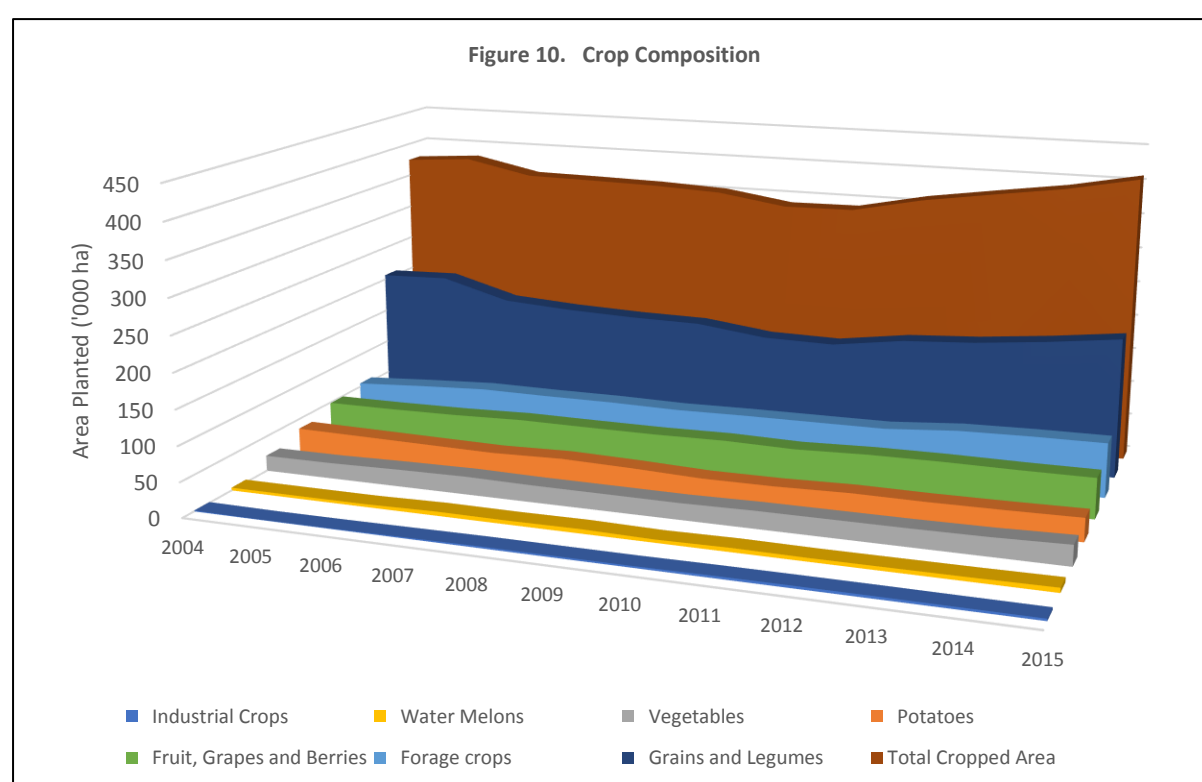
Source: World Bank Development Indicators

2.2 Modest Changes in the Composition of Agricultural Production

The composition of agricultural production has not changed substantially since 2004, consistent with the minimal shift from semi-subsistence to commercial production systems. The contribution of crop

production to total agriculture production increased from 56% in 2004 to 61% in 2015; with a corresponding fall in the contribution of livestock production from 44% to 39% (NSS). Both sub-sectors grew in real-terms, but the crop sector grew faster (30% real growth in the crop sub-sector versus 9% real growth for the livestock sub-sector).

Within the crop sub-sector there was little change in the total area cultivated or the composition of production, as measured by the area sown to annual and permanent crops (Figure 10). The total area planted increased by only 9% (35,000 ha) from 2004-2015, despite government measures to reduce the amount of unused agricultural land. Low value cereal crops grown for household and livestock consumption continued to account for approximately 50% of the total area cultivated. The area sown to high value crops (vegetables, fruit, berries, grapes) increased by only 14% (15,600 ha) from 2004-2015, during a period of rising demand for fresh fruit and vegetables on domestic and export markets. Industrial crops remained a minor component of crop production, with less than 1% of the total area cultivated. These are modest changes over such a long period, particularly given the extent of modernization and liberalization in other parts of the economy.



Source: NSS

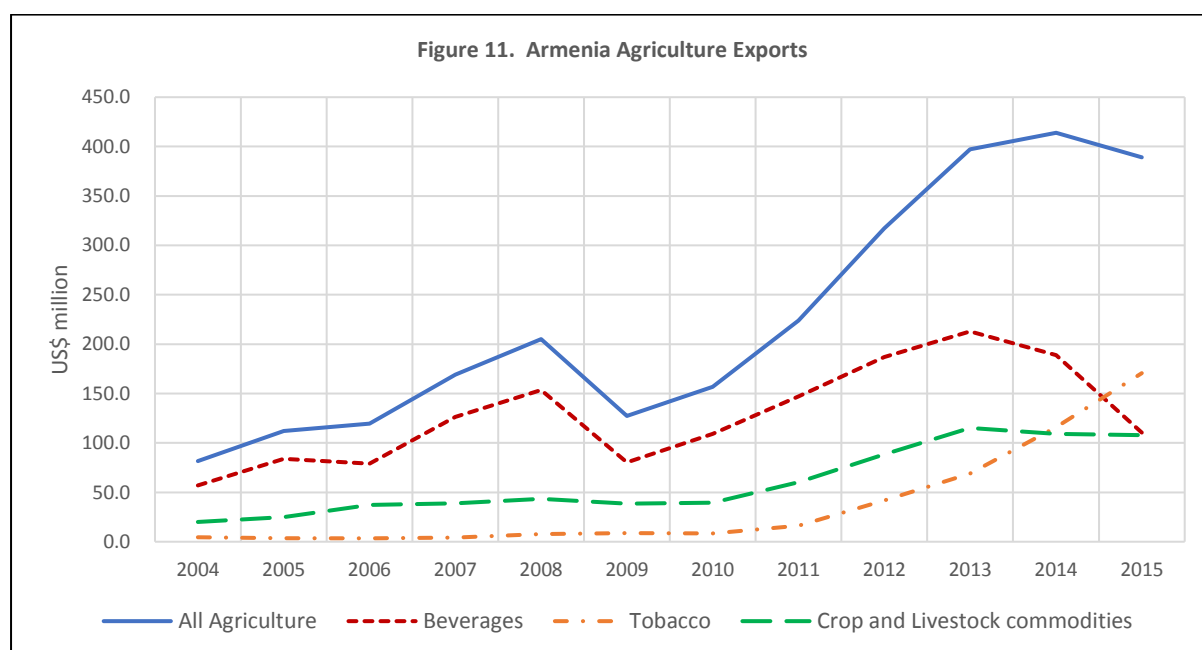
A somewhat stronger shift was evident in livestock numbers, with an increase in livestock associated with meat production (other cattle, sheep and goats and pigs), a modest increase in cow numbers (milk production) and a decrease in poultry numbers (Table 2). Cattle remained the dominant livestock type, however, followed by sheep and goats. The marked increase in pig numbers was from a very small base. Note that these modest changes in the structure of livestock ownership do not signal any real change in the livestock production systems. Herds remain small, management systems remain very traditional and livestock productivity remains low.

Table 2. Livestock Numbers ('000) – 2004-2015				
	2004	2008	2012	2015
Cattle	510.8	565.4	536.0	613.7
Cows	291.0	310.6	283.3	313.9
Other Cattle	219.8	254.8	252.7	299.8
Sheep and Goats	62.9	63.7	59.0	74.6
Pigs	25.6	26.0	32.4	42.7
Poultry	50.2	40.2	40.2	41.5

Source: National Statistical Services

2.3 The Drivers of Increased Agricultural Exports

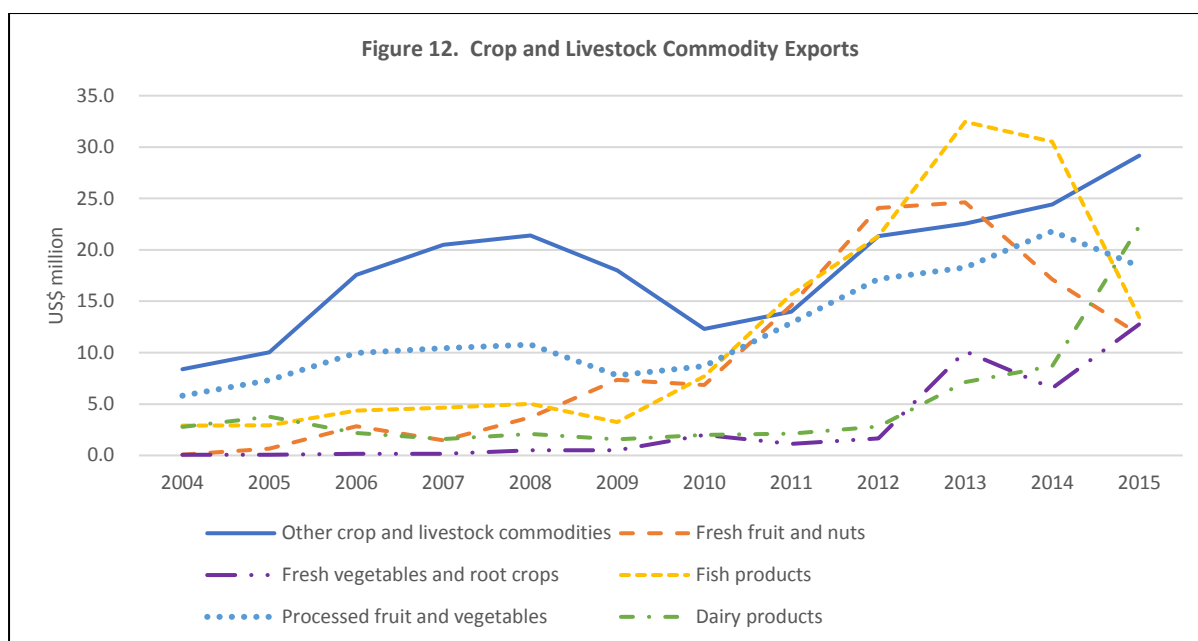
Agricultural exports³ have increased dramatically, from US\$81.6 million in 2004 to US\$389 million in 2015 – faster than the growth in total exports. Agriculture's share of total exports increased as a result, from 25% to 28%. Most of these exports, and most of the observed growth, derive from the exports of beverages (particularly alcoholic beverages) and tobacco products (particularly cigarettes) – as shown in Figure 11. While these two commodity groups accounted for over 70% of total agricultural exports throughout the period of analysis, neither group draws significantly on Armenia's agricultural resource base. Wine grapes, the raw material for Armenia's internationally renowned wines and spirits, are grown on approximately 10,000 ha – 3% of cultivable land. Cigarettes are manufactured from imported tobacco. Most of the benefits of growth in these exports have accrued to large, sophisticated corporate enterprises rather than to Armenia's farmers.



Source: UN Comtrade

The export of crop and livestock commodities, which draw much more widely on the agriculture resource base, grew from US\$20.0 million in 2004 to US\$107.9 million in 2015. Most of this growth occurred after the GFC, from 2010-2013 in response to strong demand in Russia – Armenia's traditional export market for agricultural products. Closer analysis of these commodity groups shows that exports are dominated by fresh fruit and vegetables, fish products, dairy products and processed fruits and vegetables (Figure 12 and Box 1).

³ Agricultural exports are classified as all commodities in chapters 1-24 of the harmonized system.



Source: UN Comtrade

Russia is the major export market for beverages and crop and livestock commodities, with more than 70% of exports by value (UN Comtrade). This high dependence on Russian markets is a continuation of historical trading patterns during the communist era. The EU receives less than 5% of the value of exports for these two commodity groups. Markets outside Russia and the EU currently account for more than 90% of cigarette exports.

Box 1. Key Agricultural Exports in Armenia

Armenia has rapidly growing export markets for a range of fruit, vegetable and livestock commodities. There is considerable inter-annual variation in the volume and value of these exports, however, due to the erratic supply of raw materials and the volatility of prices in Russian markets – their principal destination. Key characteristics of some of the main commodities are summarized below, together with prospects for future export growth.

Apricots: The average annual value of apricot exports for 2011-2016 was US\$6.7 million. More than 90% of these exports (by volume) are sold in Russia, which is one of the largest importers of apricots in the world. Armenia is the third largest exporter of apricots to the Russian market, due to the competitive price and good reputation of Armenian apricots. There is considerable potential to expand apricot exports in response to growing Russian demand, provided that producers can increase yields and stabilize supply, and access to modern storage facilities can be improved.

Peaches: The value of peach exports increased by 755% from 2011 to 2016, from US\$0.28 million to US\$2.37 million, with a parallel 1935% increase in the volume exported. All peach exports are sold in Russia, a large and growing market. Armenian peaches are a very small component of this market (less than 1%) but are competitively priced and have a good reputation. There is considerable potential to expand peach exports in response to growing Russian demand for both fresh and processed peaches. Increased production is needed to respond to this demand, together with an increase in processing capacity.

Plums: Plums are a small but growing export commodity, with average annual exports of US\$0.45 million of fresh plums from 2011-2016. The volume of exports increased by 190% in this period and export value by 227%. All plum exports are sold in Russia, a large and rapidly growing market. Armenian plums are a small component of this market but are very competitively priced and have a good reputation. There is considerable potential to expand plum exports in response to growing demand in Russia for both fresh and processed

plums (prunes). Increased production is needed to respond to this demand, together with an increase in processing.

Tomatoes: Tomatoes are the most widely grown vegetable in Armenia, with 25-30% of the total vegetable area. All exports are sold in Russia where there is a huge market and a strong demand for fresh and processed tomatoes (paste, juice, dried). Exports of fresh tomatoes grew from US\$0.05 million in 2011 to US\$22.7 million in 2016, with annual average exports of US\$4.17 million. As Russia is now aiming to achieve self-sufficiency in fresh tomato production, future export opportunities will derive more and more from processed products.

Cheese: Cheese exports have been re-established recently, based on a rapidly growing demand for traditional cheeses in Russia. Exports grew from US\$1.85 million in 2011 to US\$13.7 million in 2016. Armenian milk production costs are low relative to its major competitors from Russia and Ukraine and there is considerable potential to further reduce costs through improved productivity at both farm and factory level. Small farm size, low milk productivity and low consequent levels of milk production, are the major constraints to increased cheese exports.

Other agricultural exports with potential for future growth include berry fruit, processed peppers, cherries, grapes and mutton (including lamb and live animals).

Trade policy was highly liberal after Armenia's accession to the World Trade Organization in 2003, with low import protection (10% tariffs on most commodities) and minimal intervention in domestic markets. From 2008-2010 the country also worked actively to align its product standards and regulatory systems with EU requirements with a view to formulating a Deeper Comprehensive Free Trade Agreement with the EU and expanding its exports to EU markets.

Armenia's subsequent decision to join the Eurasian Economic Union⁴ (EEU), which became effective on January 1st 2015, has changed this policy focus. It will adopt the EEU's common external tariffs after a transition period of 5-7 years, which are slightly higher than current tariff levels. The immediate impact of EEU membership on trade is unlikely to be significant, as most existing trade is already with EEU members and bilateral trade agreements already exist with these countries. EEU membership will thus reinforce both the attractiveness of, and dependence on Russia for Armenia's agricultural exporters. This high dependence on Russian markets exposes Armenian exports to the volatility of the Russian economy, and the rouble exchange rate. Following the imposition of sanctions in 2014, Russia also initiated a wide-ranging program of support for agriculture in 2015 to raise production and reduce its dependence on agricultural imports – which may compromise future agricultural exports. A more diverse export orientation is needed.

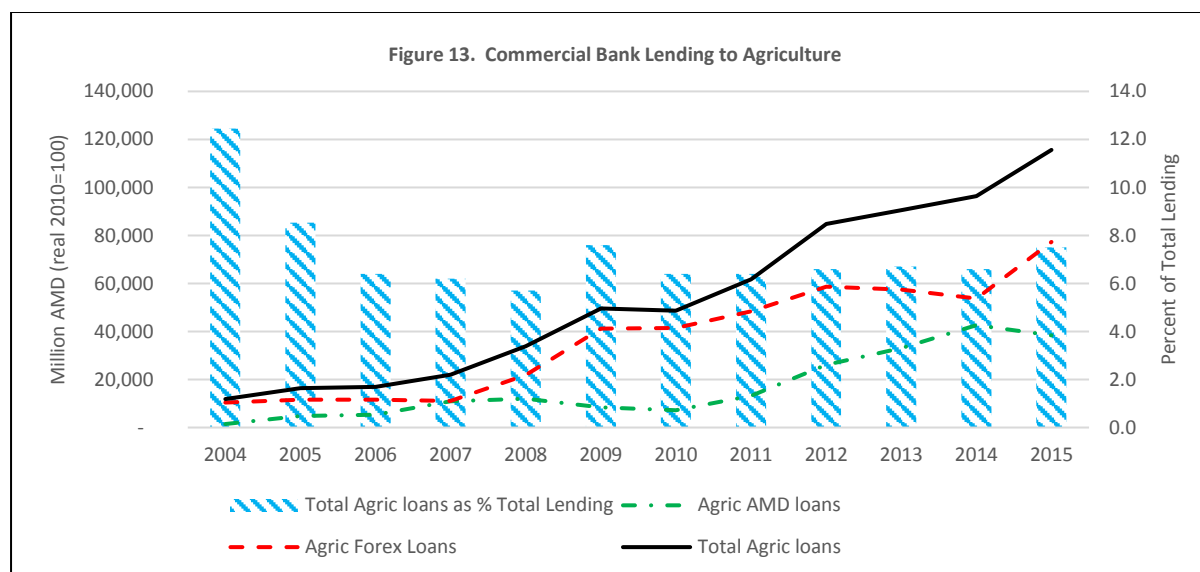
The longer-term implications of EEU membership may also be significant. A recent World Bank Group study of the impact of EEU membership⁵ shows that a long-run increase in the import prices of non-EEU merchandise is expected, following adoption of the common external tariff. This will increase the cost of farm inputs and equipment for agriculture, although energy costs will probably remain moderate. Analysis of the impact of joining the EEU rather than a trade agreement with the EU also showed that Armenia's access to FDI from the EU will be compromised, together with the ability to import new technology. Trading partners matter for technology transfer, and the extent to which the EEU will provide equivalent access to FDI, new technology and know-how is unclear. Accession to the EEU could also lower Armenia's ability to upgrade products and move up the value chain, due to trade diversion from the sophisticated EU market towards the less sophisticated markets of some members of the EEU.

⁴ The EEU comprises Russia, Armenia, Belarus, Kazakhstan and Kyrgyzstan.

⁵ An Assessment of Challenges and Opportunities in the Eurasian Economic Union, World Bank, June 2015.

2.4 Increased Agricultural Credit and Foreign Direct Investment

Sector access to capital improved significantly during the period of analysis, both through commercial bank lending for agriculture and foreign direct investment (FDI) in primary production and agro-processing. Commercial bank lending to agriculture rose from 72.3 billion AMD in 2004 to 1,916.8 billion AMD in 2015 (Figure 13) – a 10-fold increase in real-terms (deflated by the CPI). On the supply side this increase was facilitated by expansion of the Armenian banking system and a consequent increase in lending to all sectors of the economy – not just agriculture. In fact, agriculture’s share of bank lending remained fairly constant for most of this period at 6%-8%. Donor credit lines of US\$40 million for rural finance from 2012-2015 further boosted credit for agriculture.



Source: NSS

Demand for credit was increased by an interest subsidy program for agricultural loans introduced by the Ministry of Agriculture (MoA) in 2011. Designed to support Armenia’s smallest farms, this program reduced interest rates on agricultural loans by commercial banks from 10%-12% to 4%-6%, on loans of up to 3 million drams (approx. US\$6,185 at current exchange rates). These loans were targeted towards working capital for farm inputs and small capital investments. No equity contribution was required of borrowers. Total lending for this program for 2011-2016 amounted to 99.1 billion drams (approximately US\$200 million). Some 119,400 farmers received these loans (an average of 19,000 farmers/year) with an average loan of 800,000-900,000 drams US\$US\$1650-US\$1850).

The impact of this subsidised credit program is unclear. There has been no monitoring of the actual use of the credit extended under this program and consequent scepticism of the extent to which it was used for legitimate investment in agriculture. This scepticism derives from the low maximum and average loan size and the consequent focus on very small farmers, the absence of any requirement for borrowers to make an equity contribution to the investment, and the minimal apparent shift from semi-subsistence to commercial farming.

Foreign-direct investment in the agriculture sector averaged US\$44 million for the period 2008-2015 (Table 3). Of this amount, approximately 60% was for beverage processing, 33% for crop and livestock production and 7% for food processing. Investment into Armenia’s successful beverage sector has dominated FDI into the agriculture sector, contributing to the substantial growth of beverage production and exports. FDI into crop and livestock production and food processing has been largely driven by Armenian diaspora investors resident in Russia. Hence, while providing a welcome source of private sector capital, this investment has not helped to diversify export markets or to introduce

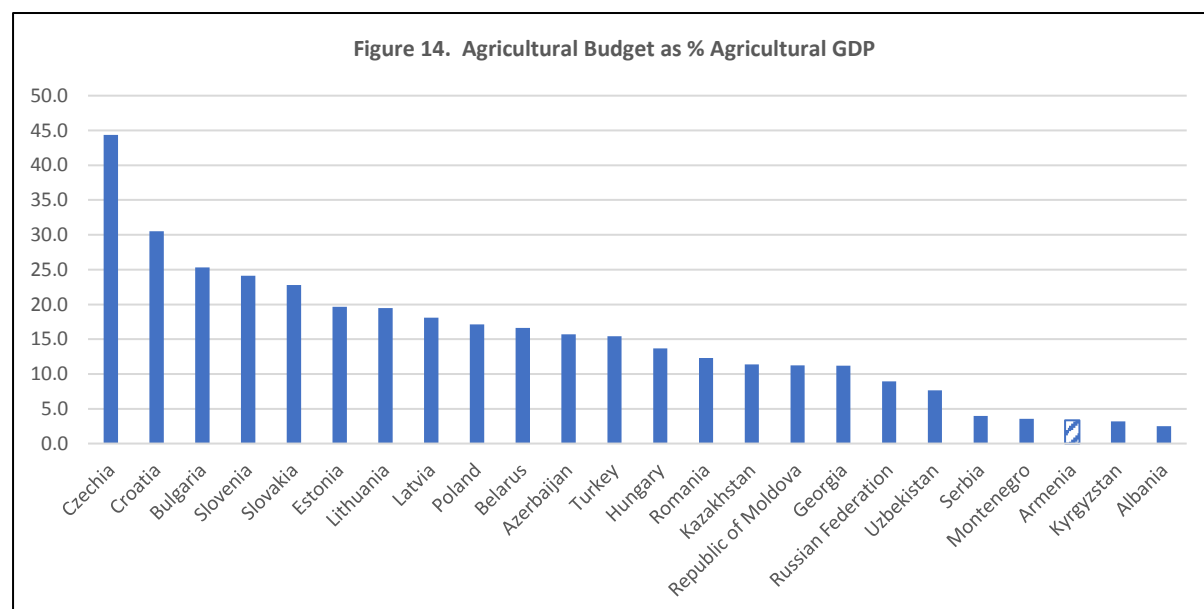
advanced western technology and management experience. The limitations of this reliance on investment from Russia are consistent with the conclusions of the World Bank Group study on the impact of EEU membership.

Table 3. Foreign Direct Investment in the Agriculture Sector 2008-2015 (US\$ million)			
Year	Crop and Animal Production	Food Processing	Beverage Processing
2008	22.9	1.1	24.3
2009	6.7	0.9	28.5
2010	4.8	1.7	27.1
2011	2.9	9.6	28.9
2012	36.1	2.7	23.1
2013	7.2	1.5	27.9
2014	10.0	na	na
2015	26.2	na	na
Average	14.6	2.9	26.6

Sources: NSS, FAOSTAT, ICARE

2.5 Budget and Donor Support for Agriculture

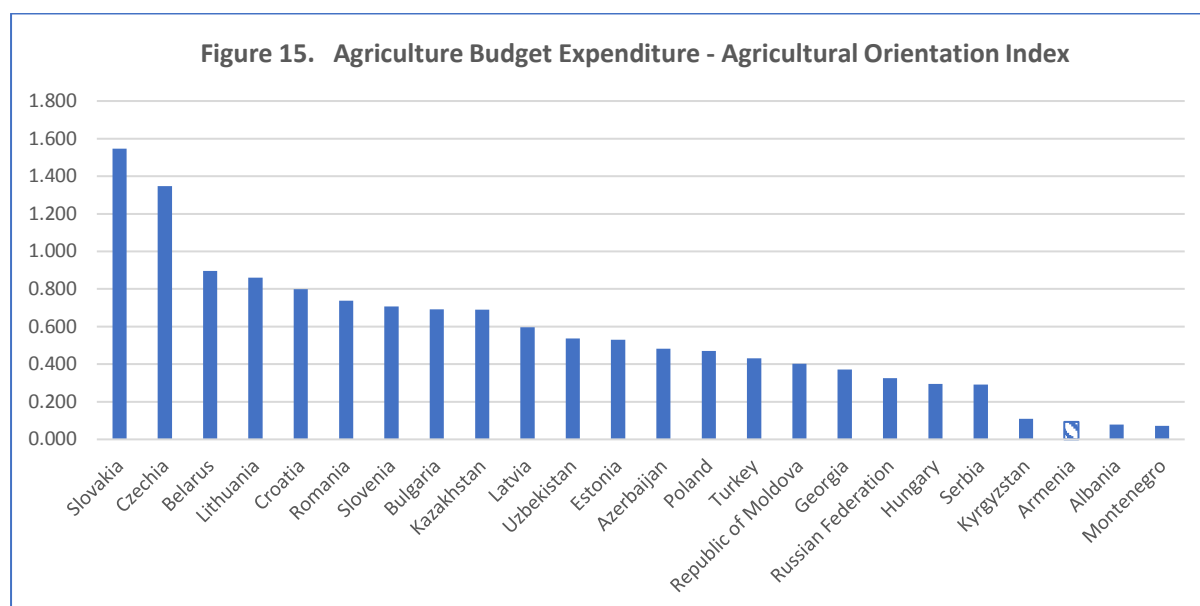
Budget expenditure on agriculture is low (Table 4), both as a proportion of total budget expenditure (2.2%-2.6%) and as a proportion of agriculture GDP (3.1%-3.6%). For a low to middle-income country such as Armenia, international experience suggests that budget expenditure equivalent to at least 5% of agriculture GDP is required to ensure an adequate provision of basic public services for agriculture. Figure 14 below confirms that budget expenditure for agriculture is low compared to other low and middle-income countries with similar agricultural conditions, and shows that very few other comparator countries fall below the 5% threshold.



Source: FAOSTAT (average for 2012-2014)

Further confirmation of this low level of expenditure on agriculture is provided by comparison of Armenia's "Agricultural Orientation Index" – an FAOSTAT index that ranks levels of budget expenditure on agriculture based on a ratio of the share of agriculture in total budget expenditure divided by the share of agriculture in total GDP. A higher index value indicates higher comparative expenditure on agriculture. Figure 15 below shows that Armenia has a very low index score relative to comparator countries. While high levels of budget expenditure on agriculture do not necessarily

lead to better sector performance, a minimum level of expenditure is required to ensure adequate provision of essential public services – services that Armenia currently struggles to provide.



Source: FAOSTAT (average for 2012-2014)

Analysis for 2012-2015 shows that approximately half of the budget expenditure for agriculture is allocated to the MoA for programs and services for crop and livestock production, 40%-45% to the SWC⁶ to provide irrigation and drainage and the remaining 4%-5% is used for forestry, fishing and hunting (Table 4). The agriculture budget increased by only 4% in real-terms during this period, much lower than for total budget expenditure.

Of the expenditure by the MoA, direct subsidies for fertiliser, improved seed, agricultural chemicals, fuel and interest rates account for a high one-third of total expenditure. In contrast, an essential public service such as agricultural extension accounts for only 2%. The allocation of one-third of the total budget expenditure to subsidies at the expense of essential public services is questionable when budget resources are so limited and the resultant capacity to deliver these services effectively is so restricted. This misallocation is even more questionable when the focus and targeting of subsidy programs is suspect. Note first that the current subsidy programs are designed to benefit the sector's smallest farmers, with a low limit on the maximum loan size for the interest subsidy (as described above) and eligibility for fuel, fertiliser, chemical and seed subsidies limited to farms of less than 3 ha. Not only are smaller farmers less likely to invest in and expand their farms, the subsidies discourage them from increasing farm size as they lose their eligibility for support. Fuel subsidies are always problematic in that they create strong incentives among beneficiaries to sell the subsidised fuel to other users and there is no guarantee that the fuel will be used for agricultural purposes.

Despite these limitations, both the fertiliser and seed subsidies appear to have had an impact on fertiliser use and crop yields since they were introduced in 2011. The use of mineral fertiliser (as measured by fertiliser imports) increased from 36,366 tons in 2011 to 66,644 tons in 2015 (UN Comtrade). Wheat yields increased from 2.1 tons/ha in 2010 to 3.2 tons/ha in 2014 although they fell in 2015 due to drought. But while this increased use of fertiliser and improved seeds has contributed to increased productivity and output, it has not contributed to the modernization of agriculture.

⁶ The SWC was moved from the MoA to the Ministry of Energy Infrastructure and Natural Resources in 2016, with a heavy attendant cut in its budget.

Armenia's traditional, semi-subsistence production systems still prevail, and the targeting of subsidies to farms of less than 3 ha reinforces the incentive to stay small and traditional.

Table 4. Budget Expenditure for Agriculture (including irrigation)				
	2012	2013	2014	2015 (plan)
	million AMD (nominal)			
Total Agriculture Budget Expenditure	24,862.3	26,236.2	31,800.4	29,093.7
Agriculture	12,055.7	14,707.2	16,407.9	14,456.8
Irrigation	12,044.0	9,739.9	12,366.2	13,381.1
Forestry	762.7	789.0	1,026.4	1,255.8
Hunting and Fishing	0.0	1,000.0	2,000.0	0.0
Total as % of Total Budget Expenditure	2.5%	2.3%	2.6%	2.2%
Total as % of Agriculture GDP	3.3%	3.1%	3.6%	3.3%
Selected Direct Subsidies	8,090.1	10,942.2	12,548.9	10,237.7
Fertilizer	1,030.1	2,293.5	2,379.7	1,829.4
Fuel	1,948.3	1,865.0	1,260.6	1,260.6
Interest	578.0	634.5	872.5	1,163.0
Irrigation (to WUAs)	4,533.7	6,149.9	8,036.1	5,984.7
Selected Public Services	8,809.1	4,984.2	5,520.2	8,985.3
Livestock Vaccination	1,000.0	1,091.8	1,120.7	1,188.6
Artificial Insemination	5.7	5.1	4.5	4.5
Agricultural Extension	293.1	297.2	346.5	395.8
Irrigation Infrastructure (Water Supply Agency)	7,210.8	3,273.8	3,732.6	7,076.7
Drainage Services (Water Supply Agency)	299.5	316.3	315.9	319.7

Source: Armenia Agricultural Strategy and Action Plan, April 2016. USAID.

The key driver of sector modernization is an effective institutional base for delivering knowledge on new technology to farmers. The current extension system has tried to fill this need but has only partially succeeded due to lack of resources (see Box 2). Annual budget expenditure on Armenia's severely under-resourced agricultural extension system averaged 335 million AMD (US\$780,000) from 2012-2015, versus 4,300 million AMD (US\$10.1 million) for direct agricultural subsidies. The MoA's recent decision to scale down the public extension system will further weaken the institutional base for knowledge transfer, which is so critical for the transition to modern, commercial agriculture.

Irrigation and Drainage

The SWC supplies water, through the public WSA, to WUA who distribute it to around 110,000 ha and 180,000 farmers. Of the area irrigated by the SWC approximately 90% is irrigated from reservoirs, river diversion or pumping from rivers – a high cost system built prior to independence. Around 60% of total water supply is gravity fed. Much of the infrastructure is in poor condition, despite considerable donor investment, which results in high water losses and inefficient water delivery. With donor support, the SWC is working to improve infrastructure, reduce the reliance on high-cost pump irrigation, and build an institutional infrastructure based on farm-level water management by WUAs. The current cost of water delivery is estimated at 22-24 drams/cu3, of which farmers pay 11 drams/cu3, and the balance is paid through subsidies from the SWC to the WSA and WUAs. Most of the high total cost is incurred by energy charges for the pump stations.

Box 2. AGRICULTURAL EXTENSION in ARMENIA

Public Extension Services

Armenia established a highly decentralized agricultural extension service in 1993, early in its economic transition. This structure was regionalized in 1998, with Agricultural Support Centers established in each Marz (MASC). It was further re-organized in 2002 to centralize core activities such as information dissemination and staff training. The extension system has received extensive World Bank support since 1998.

Each MASC has 6 staff, including a director and extension and information specialists, and around 121 village-level advisors, each responsible for 5-10 villages. Advisors visit each village on a regular schedule, typically twice a month. Responsibilities include farmer consultations; seminars and field days; preparation of leaflets, articles, radio and TV broadcasts; and provision of market information. Work plans are determined at the MASC level, based on local needs assessments, and are reviewed by a local Marz-level Extension Council, which comprises of stakeholders from local government, agri-business, science and the farming community.

The level of activity is impressive. Almost 50,000 farmers were served in 2014, including 17,500 permanent clients. Activities included: 94 demonstrations, 172 field trials, 686 seminars or trainings, 49 radio and TV broadcasts, 156 business plans produced and 580 publications. External assessments of the impact of these services were carried out in 2004, 2008, 2012 and 2014, with strong results. In 2014, 71% of farmers were using the advisory services, 97% of respondent farmers knew when their advisors visited, 95% of farmers stated that MASC advisors visit at least once a month, 85% indicated an income increase, 92% introduced technological innovations, 97% indicated productivity growth, and 63% indicated willingness to pay.

Non-State Extension Providers

Other advisory services include: the Center for Agribusiness and Rural Development (CARD); NGOs such as Green Lane, Eco-Globe Organic Agriculture, and the Armenian Platform for Sustainable Agriculture; and consulting companies. Advice is also provided by brandy, wine, fruit drying and dairy companies, which provide information on market standards and production technology. Input suppliers including nurseries, seed suppliers, green-house providers, veterinary pharmacies and fertilizer dealers also advise their clients.

Of these non-state providers, CARD is the most important. An Armenian Foundation founded in 2005, CARD is a non-profit organisation that assists farmers and agri-business in the production and marketing of food and related products through the provision of technical services. Most CARD projects are funded by USAID and USDA. Activities include Farm and Veterinary Service Centers; CARD Agro-Service, a closed joint-stock company wholly owned by the Foundation but able to retain profits; and CARD Agro-Credit, a closed joint-stock company wholly owned by the Foundation that provides credit to farmers and agri-business.

Future Development

The public extension system needs strong continued public support to develop further. Its strengths include: work plans based on farmers' needs, good acceptance by farmers, wide coverage and good results. It also generates around 20% of its total costs from the sale of services. Current budget support is low with approximately 2% of the MoA budget -- not enough to facilitate improved service provision. A doubling of budget support would make a big difference to service quality and have a major impact on sector development, without diverting significant resources from other budget programs. World Bank studies suggest that investment in farm advisory services and applied research can yield economic rates of return exceeding 40%, boosting output more than other public spending on agriculture such as subsidies.

Support for public extension does not preclude other extension providers. The MoA should coordinate with other service providers, including private suppliers such as CARD Agro-Service, depending on their strengths and areas of specialization. CARD's activities require considerable donor support, however, and may be better suited to the needs of larger farmers in areas with more intensive production. Small farmers and livestock producers in more remote areas, may be better served by the public extension service.

The progress made with rehabilitation of primary and secondary infrastructure is now being followed up with the installation of Supervisory Control and Data Acquisition compatible water meters, at distribution points along the main and secondary canals. This will improve the ability of WUAs to monitor and pay the WSA for what they actually use. Water meter installation is expected to be complete by the end of 2018.

The SWC has also rationalised the institutional structure for water delivery by creating a single WSA and reducing the number of WUAs from 57 to 14 – as a further means to improve efficiency. Medium-term objectives for the next 5 years include a technical audit of the entire irrigation system as the basis for identifying priorities for rationalization of the current system and further investment, and the introduction of more sophisticated water management systems. A law on Irrigation Water Use will also be enacted to increase the Government's capacity to control water use (levels of water use, types of crops, night versus day irrigation, etc.) and the capacity of WUAs to enforce payment of water use fees. These improvements, and a consequent improvement in the quality of water delivery, will provide a more equitable basis for an eventual increase in water use fees and the reduction of SWC subsidies. The gradual conversion from pumped to gravity irrigation will also lower the costs of water delivery.

Despite the pressure to raise water use fees in the short-term and so reduce government subsidisation of irrigation, this is not considered desirable until these improvements are in place. International experience shows that farmers are willing to pay higher fees for water use when they are assured of timely, cost-effective water delivery, when they can control their own water use and when the profitability of crop production justifies the increased costs of irrigation. Raising water use fees before these conditions are met, not only reduces the returns to farming but also undermines farmer support for WUAs.

Donor Support

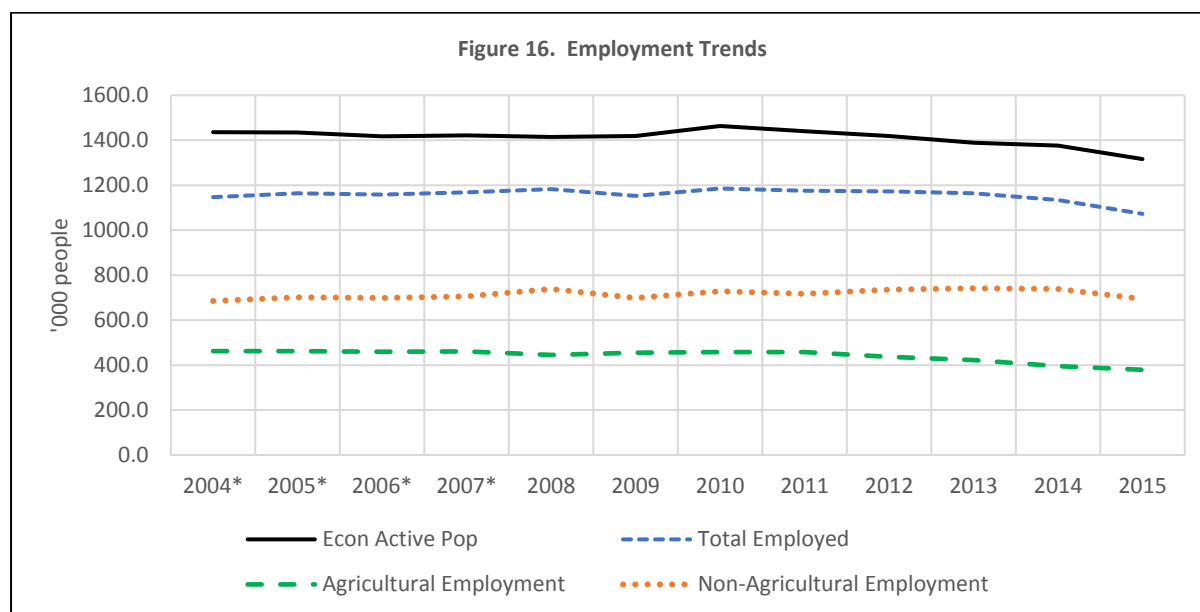
Donor support for the agriculture sector for the period 2012-2015 amounted to approximately US\$120 million. Of this amount, approximately US\$54 million was used for irrigation, US\$40 million for rural finance and US\$20 million for rural development. These allocations are broadly in line with the sector needs to improve access to irrigation and rural finance and to support rural development. However, the limited progress made towards sector modernization shows that support for these measures is not a sufficient condition for sector development. Farmers need the knowledge to understand and use modern technology, and a larger farm resource base to rationalise investment in modern management systems.

III. Agriculture Sector Growth and Employment Generation

Agricultural employment fell from 461,500 in 2004 to 379,000 in 2015 – a decline of 18% (82,500 people). While this decline has contributed to increased labor productivity, it has also reduced the sector's contribution to overall employment. Women's employment in agriculture increased by 1% (2,200 people) during the same period, however, and agricultural wages rose by 126% in real terms. The implications of these changes are reviewed below, together with analysis of the extent to which agriculture labor is shifting to other sectors.

3.1 Demography and Migration

The decline of agricultural employment is partly a reflection of underlying demographic trends. Armenia's population fell by 163,000 people (5%) from 2004-2015, due to the combination of out-migration and low fertility rates⁷. Net (out)migration was 343,400 people during this period versus a natural increase of 168,200. As most migrants are part of the economically active population ILCS, 2008), this migration driven decline in population contributed to a 7% reduction of the economically active population (119,400 people). Agriculture's share of the total economically active population remained at around 41%, however, as the economically active population for agriculture and non-agriculture fell by similar proportions. Further analysis shows that the fall in the economically active population has accelerated since 2010, and was particularly pronounced in 2015 (Figure 16). While these underlying demographic trends do not wholly explain the decline in agricultural and non-agricultural employment, they suggest that supply side factors have a bearing on trends in employment.



Source: NSS

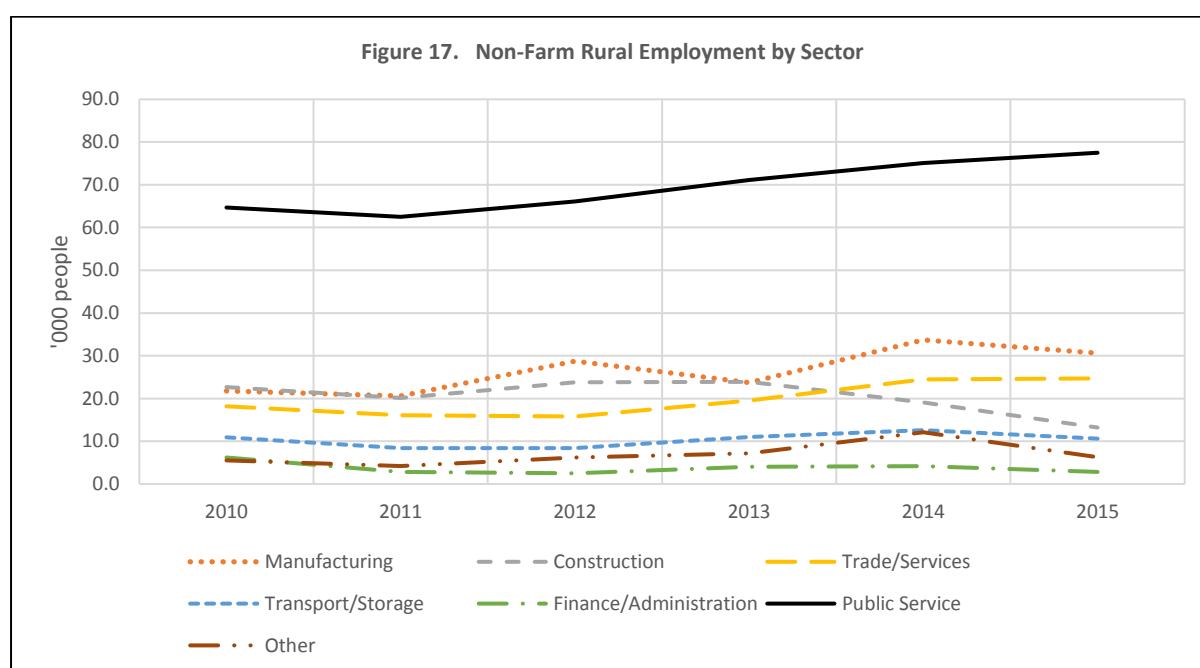
Migration to Russia is conventionally viewed as the main reason for the decline of agricultural employment. But recent analysis of migration for the period 2012-2015 (ILCS, 2015) shows that 45% of the migrants to Russia during this period returned home; and of the people who returned home, 75% were away for less than 12 months. Approximately one-third of external migration is thus seasonal. Researchers involved in this study estimate that approximately 50% of migration from rural areas is seasonal (less than 12 months) due to the low education and vocational skills of rural migrants,

⁷ Armenia's fertility rate fell from 1.72 in 2004 to 1.52 in 2015 (World Bank Development Indicators), well below the replacement fertility rate of 2.1 viewed as the threshold for zero population growth.

which limit their employment opportunities to temporary, unskilled work⁸. This high level of seasonal migration from rural areas suggests that factors other than external migration have also influenced the loss of employment in agriculture.

3.2 Non-Farm Employment in Rural Areas

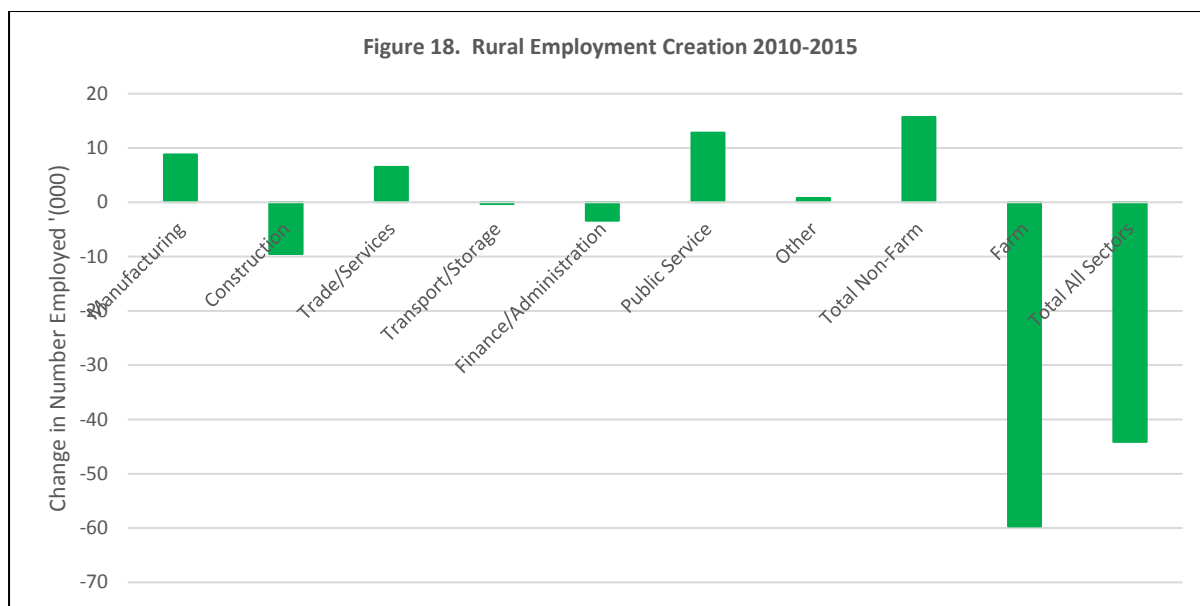
Analysis of rural employment in sectors other than agriculture for 2010-2015 indicates that there has been some shift from farm to non-farm employment. Figure 17 below shows that public services, manufacturing, trade/services and transport are important sources of rural employment and that employment in these sectors has grown. It also highlights the diversity of non-farm employment opportunities in rural areas, and the consequent need for broad-based education and vocational training to improve access to all of these opportunities.



Source: NSS

Further analysis of the net change in employment levels from 2010-2015, shows that the net gain of non-farm rural employment has not been sufficient to offset the loss of agricultural employment in rural areas (Figure 18). As in most countries, the decline of farm employment in Armenia is a deep-seated, long-term trend that is virtually impossible to halt. Ultimately, the best response is to ensure that rural people have access to good education and vocational training to prepare them for employment in all sectors – regardless of where they go.

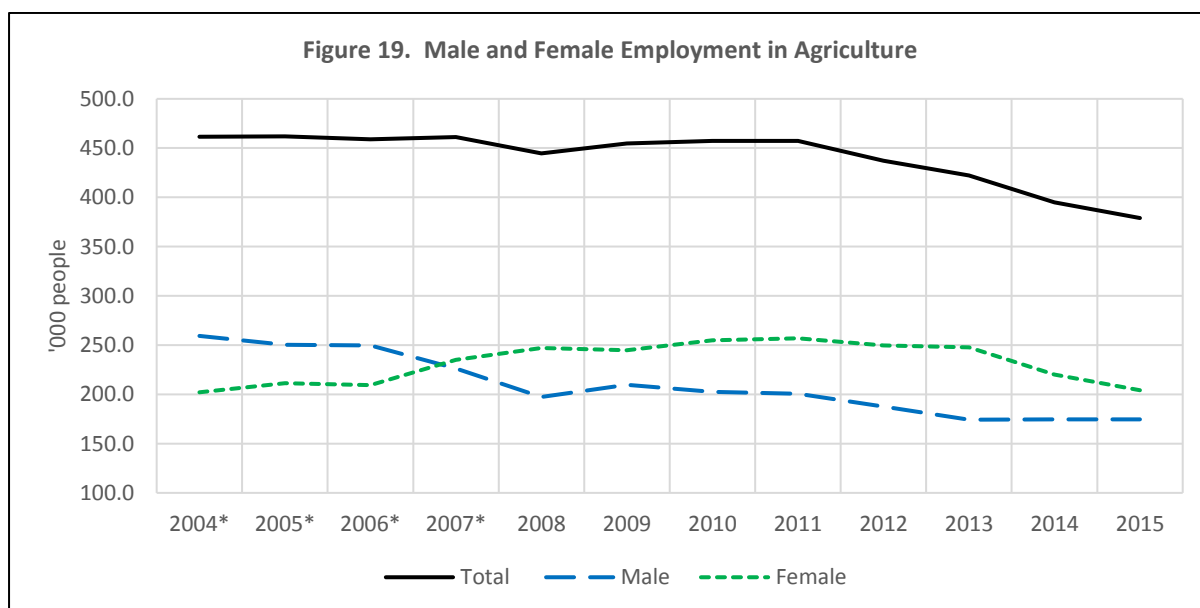
⁸ Personal Communication. Professor Yeganyan, Russian-Armenian University. April 2017.



Source: NSS

3.3 The Growth of Female Employment in Agriculture

Within agriculture there has been a marked shift in the gender composition of agriculture. The number of men employed fell by 84,800 (33%) from 2004-2015, from 259,400 to 174,600. Female employment increased by 1% during the same period, despite a sharp fall since 2013 (Figure 19). Women's share of total agricultural employment thus increased from 44% in 2004 to 54% in 2015.



Source: NSS

This shift in employment structure began in 2006 and appears to have been “managed” by farm households from 2006-2011 to keep total agricultural employment (for men and women) relatively stable. A fall in overall agricultural employment then occurred from 2011-2013, led by a decline of male employment. Falling female employment has been more prevalent since 2013. While this gender shift has improved the prospects for female employment in agriculture, it has undoubtedly also increased the overall labor burden on rural women.

3.4 Increasing Agricultural Wages

Agricultural wages increased by 126% in real-terms from 2004-2015, in response to higher returns from agriculture, the falling supply of labor and increasing wages in other sectors (non-agricultural wages increased by 140% in real-terms during the same period). Wages for women working in agriculture increased by 148% and for men by 121%. Agricultural wages remained at 65%-70% of non-agricultural wages, nevertheless, contributing to the outflow of agricultural labor.

The overall impact of this wage increase on agricultural sector incomes was probably minimal, however, as wage employees account for only 3% of agricultural employment.

IV. Evidence for the Inclusiveness of Agriculture Sector Growth

The following factors provide indirect support for the inclusiveness of agriculture sector growth.

4.1 The Predominance of Small Farms

The small size of most of Armenia's farms means that agriculture sector growth inherently benefits smaller, poorer households. As noted in Chapter I, 60% of Armenia's 345,875 farms are less than 1 ha, and 80% are less than 2 ha. Only 1% of farms have more than 10 ha.

4.2 The Scale Neutral Characteristics of Productivity Increases and Public Investment

The productivity increases and public investments that have driven sector growth are scale neutral and so readily accessible by small-scale farmers. The yield increases that have driven increased crop production are the result of increased fertiliser use and wider use of improved seed -- simple, low cost technologies that most farmers use and understand. Access to fertiliser and seed has also improved in response to government subsidy programs introduced in 2011. Similarly, the parallel increase in livestock production has been driven by an increase in livestock numbers -- the easiest and least costly way to increase livestock output. Herd numbers have been increased incrementally by retaining young stock.

Public investment has focused on irrigation, support for development of the extension system, measures to strengthen WUAs in order to improve grass-roots management of irrigation, and farmer cooperatives and producer associations as a means to improve the economies of scale needed to engage more profitably in agricultural markets. All farms -- large and small - can benefit from better irrigation, knowledge transfer through better extension, and the capacity to engage collectively in market activity. As a result of these programs, access to irrigation has increased; support for a cost-free public extension system has meant that more farmers can understand and adopt new production technologies; and support for the establishment of cooperatives and producer associations has provided the institutional infrastructure for farmers to engage more actively in market activities. While the success of these public investment programs has varied, they have all facilitated the transfer of program benefits to small-scale farmers.

4.3 The Small-Farm Focus of Government Subsidy Programs

As noted in Chapter I, the subsidy programs of the MoA explicitly target small farms. Subsidies for fuel, fertiliser, seed and agricultural chemicals are limited to farms of less than 3 ha and the subsidised credit program has a relatively low maximum loan size. Farms of 3 ha account for 89% of all farms and 51% of total agricultural land. Equally importantly, there is no lower limit on eligibility for these subsidy programs.

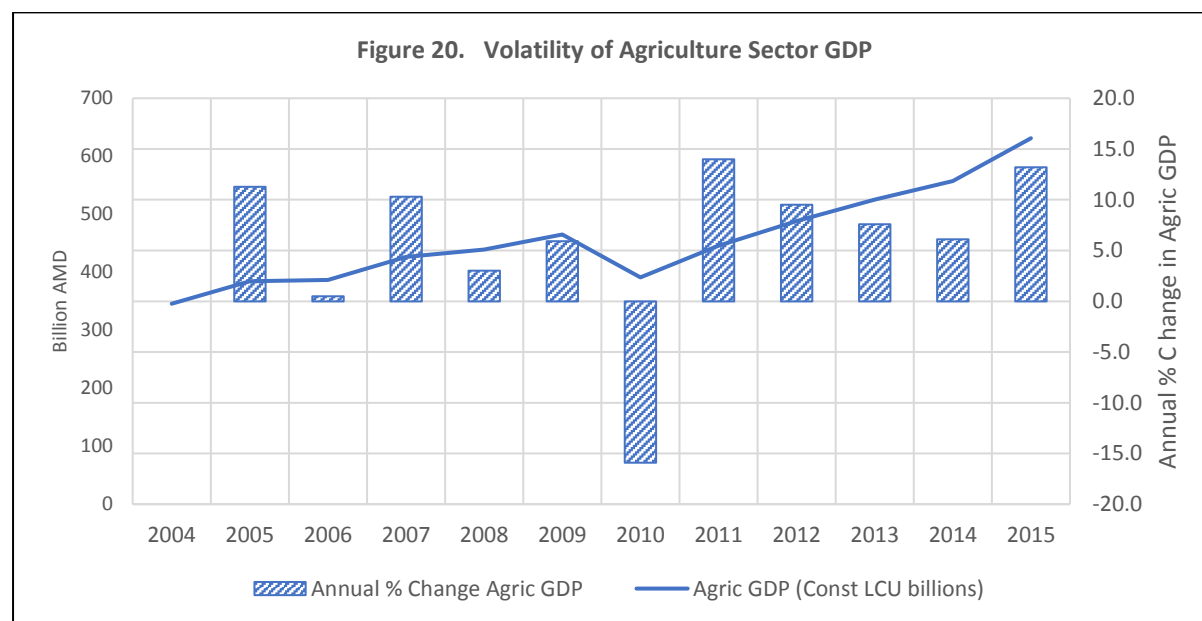
4.4 The Impact of Growth on Rural Household Incomes for the Bottom 40%

To deepen this component of the analysis, the study tried to obtain disaggregated data on rural household incomes from the ILCS implemented annually by the National Statistical Service (NSS). The aim was to examine changes in the level and composition of household incomes -- by decile -- for the period 2004-2015. This would have provided useful insight into the impact of sector growth on the level and composition of income for the bottom 40%. Unfortunately, it was not possible to implement this analysis. The analysis remains highly germane to the objectives of the SCD, however, and should be completed if possible.

V. Resilience in the Agriculture Sector

5.1 Low Current Sector Level Vulnerability to Exogenous Shocks

The sustained agricultural growth since 2004 has not increased the sector's vulnerability to exogenous shocks. Growth slowed in response to the GFC in 2009 and the Russian recession in 2013-2014, but even these events did not lead to sector contraction (Figure 20). The only contraction from 2004-2015 was due to a severe drought in 2010, which resulted in a sharp (15.9%) fall in real agriculture GDP.



Source: World Bank Development Indicators

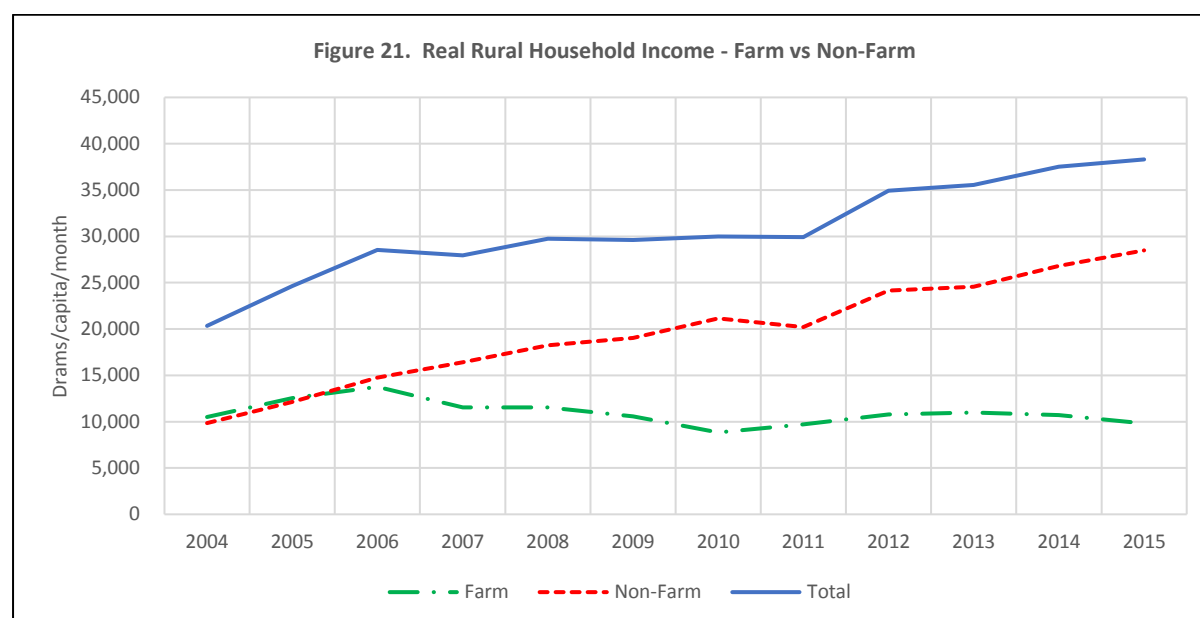
The sector's strong innate capacity to withstand economic shocks derives from its semi-subsistence nature and high consequent proportion of production grown for own-consumption; and the highly diversified mixed crop and livestock production base of most farms. The diversified income base of rural households also facilitates rapid recovery from the shocks that do occur as non-farm income sources provide the means to acquire farm inputs and finance land preparation for the following season. Exposure to climatic shocks remains, nevertheless, due to Armenia's low rainfall agro-climatic conditions and the limited area under irrigation. The high current reliance on drought tolerant cereal crops mitigates this risk to some extent; but severe droughts, although infrequent, can take their toll.

The modernization and commercialization of agriculture, and associated emphasis on high value export crops will increase the sector's exposure to economic and climatic shocks. Without irrigation, the production of high value crops is highly vulnerable to drought. Increased exports will raise the sector's exposure to price and exchange rate risks in export markets. Climate change will further exacerbate the sector's exposure to climatic risks and increase the volatility of international markets.

5.2 Low Variability of Rural Household Income

There was no major contraction of real rural household income from 2004-2015, and minimal inter-annual income variability (Figure 21). These trends suggest strong underlying resilience to exogenous shocks at household level, due to the highly-diversified nature of household income composition. Household income growth can be driven by multiple sources, and falling income from one source can be offset by higher income from another.

Total rural household income grew from 2004-2008, stagnated from 2008-2011 in response to the GFC and then grew again from 2011 onwards (Figure 21). The composition of rural household income changed significantly during this period, however, as did the sources of household income growth. Farm⁹ and non-farm income contributed equally to household income and income growth for the period 2004-2006. But real non-farm income continued to grow steadily after 2006, while farm income fell from 2006-2010 and then stabilized after 2011.



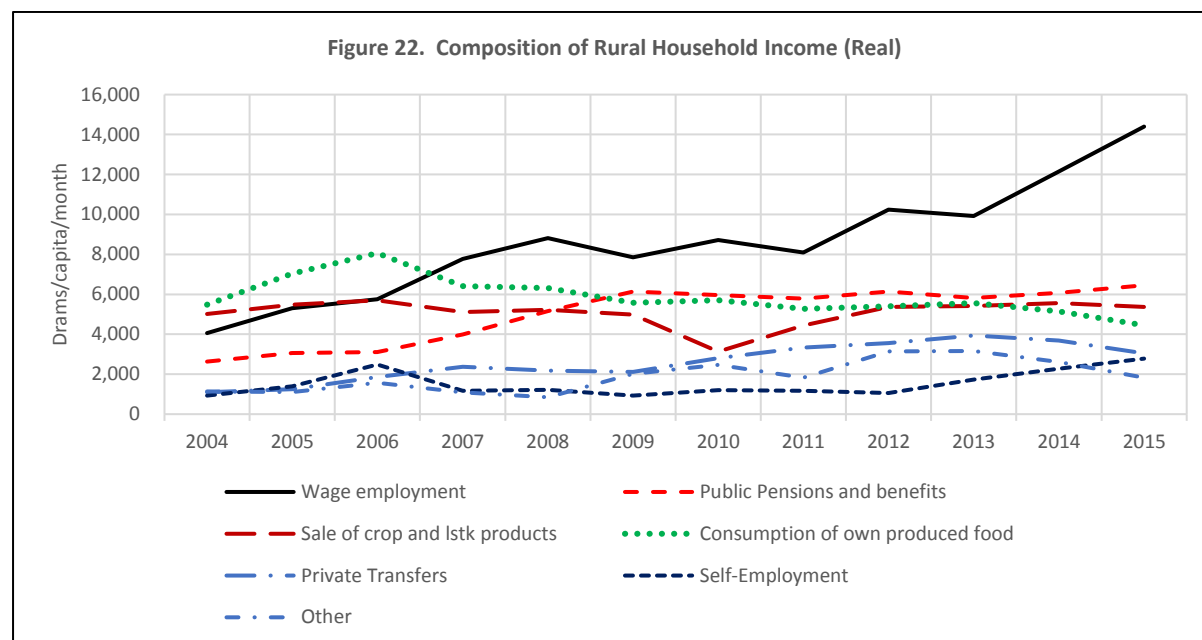
Source: NSS, Integrated Living Conditions Survey

The observed trends in real farm income after 2006 are at odds with the sustained, sector level growth of real agricultural GDP observed in aggregate level data (as in Figure 20). There are two possible explanations for this disparity. First, there is an ongoing concern within the Government that agriculture sector growth has been over-estimated due to the qualitative basis for estimating crop yields by the NSS. If this concern is legitimate, observed aggregate agricultural sector growth may be over-estimated. Second, the marked decline in household farm incomes, as reported by the ILCS, may have been over-estimated. Closer analysis of ILCS data shows that of the two components of farm income, cash income from the sale of crop and livestock products was relatively stable for the period 2004-2015, while the value of own-production consumed by the household rose and then fell sharply from 2004-2007 (Figure 22). This oscillation in the value of own-consumption accounts for most of the marked divergence between farm and non-farm income after 2006. In practice, it is unlikely that household consumption of own-production would vary so much over the relatively short period from 2004-2007. A more gradual shift in levels of own-consumption is more likely, as observed for the period 2010-2015. Together, these two anomalies suggest a flatter trajectory of growth in aggregate agricultural GDP and a moderate rise in household farm incomes.

Modest growth of farm incomes would not change the underlying conclusion that non-farm incomes have become the major source of rural household incomes (approximately 70%), the major driver of household income growth and the major source of household income stability. Increased wage earnings have largely driven the growth in rural household income, and now account for 27%-32% of total household income. Earnings from self-employment and private transfers (including remittances) have also grown. Public pensions and other welfare payments rose strongly in real-terms from 2004 -

⁹ Farm income includes the cash sales of crop and livestock products and the value of production consumed by the household.

2009, and now account for around 20% of total income for rural households. These public transfers provide a critical buffer in times of difficulty and a major source of income stability. Private transfers also remain an important source of income stability. This combination of public and private transfers ensured that real incomes for rural households remained relatively stable from 2008-2011, a period of significant successive shocks from the GFC and then from drought.



Source: NSS, Integrated Living Conditions Survey

5.3 Rapid Recovery from Exogenous Shocks

Resilience denotes not only the capacity to withstand shocks, but also the capacity to recover quickly from shocks when they do occur. The highly-diversified income base of rural households, with its mix of farm and non-farm incomes and public and private transfers not only mitigates the impact of exogenous climatic and economic shocks, it also facilitates access to the financial resources needed to recover from such shocks.

As noted above, this capacity for rapid recovery is evident at both sector and household level. At sector level, aggregate growth recovered very quickly after the 2010 drought, with annual growth of 14% in real-terms in 2011. At household level, the capacity to recover from two severe, successive shocks in 2009 and 2019, was facilitated by an increase in private transfers, a strong and stable base of public transfers and the stability of most other sources of rural household income.

(If completed, the proposed analysis of disaggregated rural household incomes by decile would add further insight into the resilience of rural households in the face of exogenous shocks – particularly for the bottom 40%).

VI. Implications for the SCD and Future Agriculture Policy

The study began by outlining four hypotheses as the basis for review of the contribution of the agriculture sector to sustainable, inclusive growth. Each of these hypotheses is considered below, followed by associated recommendations on the kinds of policies and programs needed to support their underlying objectives.

6.1 A New Model for Agriculture Sector Growth

Evidence from the preceding analysis strongly suggests that the current model for agriculture sector growth is not sustainable. Although sector growth has been significant and inclusive, it has not led to the structural transformation needed to build a modern agriculture sector or the institutional infrastructure needed to transfer the knowledge that modern agriculture requires. The sector has not changed substantially in the last 20 years. Growth has been achieved by improving the productivity of small-scale farms that continue to use the semi-subsistence production systems initiated after economic liberalization and land privatization in the late 1990s. Low value cereal and livestock commodities still predominate and Armenia's known capacity to produce and export high value crop and livestock products has yet to be fully exploited. By focusing on input subsidies for the smallest farms rather than facilitating farm enlargement and building the institutional infrastructure for knowledge transfer, the Government has preserved this structure rather than driving its transformation.

The suggested building blocks for a new model for agriculture sector growth are as follows:

- ***A focus on medium-scale farms, and farmers willing to invest in modern farming technology and the knowledge needed to use this technology effectively.*** The immediate challenge will be to identify this sub-set of medium-scale farmers among the current 345,875 rural households. In addition to setting minimum and maximum size thresholds for eligibility for public support programs, beneficiaries of future public support programs for investment should also be required to make a significant equity contribution to any investments supported. This approach, which would introduce a strong element of self-targeting, is conspicuously lacking in current government support programs. While the focus on medium-scale farms and progressive farmers will inevitably limit the number of farms supported, these are the farms and farmers with the resources and incentives to drive the transformation to a modern, competitive agriculture sector. Note also that this approach is conducive to inclusive sector growth. Farms of 3-10 ha, the potential range for targeting, are small in absolute terms and a high proportion will be among the bottom 40%.
- ***A broad-based medium term program to facilitate farm enlargement through the land market.*** The deep-seated constraints to modernization posed by Armenia's small, fragmented farms are currently being addressed through support for cooperative activity. While effective in some contexts, this approach does not address the long-term need to resolve this issue through land markets. Average farm size has changed little in 20 years. The following initiatives will accelerate progress in the next 20 years (see also Box 3):
 - Land consolidation programs;
 - Strengthen the public institutions responsible for land surveying, land registration and land conveyancing;
 - Strengthen the private institutions responsible for rural land valuation and the sale of rural real estate;
 - Review the role of land taxes as a way to improve the efficiency of agricultural land use; and

- Incentives to encourage older farmers to lease or sell their land to younger farmers (e.g. land tax exemptions, public transfers etc)

Box 3. Farm Land Consolidation and Rural Land Markets - International Experience

As with many countries in Eastern Europe and Central Asia, Armenia faces the challenge of small farm size and high land fragmentation originating from land privatization in the 1990s. Average farm size and plot sizes have changed little in the last 20 years, inhibiting farm investment and modernisation and contributing to the abandonment of agricultural land. Most arable land is privately owned (73%), with a further 24% of community-owned land managed by local government authorities (mainly leased to farmers). Although the sale and lease of agricultural land is increasing, farm enlargement and reduced land fragmentation will not be resolved through normal land market activity alone. A range of new laws, policies and programs is needed to strengthen land market activity and reduce land fragmentation.

International experience suggests that the following measures have potential for Armenia:

- **Land Consolidation Programs:** Differing approaches to land consolidation could be used to augment current land exchange between private partners and the Government. These include comprehensive voluntary land consolidation (as in Lithuania) and majority based land consolidation¹ (as in Serbia and FYR of Macedonia). Majority based land consolidation is most appropriate in areas with (i) little heterogeneity in production capacity and (ii) planned improvement of infrastructure such as irrigation. Wherever possible, land consolidation should be combined with irrigation restructuring.
- **Review of the Land Lease Framework:** A better regulated, more active lease market is an effective means to improve access to land when sales activity is low, particularly for people with limited access to land (landless people, small farmers). Improved security of tenure can be achieved through better regulation of: tenancy duration (minimum term), price range, automatic right of renewal, contract dispute resolution, succession rights and right of pre-emption in case the land owner sells. Incentives such as improved access to subsidies and inclusion of lease rights in land consolidation for registered lease holders also merit consideration.
- **Improved Management of Community Land Funds:** As in other countries in the region, the state and community land that remained after privatisation does not contribute adequately to the sustainable development of farms. The role of current Land Fund activities, particularly in marzes with more arable land, should be reviewed to assess their contribution to strengthening farm structure. One option would be to orient marze Land Fund management towards the mediation of private leases with the Land Fund providing services and guarantees (e.g. the land bank of Galicia in Spain) and targeting specific target groups (e.g. women, young farmers).
- **Review of Pre-emptive Rights (rights of first refusal):** Many countries grant tenants a pre-emptive right (first refusal) to buy the land they are leasing. Pre-emptive rights can also be granted to relatives and/or neighbouring farms, as in France, Hungary, FYR Macedonia, Serbia, Estonia and Lithuania. In Portugal, Spain and Lithuania pre-emptive rights are also used in combination with retirement schemes and in land consolidation areas.
- **Review of Land Taxation:** The level of land transaction taxes (selling/purchasing) and land use taxes can influence the level of activity by current and potential land-owners on land markets. Review could begin by considering the potential impact of altering the level of land taxes on farm structure and land market activity. Further options for reform include specific exemptions related to the instruments described above (e.g. land consolidation and use of pre-emptive rights for co-owners, leaseholders, neighbours).
- **The Integration of Equity and Inclusiveness in the Policy and Program Instruments described above:** Measures to improve access to land and secure better tenure rights should be oriented to the interests of women and young entrepreneurs.

To be effective, implementation of these policies and programs would need to be supported by extensive awareness raising, capacity development of both the public and private sectors and technical assistance.

¹ Under ‘majority based land consolidation’ a qualified majority of participating landowners can mandate that all land in the designated area is involved. It differs from the voluntary approach in that it can force cooperation by a small minority (including unknown owners, absent owners) who do not agree, but still ensures the protection of rights and legal safeguards.

- ***High levels of public and private investment in knowledge transfer systems for farmers and agri-business (discussed further below)***
- ***Continued government and donor support to develop and strengthen value chains as the basis for increased commercialization of agriculture and increased agricultural exports.***
- ***Increased engagement by the ministries of health, education, social welfare and employment in measures to improve rural livelihoods.*** The livelihoods of most rural people depend more on non-farm activities than on farming. With its limited human and financial resources the Ministry of Agriculture should focus on measures to strengthen agriculture and so the farm component of rural household income; and not try to serve as the major source of public support for all rural people. The other ministries listed above should share this mandate. An increased engagement by these ministries also responds to the reality of falling on-farm employment opportunities and continued rural out-migration – which are going to continue. Rural people need education and training systems, such as Vocational Education Training (VET) at upper secondary level, that prepare them for alternative, non-farm employment opportunities – wherever they find them. It would therefore be important to introduce VET streams in general secondary school system in rural areas where upper-secondary students do not have access to VET institutions. And good access to health and welfare services will improve the livelihoods of those who choose to stay.

6.2 A Vibrant Private Sector driven by Medium-Scale Farms and Agri-Business Enterprises

Agriculture is a predominantly private sector activity. Its lack of “vibrancy” reflects the limited incentives of many rural households to invest in their farms when non-farm investments offer better opportunities; the small size of most farms and limited consequent ability to commercialize and compete; and the presence of a small number of larger agri-business enterprises (agro-processors, exporters) that distort the playing field for competition. Measures to promote medium-sized farms and agri-business enterprises are needed to strengthen the “missing middle” between very small, semi-subsistence farms and larger agri-business enterprises. A stronger, broad-based presence of these medium scale farms and agri-business enterprises will create a more level playing field and strengthen competition – so increasing the vibrancy of private sector activity. The productivity increases needed for these medium-scale farms and agri-business enterprises to be sustainable will come from support for value chain development – support that is already ongoing in Armenia.

6.3 Investment in Knowledge Transfer for Farmers and Agri-Business and Improved Education and Training for Rural People

There are two compelling reasons to prioritize investment in knowledge transfer, training and education in rural areas. First, the transformation of agriculture from semi-subsistence to modern farming systems will not succeed if farmers and agri-business enterprises are unable to use this technology effectively. Investment in modern equipment, animal housing, commodity storage systems and machinery is unlikely to generate high returns if its use is sub-optimal. By improving understanding of these technologies, an effective agricultural extension system also increases the incentives to make these investments and reduces the risks that investment will fail. Second, the rural people leaving agriculture need a strong, broad-based education and access to a range of vocational training programs if they are to find employment elsewhere. The preceding analysis shows that non-farm employment opportunities in rural areas are not restricted to agro-processing. Opportunities exist across the whole spectrum of economic activity, including employment in public services. The

ongoing loss of employment in agriculture will also accelerate as farm size increases – strengthening the imperative to invest in broad-based education and training of rural people.

6.4 Resilience in a Modernized Agriculture Sector

The transformation to a modern agricultural economy may well increase the vulnerability of the sector and its farmers to exogenous economic and climatic shocks. The current high resilience conferred by a highly-diversified production base, semi-subsistence production systems that rely on drought tolerant cereal and livestock commodities, and the mixed farm and non-farm income sources of rural households will inevitably diminish. A greater emphasis on commercialization and exports will increase exposure to the vagaries of domestic and export markets, and greater reliance on high value fruit and vegetable crops will increase vulnerability to climatic shocks.

Continued recognition of the benefits of diversified production systems will help to mitigate these risks, together with improved use of irrigation. Improved access to credit and insurance (including self-insurance) will also be important, together with better access to and use of market information. But ultimately the best protection against these risks is good management, and this comes from effective knowledge transfer.

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