

MARKET SYSTEM PERFORMANCE MEASUREMENTS: SUMMARY OF INSIGHTS FROM THE LITERATURE

By

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EXECUTIVE SUMMARY

The overarching goal of the U.S. Government's Global Food Security Strategy (GFSS) is to sustainably reduce global hunger, malnutrition, and poverty. Central to achieving these objectives is the existence of a competitive, inclusive, and resilient market that engages a variety of actors and ensures consistent availability and access to goods and services to all. How to design effective programs and policies that promote market systems that are growing, resilient, competitive, inclusive, nutritious, and sustainable requires developing a better conceptual understanding of the complexities of market systems and systemic change.

However, there remains a lack of agreement about how to understand and measure the systemic change in market system. There is diversity of views that has led to a variety of measurement approaches and tools made available for use by practitioners and implementers to measure systemic change. A recent review conducted by the Feed the Future Enabling Environment for Food Security Project summarized this diversity of approaches to measure systemic changes related to market-oriented interventions. This paper has a similar focus on the 'measurement' related learning question: How to measure market system performance? However, in addressing this question, this review goes beyond the literature reviewed by this previous report. It is generally focused on the economics and agricultural economics literature (the latter in turn has relied on concepts/theory borrowed from the industrial organization literature) and asks following question: what are the generally known, proven, and widely used measures of market performance by agricultural / marketing economists that can be applied to market systems performance in the FTF context?

The review suggests that there is a diversity of indicators, measurement approaches, and tools that researchers and practitioners have used to measure market performance. While some of these approaches focus on the performance of the market system in terms of the desired outcomes related to agricultural productivity, incomes, employment, and nutrition, other approaches focus on indicators that measure the structure and conduct of the market system and the actors in the system.

Based on the literature, the paper identifies several measures of market system performance and proposes them as potential indicators of systemic change in the context of FTF objectives of growth, efficiency, and sustainability; resilience; competitiveness; provision of nutritious food; consistent availability and access to goods and services; and inclusivity. Most of the proposed measures are well-tested and widely used by market economists. However, a few of the proposed measures are new and will require some piloting in a few countries. Also, operationalizing some of these proposed measures will require investment in data collection.

Table of Contents

Executive Summary.....	iv
1. Introduction.....	1
2. Key concepts: From theory to application in development.....	1
3. Measures of Market System Performance: INSIGHTS FROM LITERATURE REVIEW	5
3.1. Early attempts based on the industrial organization framework.....	5
3.2 Market performance indicators and measurements: Examples of applications from developing countries.....	8
3.2.1 Efficiency.....	8
3.2.2 Stability.....	13
3.2.3 Market participation.....	13
4. Measures of Market System Performance in the Context of FTF	14
4.1 Performance measures for growth, efficiency and sustainability	16
4.2 Performance measures for resilience.....	17
4.3 Performance measures for competitiveness.....	18
4.4 Performance measures for provision of nutritious food.....	18
4.5 Performance measures for consistency in availability and accessibility of goods and services.....	20
4.6 Performance measures for inclusiveness	20
5. Conclusion.....	21
References.....	23

List of Tables

Table 1. Objectives, indicators, extremes, and quantifiable measures of industry performance	28
Table 2. Proposed measures of market performance at the level of system actors and system level by performance objectives (or attributes of 'good' performance)	34

1. INTRODUCTION

Markets have existed for as long as humans have engaged in trade. They interact in many ways with the structure of our material lives. Market represents one of the most important social and economic institutions and has become a key word in global political discourse since the early 20th century (Crow 2001). During the Cold War, ideological views for and against market processes were central to the division between East and West. In the post-1989 global order, market forms of organization provided the central theme of policy worldwide. Privatization and liberalization, the promotion of markets to replace state ownership and regulation, became central to change in Eastern Europe and in the industrialized capitalist world. Structural adjustment, based on similar principles, came to dominate policy-making in developing countries in 1980s to 2000s. A market thinking, or the virtues of markets has become a ruling global idea and a major underlying principle of development funding since the last two decades of the 20th century.

Given this centrality in political debate and public policies, it is no wonder that there exists a huge literature on the concept of the market from a theoretical perspective¹ and applied perspective.² This paper first provides a brief overview of the theoretical concept of ‘market,’ and related concepts of ‘marketplace,’ ‘market failure,’ and ‘market system’ (section 2) and then takes stock of some of the commonly used measures found in the literature (section 3) to set the stage for addressing the question of assessing market performance and measuring it in the context of USAID’s investments in market system development (section 4). The summary presented in this paper does not claim to be an exhaustive review of the vast literature that exists on market analysis in both developed and developing country settings. It is a modest attempt to present key insights from the survey of the literature on measures of market performance commonly used (and not used) by agricultural marketing and development economists and to propose measures that can be applied to market systems performance in the context of FTF.

2. KEY CONCEPTS: FROM THEORY TO APPLICATION IN DEVELOPMENT

‘Market’ is the central institution underlying the neoclassical economics^{3, 4}. The Wikipedia definition of market is ‘any structure (physical or virtual) that allows buyers and sellers to exchange any type of goods, services and information.’⁵ The exchange of goods, services, or information (referred

¹ See Swedberg, 1994 for a historical overview of the concept of market.

² As examples of applications in development, see Shaffer 1972, Harrison et al. 1975, the 1996 American Journal of Agricultural Economics volume 78, issue 3.

³ In the tradition of Alfred Marshall (2013), neoclassical economics is an approach to economics focusing on the determination of goods, outputs, and income distributions in markets through supply and demand. This determination is often mediated through a hypothesized maximization of utility by income-constrained individuals and of profits by firms facing production costs and employing available information and factors of production, in accordance with rational choice theory (Weintraub 1993).

⁴ Prior to the rise of neoclassical economics, market was also considered an important institution by classical economists from Adam Smith to Karl Marx. But in their view production was far more important than exchange (or market) when it came to analyzing and understanding economic life (Swedberg 1994).

⁵ [https://en.wikipedia.org/wiki/Market_\(economics\)](https://en.wikipedia.org/wiki/Market_(economics)).

hereafter as 'commodities'), with or without money, is a transaction, and market creates the potential for a transaction to take place.

The literature distinguishes between this abstract and all-encompassing concept of "the market" in the neoclassical sense, to actual markets made up of persons interacting in diverse ways. The term "the market" generally denotes the abstract mechanisms whereby supply and demand intersect each other at an equilibrium price, and exchanges/transactions take place. In this abstract concept, market is asocial and ahistorical (Swedberg, 1994). The reference to markets, on the other hand, reflects ordinary experience and the places, processes and institutions in which exchanges occur (Callon 1998). In this non-abstract sense, market is considered one of the many types of systems, institutions, procedures, social relations and infrastructures which allow participants to engage in the exchange of commodities (Callon 1998).

Some characteristic features of a 'market' is that it facilitates trade, enables the distribution and allocation of resources in the society, enables the exchange of rights (i.e., ownership) over commodities, and allows tradeable items to be evaluated and priced. They are held in place through rules and customs. A market can emerge spontaneously or may be constructed deliberately by human interaction. As against the abstract concept of 'the market,' real world 'markets' exhibit great deal of complexity and diversity. Markets are thus viewed as social phenomena and not only as price-making and resource allocating mechanisms (Swedberg, 1994). In this broader sense, Ronald Coase defines market as a 'social institution which facilitates exchange' (1988, p. 8).

The concept of **marketplace** is akin to market and refers to a physical or virtual space where people regularly 'gather' for the purchase and sale of commodities. Market participants consist of all the buyers (representing the demand side) and sellers (representing the supply side) of a good who influence its price. This relationship between demand and supply in this context of a market implies that they refer to the same commodity. The demand and supply of a given commodity are connected to each other with adjustments in price, which keeps them in "equilibrium."

Neoclassical economics asserts two things about equilibrium. First, in a **free market**, competition establishes a price equilibrium that is perfectly **efficient**: demand equals supply (where all suppliers are forced to operate at the least cost point on the average cost curve) and no resources are wasted. Second, in equilibrium no one can be made better off without making someone else worse off (i.e., the concept of 'Pareto efficient'). Free market implies free from any exogenous interference, including government, in the sense that the government makes no attempt to intervene through taxes, subsidies, bailouts, minimum wages, price ceilings and so on.

Markets where price negotiations meet equilibrium, but the equilibrium is not efficient are said to experience **market failure**. Market failures are often associated with time-inconsistent preferences, information asymmetries, non-perfectly competitive markets, principal-agent problems, externalities, or public goods. If a market failure exists, the outcome is not Pareto efficient. Analysis of the causes of market failure and possible means of correction plays an important role in many types of public policy decisions and the design of development interventions.

Another cause of market inefficiency is price distortions. Distortions in price arising when sellers have monopoly power or buyer has monopsony power can have an adverse effect on market participant's welfare and reduce the efficiency of market outcomes. The relative level of organization and negotiating power of buyers and sellers also markedly affects the functioning of the market.

Although, the virtues of markets (with private sector as a major participant and the implied limited role of government) remain central in policy debates and a guiding principle of most donor funded investments, there has been also a recognition that markets are more than an economic institution and a price making mechanism. Markets affect fortunes and shape wealth. But they also shape poverty and affect inequity in society. Markets fail and prices get distorted; negatively affecting the poor and the unpowerful. Markets are thus implicated in the making of society, its identity, and its division and class system (Crow 2001). As noted by James Shaffer, agricultural marketing economist and one of the pioneers who lead some of the early efforts by USAID in 1960s-1980s on agricultural market development, “A market can be efficient and still result in poverty. The “efficient but poor” observation, often made about individual farmers, is equally possible for traders, markets, and entire economies” (Shaffer 1968, p. 3).

Building on the pioneering work supported by USAID in 1960s to 1980s on understanding the role of market in economic development and sub-sector analyses of staple commodities based on methodologies such as ‘structure-conduct-performance,’ (SCP), and the subsequent evolution of value chain analysis and a ‘systems’ thinking, policies are now focused on strengthening ‘market systems’ (see Box 1 for an overview of the concept of subsector and value chain). According to the early market development literature, the concept of **market system** included: a) the exchange activities associated with the transfer of property rights to commodities; b) the physical distribution of goods and services; and c) the mechanisms or processes (i.e., institutional arrangements) of coordinating production, distribution, and consumption activities (Shaffer 1968; Harrison et al. 1974).

In the context of development initiatives such as Feed the Future (FTF), the discourse on market system has focused on following definitions.

“Market systems are spaces in which private and public actors collaborate, coordinate, participate, and compete for the production, distribution, and consumption of goods and services, at local, regional, and international levels.”
(USAID 2017)

“A market system is a dynamic space — incorporating resources, roles, relationships, rules, and results — in which private and public actors collaborate, coordinate, and compete for the production, distribution and consumption of goods and services”
(Campbell 2014; p. 2).

“A ‘system’ or ‘market system’ centers on a series of interconnected supply–demand transactions, each of which is supported by other functions and governed by formal and informal rules. each of the supporting functions and rules as well as the roles of

supply and demand are performed by a range of public, private, and civil society actors.” (Taylor and Donovan 2016)

Box 1. Subsector versus value-chain: Perspective from the literature

In the structure-conduct-performance (SCP) framework, the subsector is ‘a meaningful grouping of firms related vertically and horizontally by market relationships’ (Shaffer 1968). For example, the dairy subsector includes the dairy farmer, his suppliers for milk production (upstream), and the processors and distributors of dairy products (downstream). The major organizing mechanisms of a subsector are markets. While a subsector represents a more or less arbitrary organization, it is the most important unit of analysis in the SCP framework of industrial organization economics. During the 1990s, value chain analysis became widely used, particularly as a consequence of the writings of Michael Porter (1990) and Womack and Jones (1996) (who refer to it as the ‘value stream’). According to Kaplinski (2000), the value chain “describes the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production, delivery to final consumers, and final disposal after use” (p. 121). The concept of value chains has roots in four theoretical streams (Trienekens 2011)—a) Global Value Chain (GVC) analysis that focuses on the position of the lead firm in value chains and power relationships between developing country producers and Western markets or multi-national companies (MNCs); b) Social network theory which focuses on the inter-relationships between economic and social interactions in (production) networks composed of multiple horizontal and vertical relationships between value chain actors; c) Supply chain management, which studies management and control of inter-company operations (flows of products and services); and d) New institutional economics, which studies the governance/organization of transactions between companies. Over the decades, value chain has evolved from merely a descriptive construct to an analytical tool (Kaplinski 2000).

In the context of agriculture, value chains encompass the flow of products, knowledge and information between farmers and consumers. They offer the opportunity to capture added value at each stage of the production, marketing and consumption process. Designing value chains that deliver greater value to smallholder farmers, reduce their risks and increase their resilience thus became a major focus of development efforts. Value chains have been accepted as an effective way of focusing on measures to improve the scale and impact of private sector investments, including those by smallholder farmers. Development partners have adopted value chain approaches when designing interventions and project implementation to coordinate their support to specific sectors and commodities; particularly due to the emphasis on targeted value chains in the first phase of the US Government’s Feed the Future Initiative. USAID (2017) refer to value chains as ‘one way actors organize themselves within market systems. Value chains refer to the actors and functions connected by a series of value-addition transactions from production to consumption for provision of particular goods and services.’ In this sense, the concept of value chain is not distinct from subsector. It recognizes that value chains depend on cross -market functions (input services, financial services) and the broader enabling environment, including policies regulating safety standards and social and cultural norms that affect access to resources.

Unlike the static neoclassical concept of an efficient market that is in a state of equilibrium, the concept of ‘market system’ considers the dynamic interplay of market institutions and development goals such as efficiency, equity, growth, employment, and food and nutrition security. It also brings in a broader set of market participants as actors, stakeholders, and beneficiaries along the

production-distribution-consumption spectrum. In this market system--producers seek improved inputs and buyers to make their production profitable; small and medium-sized enterprises (SMEs) explore how to provide marketable goods and services; workers provide labor across farms and other rural enterprises; and households purchase foods and other necessities. As consumers, household demand largely helps ensure the sustainability of markets (USAID, 2017). According to Taylor and Donovan (2016), this systemic approach to market system development is grounded in the works of Polanyi, Porter and new institutional economics, has analytical synergies with work on complex adaptive systems, builds on the production networks literature, and is more inclusive of the multidirectional flows and institutional dynamics of systems.

The neoclassical concept of efficient market has thus been replaced with a dynamic view of the market system that needs to be developed/strengthened such that it becomes capable of achieving multi-dimensional development goals, while performing following critical functions.

- provide a means of transferring ownership;
- determine prices through interactions between buyers and sellers;
- provide a setting for transformation of commodities in time, place and form;
- coordinate transactions between all stages—from producers and first handlers to retailers and consumers; and
- spur entrepreneurship and innovation, research and productivity gains.

A market that fulfills these functions efficiently and effectively are considered to be performing well. As used in this paper, the word ‘performance,’ is akin to the way it is used in SCP literature. It represents a combination of economic consequences of structure and conduct (Bain 1959). It refers to “economic efficiency in the use of resources in marketing activities, effectiveness in market coordination to promote price stability, fulfillment of consumer quality preferences, and competitive flexibility and willingness of market participants to innovate and progress” (Harrison et al. 1975; p. 4). Improving the performance of agricultural marketing system through policies, programs, and interventions is an implicit or explicit goal of governments and development investors.

How does one know whether a market system is performing well? What are the measures for evaluating the performance of market systems? These are some of the questions underlying the motivation for this paper. we address this in the following section by taking a stock of some of the commonly used measures and discussions around challenges of measuring market performance found in the literature. we also shift the focus specifically on food and agricultural markets and its performance measurement.

3. MEASURES OF MARKET SYSTEM PERFORMANCE: INSIGHTS FROM LITERATURE REVIEW

3.1. Early attempts based on the industrial organization framework

The literature on this topic started more than five decades ago with the work of the U.S. Commission on Food Marketing, which was chartered by Congress in the 1960s to evaluate the performance of the US food system. It was subsequently pushed forward by a regional research

program of several land-grant universities, NC-117, entitled “Organization and Control of the US Food System.” George Brandow led some of these early efforts that helped conceptualize the framework for evaluating market performance. This early work by him and other colleagues working on this topic make several important points that also apply today, and are highlighted below.

One is that **evaluating market and industry performance necessarily involves looking at several different dimensions and attempts to consolidate performance into a single measure are futile and naïve.** Based on the structure-conduct-performance (SCP) framework, several authors attempted to outline dimensions of market performance which can be measured to evaluate a particular industry or make comparisons among industries. The SCP was an attempt to compromise between formal structures of economic theory and empirical observations of organizational experience in imperfect markets. Borrowing from Bain’s (1959) seminal work, Sosnick (1964), for example, proposed following 12 criteria for evaluating market performance: technical efficiency, progressiveness, product suitability, profits, level of output, exchange efficiency, promotion costs, unethical practices, participant rationality, conservation, external effects, and labor relations. Hildreth, Krause and Nelson’s (1973) shortened list of performance criteria included progressiveness, magnitude and distribution of externalities, values of participants, income and power distribution, and three forms of efficiency—technical, economic, and price. Padberg’s (1975) list of performance dimensions distinguished between quantitative—i.e., technical efficiency, profits, and promotion costs, and qualitative dimension concerned with product characteristics such as availability of alternatives, product safety, product image, and adequacy of consumer information. Bradow’s (1977) list of performance dimensions was a synthesis of the previous lists proposed by others, and included product characteristics, technical efficiency, progressiveness, promotion costs, profits, stability of prices, output, and employment, fair conduct, price coordination, and externalities.

Many industrial organization economists argue that any measures based on these broad performance criteria (i.e., technical efficiency, profits, stability, output, employment, etc.) require specification of a norm or standard to which actual values can be compared. Much discussion in the literature thus centered around specification of these norms and measuring performance. **This leads to the second and third points that come across from the review of this early literature, which relate to challenges of defining norms/standards, and measuring performances against those norms.** Coming up with empirical measurement of market performance against specific standards has remained elusive and a point of contention among economists. Jesse (1978) reports that a working group at the conference in which Sosnick proposed his performance dimensions attempted to come up with consensus norms for each of Sosnick's twelve criteria but failed to come up with precise standards.

As emphasized by Marion and Handy (1973), norm specification is fraught with problems of operationality, weighting, and reconciling conflicting goals and values. They point to five fundamental weaknesses of market performance measures. In general, they: 1) require some judgmental norm; 2) are difficult to combine into a single overall index of performances; 3) concentrate on only limited dimensions of performance; 4) are historical in nature, and not particularly useful for prediction; and 5) can be misleading with respect to causal relationships.

Acknowledging these problems of performance measures, Jesse (1978) argued that one should measure comparisons of performance over time and across markets rather than set absolute standards. Building on work by Brandow (1977) and Shaffer (1972) he defined eight generalized performance objectives, implied performance indicators, performance extremes, and quantifiable measures, and assigned an index to each performance measure based on ease of calculation. These are described in Table 1. The generalized performance objectives (in column 1) are themselves immeasurable and defy quantification. But according to the author they reflect an exhaustive specification of what an ideal economic system should accomplish (i.e. societal goals). The industry performance indicators (in column 2) represent lower level of generality and can be subjected to relative measurement. In column 3 the author specifies performance extremes (good and bad) derived from the indicators. These performance extremes can be interpreted as positive and negative norms and are not precisely defined. They represent conditions (which involves subjectivity) not expected to be observed in real life. According to the author, these extremes should be viewed as examples of inferior and superior performance based on the implied performance indicators.

Next, for each performance indicator, he attempted to define quantifiable measures and assigned a measurability index on a scale of 0 to 10 reflecting increasing difficulty in computation. As one moves from the performance objectives to performance indicator to performance measure, there is decreasing level of generality and increasing subjectivity. Jesse (1978) acknowledged this tradeoff between coming up with precise measures of performance and its ability to reflect performance objective. For example, he noted that the generalized performance objective of assuring reliable food supplies seems unquestionably valid, but numerous questions might be raised concerning how well variance in quantity about a trend line reflects reliability of supplies. This is because there could be several underlying causes of variability. For example, variability could be due to weather and other random factors which would not denote poor performance. On the other hand, variability due to shifts in supply and demand would be desirable, and thus not a reflection of poor performance. Jesse argued that only systematic variability, attributable perhaps to the use of market power, would be deemed as exemplifying poor performance. But unless one understands and has more information on the underlying causes of variability, the measure itself could be an inaccurate reflection of the generalized objective of assuring reliable food supplies. He points that similar problems in interpretation are associated with most, if not all of the quantifiable measures in Table 1.

The quantifiable measures of economic performance suggested by Jesse (1978) were not new, nor do they escape much of the criticism outlined by Marion and Handy (1973). However, the list of quantifiable indicator measures in Table 1 offers alternatives with respect to ease of computation, explicitly recognizing trade-offs between measurability and accuracy in reflecting an implied objective. This is important for operationality, because one could select a set of quantitative measures with low indexes of measurability, and consistently apply them to a group of related industries. This would permit relative comparison of economic performance over a broad spectrum of objectives, even though individual measures only imperfectly reflected the objectives.

Some of the commonly used measures of market performance in this earlier days used time series price data to measure: intermarket price correlation to indicate the degree of market integration; the relationships between transport costs and intermarket price differences (via graphical plots, regression analysis, and the analysis of average margins) to indicate the competitiveness of interrelational trade; and the relationships between seasonal price fluctuations and storage costs to indicate market competitiveness through time, as well as the calculations of annual and longer term moving averages to investigate longer period cyclical changes in the price level (Harriss 1979).

Although these earlier studies based on the SCP framework were focused on the US food system, some of the work of USAID in developing countries (e.g., the Latin American Marketing Project) grew out of those efforts (USAID 2013). The 1960s and 1970s were also an era of pioneering research in the economics of agricultural marketing in developing countries resulting in, for example, studies by Gilbert (1969), Ilori (1968), Thodey (1968), Whitney (1968), Anthonio (1968), Cummings, Jr., (1967); Lele (1967); Holmes (1969); Jasdanwalla (1966); Gupta (1973); Farruk (1970); Harrison et al. 1974; Hays, Jr. (1975); Ejiga (1977); Kohlers (1977); and Berg (1977). The lessons and experience from these efforts to develop and measure market performance are likely relevant to the current work on market system development in the context of the FTF strategy. We shift the focus on the performance indicators and measurements proposed or used in the context of developing countries.

3.2 Market performance indicators and measurements: Examples of applications from developing countries

Economists studying agricultural markets in the context of development investments or exogenous shocks have used a number of indicators to assess market performance. Based on the literature, we have identified three broad categories of measures of market performance – efficiency, stability, and market participation.

3.2.1 Efficiency

A stated objective of most market system development efforts is to increase the efficiency of the market in an effort to increase producer welfare. In the literature we can find a number of ways economists have conceptualized efficiency as a performance criterion. These include: changes in the degree of market integration or price dispersion over time; changes in per-unit gross marketing margins (e.g., between the farmer and wholesale level) over time; level and stability of supplies; changes in production/productivity; and evolution of real retail food prices over time.

Market integration is a necessary (but not a sufficient) condition for the Pareto optimality of the competitive equilibrium (Ravallion 1986). It is one of the widely used measures of efficiency in the context of agricultural market analysis. A spatially and temporally well integrated market is a sign of market efficiency. Market integration can be measured over several dimensions: between farm and retail prices; among key markets within a country; among key markets across neighboring countries; and between domestic and international prices. The degree to which price formation for agricultural commodities in one market is related to the process of price formation in other markets can be indicated by the correlation coefficients of prices in these markets. Most of the earlier work that

evaluated the degree of market integration used pairwise or **bivariate correlations of prices** across different markets as a measure of that indicator (for e.g., Thodey 1968; Jones 1968; Cummings 1969; Blyn 1973; Hays 1975; Gupta 1973; Thakur 1974). But as pointed out by Ravallion (1986) and Harriss (1979), this approach has methodological problems.

Over the decades, several authors have proposed improvements to the analysis of market integration; all requiring sophisticated modeling or econometric approaches and more refined (timeseries) data.⁶ Ravallion (1986), for example, proposed a **model of spatial price differentials** for a tradable good to avoid the shortcomings of using static price correlations. He illustrated this method using monthly rice price data for post-independence Bangladesh. Palaskas and Harriss-White (1993) and Alexander and Wyeth (1994) used **cointegration analysis of time-series data** to improve on the work by Ravallion (1986). Their innovation was the systematic use of error-correction mechanisms in dynamic analysis, as the basis for tests of market integration. Dercon (1995) provided further corrections to and methodological extensions to Palaskis and Harriss-White (1993) and Alexander and Wyeth's (1994) work and applied the market integration techniques to the analysis of shocks such as market liberalization and war on food markets in Ethiopia. As another example, Bassolet and Lutz (1999) used cointegration analysis technique to examine the effects of liberalization of grain market in Burkina Faso. They found that the markets are integrated in the long run, but note remaining limits to market efficiency, including perceptions that market reforms are incomplete or will be readily reversed under some conditions.

The methods based on bivariate price correlation, time series techniques, and cointegration analysis noted above all rely only on price data and fail to recognize the important role played by transfer costs (comprising transportation, loading and unloading costs, and trader's normal profit). Baulch (1997) proposed a method, referred as **parity bounds model**, that measured and incorporated **transfer costs** in assessing food market integration with application to Philippine rice markets. He argued that information on the different components of transfer costs is usually available from structure-conduct-performance studies or from interviews with traders, at least for one point in time, which can be used to extrapolate to other time period. He acknowledged that such extrapolation will be subject to inaccuracies, but contended that "as long as care is taken to ensure that no significant element of transfer costs is omitted from the calculation for the single period, the extrapolation of transfer costs to other periods provides a useful starting estimate of transfer costs over the whole time series" (Baulch 1997, p. 478).

When a market is not well integrated with surrounding markets, consumers face higher prices for goods coming from outside the market, agricultural producers typically receive lower prices at harvest, and all are exposed to greater price volatility when local supply shock occurs. Butler and Moser (2010) developed a **structural model to assess market integration** based on the law of one price. They used price data between markets to estimate the probability of integration, which is the

⁶ See Barrett (1996) and Sekhar (2012) for an excellent review of the literature on the evolution of empirical work on market integration. Barrett (2001) provides a critical review of methods used to measure integration and efficiency in international agricultural markets.

probability that conditions for trade are favorable and that markets appear to be competitive and integrated and the law of one price holds.

Another way in which market performance is partially analyzed uses **price spreads** or **price dispersion** between prices received by producers and prices paid by consumers. One way to measure this is the simple computations of the share of the consumer's price obtained by the producer and by the traders at each stage in the marketing process. One minus the percentage share of the consumer price obtained by the producer reflects the total **marketing margins**. Reductions in marketing margins are hypothesized to benefit both farmers and consumers. These measures are used for comparison with the same product at different points in time, or in different regions of a country, or with other commodities in the same or other regions, or with the same commodity in other countries in order to gain insights into relative positions on a scale of allocative efficiency (e.g., Holmes 1969; Mahalanobis 1972; Sriraman et al, 1973; Wollen and Turner 1970).⁷ In a competitive market, changes in the margin should reflect changes in the supply and demand for marketing services, the former determined by factor prices and technological change and the latter by consumer income (Wollen and Turner 1970; Shepherd and Futrell 1969).

Hays and McCoy (1978) examined the temporal and spatial aspects of marketing efficiency for millet and sorghum by examining movement between, and prices at, fifteen selected locations in Nigeria's four northern states. Spatial price relationships were analyzed by examining intermarket price differentials in relation to transport and other transfer costs reflected in a measure called **parity price and price spread**, and temporal price relationships were analyzed by examining the significance of storage costs as a factor in explaining seasonal price rises. Results suggested lack of spatial market integration as reflected in positive price spreads among markets resulting from an erratic nature of supply, which tends to increase risks in intermarket arbitrage; lack of information on prices and supply in the various markets; and a lack of specialisation in trade by traders.

Harriss (1977) improved the analysis of margins and made it dynamic in time and space based on the hypothesis that markets are efficient in pricing terms if off-season price rises are approximately equal to storage costs, if intermarket price differences are approximately equal to transport costs, and if changes in the form of the product (for example, paddy to rice, maize to maize meal) are approximately equal to processing costs. She analyzed all combinations of storage, processing, and transport costs, and their relations to margins in a system of n marketplaces.

Other studies of broader economic integration that use spatial and temporal price dispersion measures include Jensen (2007), Aker (2010), Shahidur (2004), Aker and Fafchamps (2015), and Goyal (2010). Jensen (2007), for example, evaluated the effects of the introduction of mobile phones on market outcomes in the fishing industry in Kerala, India, and found that by improving fishermen's and trader's ability to communicate over large distances, the introduction of mobile

⁷ In comparing margins across time and space, it is important to ensure that the same bundle of marketing services is measured over these dimensions. As more value is added to a commodity by market intermediaries (i.e., cleaning, grading, packaging, etc.), gross marketing margins is likely to increase, but that would not necessarily mean the system is becoming less efficient.

phones improved arbitrage opportunities and resulted in **reduced waste and decreased price dispersion** across geographic markets. Aker (2010), evaluated improvement in market performance by agricultural price dispersion across markets measured by the **absolute value of the price difference between markets** at certain time. Her analysis found that the introduction of mobile phones in Niger was associated with a significant reduction in cowpea grain price dispersion across markets compared with pre-introduction levels. Similarly, Aker and Fafchamps (2015) compared **differences in maximum and minimum producer prices** across markets with and without mobile phone coverage and found that mobile phone coverage reduced the spatial dispersion of producer prices for certain semi-perishable cash crops in Niger. Goyal (2010) also finds that internet kiosks providing price information to farmers resulted in reducing dispersion of soybean prices, measured by variation of mode price, across wholesale agricultural markets in India.

More recently, Andersson, Bezabih and Mannberg (2017) evaluated the impact of Ethiopian Commodity Exchange (ECX) on market efficiency. They measure market efficiency by **spatial price dispersion**, comparing price dispersion between pairs of regional markets. They suggest that, in Ethiopian coffee markets, local markets connected to the ECX via local warehouses experienced less price dispersion. The efficiency-enhancing feature of commodity exchanges is that they stimulate market transparency and price discovery, and attenuate collusion, (speculative) bubbles and price volatility. They may also lower transaction costs by increasing the range of trading partners, by providing monitoring and enforcement of standards and contracts, and by tackling conflicts via arbitration services.

As noted earlier, a major cause of market inefficiency is price distortion which can arise from many factors, including policies, lack of infrastructure, and market failure. Price distortions can affect incentive structures of market actors. There are many indicators of price incentives found in the literature that try to measure the extent of price distortions due to policies. The FAO's Monitoring and Analysing Food and Agricultural Policies program (MAFAP 2015) provides theoretical and methodological guidelines on the following five commodity-specific indicators: **price gap (PG), nominal rate of protection (NRP), effective rate of protection (ERP), nominal rate of assistance (NRA), and the market development gap (MDG)**. The first two are calculated at three points along the value chain: retail, wholesale, and farm gate, while the other three are only calculated at farm gate level. All indicators are calculated using two different types of data: observed and adjusted. The adjusted indicators account for all indirect taxation and market inefficiencies. The market development gap summarizes the gap between observed and adjusted measures.⁸ This indicator proposed by MAFAP attempts to measure the effects on price incentives of policy distortions in international markets, limited market integration, asymmetrical distribution of market power among agents, illicit taxes and insufficient value chain development.

Other less used measures of market performance under the rubric of 'efficiency' include level and stability of supplies, changes in production/productivity, and changes in food prices over time. Few examples of these measures found in the literature are noted below.

⁸ See Ahmed and Balié (2016) for an illustration of the methodology for calculating the market development gap (MDG) indicator with application to five commodities in Uganda – rice, wheat, cotton, tea and coffee.

In the context of examining the performance of Argentinian export markets, Cook and Wilson (1980) used **level and stability of supplies** as a measure of technical efficiency. They operationalized this indicator as comparison of the means, slopes of trend lines, and coefficients of variation between different time periods. This type of measure requires time series data on production and price of a given commodity of interest.

As another example, Svensson and Drott (2010) use a general equilibrium model of the agricultural economy to estimate the impact on agricultural market outcomes of providing small-scale farmers in Uganda with access to market price information. They measured market outcomes by farmers' involvement in **market exchange, total share of output sold, and farm-gate prices received** (this last indicator was also the main focus of the study by Svensson and Yanagizawa 2009).

The literature includes many studies that evaluate macro-level market reforms during the structural transformation era based on sector level indicators related to growth and price efficiency. For example, Ahmed et al. (2000) evaluated the effects of the Bangladeshi government's reforms of 1990s (which included dismantling of the food rationing system, privatizing grain distribution, easing restrictions on international trade, and reducing government's involvement in grain markets) by examining following outcome measures—**level of production, marketing volumes, prices, and private grain stocks**. Basu and Stewart (1996) used sector data to analyze the consequences of structural adjustment on rural poverty using **incomes and per capita food consumption** as measures of market reform outcomes. Their analysis showed that though the terms of trade improved for agriculture in 12 of the 19 sub-Saharan African countries in their study, incomes and per capita food consumption fell in both adjusting and non-adjusting countries. Badiane and Shively (1998) investigated the roles of spatial integration and transport costs in explaining changes in local maize **prices and price variance** in Ghana. Using a modeling approach and data from wholesale maize markets they find that reductions in local prices and local price variance following the introduction of economic reforms in 1983 can be traced to both local and central market forces, but that differences in the degree of market integration have important implications for long-run changes in transport costs and the evolution of prices in outlying markets.

As another example, Jayne et al. (1998) analyzed the effects of grain market reform in Ethiopia using a reduced-form econometric model. They examined the effects of reform on maize and teff **prices and price spreads** after controlling for exogenous factors such as rainfall, food aid distributed onto local markets, and seasonality. The results generally indicated that grain market reform was associated with higher prices in major grain-producing areas and lower prices in major grain-deficit areas, and grain price spreads (the difference in wholesale prices between surplus and deficit markets) declined in 7 of 8 cases for maize and 10 of 11 cases for teff. A latter study by Minten et al. (2012) showed similar results. They used price data collected over the 10 year period (2001-2011) from cereal wholesale and retail markets in Ethiopia to show that the changes in the cereal marketing system were associated with significant declines in **real margins of wholesale food prices** between supplying and receiving markets over time, in real cereal milling margins, as well as in **retail margins**, and this changes were benefiting both producers and consumers alike. Finally,

some studies have attempted to measure the impact of market changes on overall aggregate economic welfare, as measured by **changes in economic surplus** (Kizito 2009).

3.2.2 Stability

Price instability creates income instability for producers and uncertainty for export revenue-dependent countries. Stable food prices help prevent poor farmers and consumers from falling into poverty traps, promote farm-level investment, and encourage investment throughout the economy (Dawe and Timmer 2012). Because of these benefits, price stabilization has been an important agricultural policy objective in developing countries. Market systems development efforts aim to contribute to this goal by improving coordination mechanisms between demand and supply to reduce price volatility over time (inter-seasonal or year-to-year). There is an extensive literature on commodity price instability, its causes, and consequences on developing countries. Measures of price instability involve analyses of **correlations between price instability and income** (or yield instability). Many studies assess price instability through measures of price volatility. For instance, Deaton and Laroque (1992) used coefficients of variation of aggregated price indexes as a measure of volatility to analyze the price volatility of 13 commodities (including two non-agricultural commodities) from 1900-1987. Arezki et al. (2011) measured volatility with the **standard deviation** of de-trended price series. They used a large dataset of monthly prices observed in international trade data from the United States over the period 2002 to 2011.

Commodity price volatility or uncertainty has been also widely modelled as the conditional variance in the **Autoregressive Conditional Heteroskedasticity (ARCH) and Generalized ARCH (GARCH)** framework. They also require time series data of commodity prices at some frequency depending on the nature of the commodity and type of market. Gemech and Struthers (2007), for example, used GARCH technique to model the volatility of coffee prices in Ethiopia (using monthly price data) to test the change in volatility—pre- and post-reform periods—in order to assess the relative impact of the market reforms. In the Gemech and Struthers (2007) study price volatility is an estimate of the range within which prices might vary at a future time. When prices are said to be volatile, it means that the range in which they might fall (rise) at a future date is wider compared with the mean. Other studies that have employed this methodology to measure commodity price volatility (but mostly in a developed country setting) include Holt (1993), Jayne and Myers (1994), and Mananyi and Struthers (1997).

Price volatility has also been used as a measure of risk in the literature. The study by Capitani and Mattos (2017), explores different procedures to estimate price risk in Brazilian commodity markets. One of the measures proposed is price volatility which is measured by the **standard deviation of price** over a specific time period. For meaningful comparisons across commodities, they also use **coefficient of variation** as a measure of risk.

3.2.3 Market participation

Market participation is both a consequence as much as a cause of development (Barrett 2008). For broad, welfare-enhancing market participation, farmers need to have access to productive technologies and adequate institutions and endowments, as well as “right” prices. Using household

and community survey panel data from Uganda, Muto and Yamano (2009) measured market participation as changes in the **proportion of households who sold certain agricultural products**. They hypothesize that the expansion of mobile phone network increases information flow, which reduces marketing costs of agricultural commodities. Stratifying the sample of farmers into three groups according to the timing of the mobile phone coverage, they find that mobile phone network expansion induced farmers' market participation, especially those that were located in remote areas from district centers and produced perishable crops, for which freshness was important. Aker and Ksoll (2016) also measure improvement in market participation induced by mobile phone access in Niger. Their measure of market participation was **change in the likelihood of selling crops**. Based on an adult education program conducted in randomly selected villages in Niger, they find that distribution and education of mobile phone usage increased market participation of farm households.

On the flip side of market participation is **market access**. Farmers will participate in markets if they have access to markets. Thus, increasing access to markets is often an explicit goal of market system development efforts, and is based on the widespread consensus that smallholder farmers need improved access to agricultural markets to raise farm productivity and living standards. Most studies that use household level data to assess market performance define market access in terms of **distance to a road or travel time to a nearest market** (for e.g., Mather et al. 2013). Chamberlin and Jayne (2013) examined ten diverse and multidimensional indicators of market access in rural Kenya to investigate how accurately they reflect specific market access conditions of interest. These indicators included—distance (km) to point of maize sale, to fertilizer retailer, to veterinary services, to telephone, to extension advice, to a motorable road, to a tarmac road, to piped water source, to health center, and to electricity supply. Using farm panel survey data from Kenya, they find that distances to physical infrastructure, which is a widely used measure in development literature, are often not representative of farmers' access to markets, and that changes in specific market access conditions may have more to do with the behaviors of marketing agents. They suggest that better information on **trader concentrations** and competition in rural markets (including **services provided at the farmgate**) are important dimensions of rural markets that are not necessarily correlated with typical distance and time variables. Thus, they recommend that more attention be paid to quantifying **intermediate marketing services in rural areas as a measure of market access**.

4. MEASURES OF MARKET SYSTEM PERFORMANCE IN THE CONTEXT OF FTF

Overall, the work led by different strands of theoretical and applied economics (industrial organization, institutional economics, agribusiness, agricultural economics) summarized in the previous section point to the complexity and challenges of evaluating market system performance. Brandow's following observation made in 1977 summarizes the complexity of measuring market performance that still holds today.

"Economists asked to appraise the economic performance of an industry have a difficult task. If they confine themselves to the elegant abstractions of rigorous general theory, they find few handles by which to grasp the inelegant real world and are wholly unprepared for some of the institutional and dynamic characteristics of the industry. If they adopt the approach of industrial organization economics, they find standards imprecise,

measurement both conceptually and empirically difficult and judgment usually necessary to reach conclusions. Yet to insist on elegantly derived results that are fully conclusive and leave no room for judgement is to require the impossible. The facts are that good performance is a set of sometimes conflicting goals; the economic world is complex, changing, and never fully knowable; and the economic results of interest range along continuous scales from good to bad rather than being clearly one or the other. Economists must accept this if they are to produce valid information, and the public must accept it if effective use is to be made of such information for policy purposes.” (Brandow 1973, p.81).

Keeping in mind the fundamental challenges of measuring market performance and its weaknesses, we can proceed with identifying some specific performance measures relevant to the context of FTF. The review of the literature points to three things that go in to defining performance evaluation: performance dimensions (e.g., efficiency, stability, progressiveness), appropriate measures for each dimension, and norms of good performance against which to compare those measures. In adapting some of these approaches to today’s development efforts, it is important to first understand the performance dimensions or the end goal of strengthening market systems. The GFSS and the FTF strategy, for example, strive to reduce global hunger, malnutrition, and poverty based on well-functioning markets. In one sense, these are the goals of all development efforts. Specifically, market system development efforts under FTF are expected to lower costs, stabilize price, and moderate supply volatility, which in turn are expected to improve the purchasing power of the poor, who in many parts of the world spend half or more of their limited incomes on food (USAID 2015).

Well-functioning markets are envisioned to have following characteristics—they are growing, resilient, competitive, inclusive, sustainable, provide nutritious food, ensure consistent availability and access to goods and services to all, and benefit the poor, women, and youth. Some of these characteristics of a well-functioning market system are reflected in Jesse’s (1978) performance objectives described in Table 1. For example, objective 1 is “To assure an abundant and reliable supply of food at economical prices. To stimulate the production and distribution of sufficient food to provide the possibility of nutritionally adequate diets for all.” This is consistent with the GFSS and FTF vision of markets that are growing, inclusive, ensuring consistent availability of goods and services to all, providing nutritious food, and benefiting all.

Most of the measures used in the literature are data intensive and require sophisticated statistical and modeling techniques, and interpretation skills. In that sense, they have low operational value for practitioners. However, they do provide a theoretical and conceptual basis to come up with some meaningful indicators that can be used as measures of performance across the FTF targeted dimensions. Table 2 summarizes a proposed list of measures grouped under following six market performance objectives or attributes of well-functioning markets FTF initiative strives to achieve: 1) growth with efficiency and sustainability; 2) resilience; 3) competitiveness; 4) provision of nutritious food; 5) consistent availability and access to goods and services to all; and 6) inclusivity. The measures are listed under two columns depending on the level of measurement. In column 1, the proposed indicators are to be measured at the level of specific actor or agent in the market system targeted by FTF interventions/programs/policies. This could be the input suppliers, smallholder farmers, credit providers, traders, processors, wholesalers, retailers or consumers. The proposed

measures in column 2 are system level indicators of systemic change that is the goal of FTF. The unit of measurement for systemic change can be a value chain, a sector, an industry, a geographic region, or an economy. This level captures changes in the dynamics of the overall market systems, which is a culmination of the demand and supply side forces reflected by the behavior of all the actors (those targeted and not targeted by a specific program intervention). We briefly describe the rationale for each category of these performance measures and discuss potential sources of data.

4.1 Performance measures for growth, efficiency and sustainability

Measures under growth, efficiency and sustainability reflect some of the standard measures of economic growth and efficiency such as productivity and income at individual level (first column, Table 2) and GDP, employment, real wages, and labor productivity at the system level (second column, Table 2). It also includes adoption of productivity/efficiency increasing and conservation promoting innovations as triggering factors for growth, efficiency and sustainability. Reduction in marketing margins (difference between the producer price and consumer price for the same product) is a sign of efficiency. Guided by the literature, several measures related to marketing margins and transfer costs are thus proposed at the individual actor level.

Well integrated market (which means movements in prices between two markets over time are related to each other by transfer costs only, and prices between two time periods are related by storage costs only) is a sign of efficiency and measuring that has been a focus of much of the agricultural marketing literature as described in the previous section. This indicator can be measured only at the system level as it involves comparison of prices across markets. Several other measures related to efficiency are also proposed at the system level based on prices at different nodes in the value chain. This includes measures of price incentive such as the price gap, the nominal rate of protection, and the nominal rate of assistance. These indicators measure absolute and relative values of outputs with and without the effects of domestic policies and can measure the extent of policy induced market distortions, which cause inefficiencies. MAFAP (2015) and Dembele et al. (2008) provide technical guidelines on how to calculate many of these price related indicators of market efficiency.

All the proposed measures (including those in other five categories discussed below) require investments in primary data collection or strengthening data systems (i.e., government statistical bureaus, market information system) that can generate reliable and quality data to track these measures across geographies and time period. Sources of primary data include representative surveys, key informant interviews or focus group discussions conducted at the level of the market actor (e.g., farmers, traders, input suppliers, processors, SMEs, retailers, consumers). Such data collection efforts can be program-led or done in partnership with institutionalized efforts (e.g., LSMS, census surveys, crop forecasting surveys, cost of production surveys) taking place in a region/country. Most system level measures will need national statistical data (e.g., CPI, WPI) and data collected by government ministries/units/statistical offices, commodity boards or other donor funded programs (e.g., FEWS network). Data generated by a market information system (if it exists) can be a great source of many types of price data to measure some of these proposed indicators of market performance.

4.2 Performance measures for resilience

Resilience is one of the pillars of FTF's market systems development strategy (alongside inclusiveness and competitiveness). A recent guidance document from USAID defines market systems resilience as "...the ability of a market system to respond to disturbance (i.e., shocks and stresses) in a way that allows consistency and sustainability in the market system's functioning, or that leads to improvement in its functioning" (USAID 2019, p. 4). Two key indicators of 'market system's functioning' are supply and price. Thus, from an operational perspective, as a performance objective, we define resilience as 'the ability of a market (of a specific commodity or set of commodities in a particular location) to withstand or recover from a supply shock (usually negative but could be positive) without too much of a change in price.'

The ability for a market system to withstand supply shock without dramatic shifts in price would be affected by the level of spatial integration of the market. For example, if markets are segmented, a shock in one region would have a large effect on price in that region, but little elsewhere. But if markets are well integrated domestically and internationally, the effect of the same shock would be smaller and spread over a larger number of markets and consumers. Thus, measures of market integration included under the efficiency category could also apply to resilience. In addition, some indicators of price volatility found in the literature are proposed at the system level, such as correlations between price instability and income or yield instability; coefficient of variation of price indexes; variance or standard deviation of price series over seasons or a time period. Although not based on the literature, number of days after a shock it takes for prices in a given market to return to a level close to the pre-shock levels is proposed as another measure of resilience at the system level (Table 2). Similar measure is proposed also at the level of system actors, which reflects the ability of a market agent to 'bounce back' after a shock. It measures the length of time for a market agent's production, sales, income, consumption, and other welfare indicators to return to levels close to those observed before a shock.

The ability for a market system to withstand supply shock without dramatic shifts in price would be also affected by storage capacity at the level of individual actors and the level of grain stocks at the level of a market system. For example, if there is storage, a price spike is moderated by people destocking, which means the shock is spread out over time. Similarly, availability of close substitutes or diversity of products can increase absorptive capacity of an individual system actor as the shock is essentially shared across multiple markets and the price effect on each will be less. Access to risk sharing mechanisms such as warranties and insurance is another way to reduce the effects of shocks. These indicators can be viewed as causal factors that can influence market system resilience, and thus the level and change in these indicators can be considered as measures of strengthening market system resilience.

Data for most of these measures can be sourced from program led surveys and data collection efforts (e.g., storage, availability of close substitutes, diversity of products, access to risk sharing mechanisms), monitoring data by government ministries (e.g., price data, grain stocks), and special purpose surveys conducted after a shock has occurred (e.g., to assess the length of time to recover from a shock). It can be a challenge to collect data soon after a devastating shock caused by a natural

disaster or a conflict occurs. In such scenario, mobile phone surveys can be a useful tool to assess the situation and collect data to measure the proposed time length related indicators of market system resilience.

4.3 Performance measures for competitiveness

Competitiveness is another pillar of FTF's market systems development strategy. As discussed in previous sections, a competitive market helps the society reach closer to allocative and productive efficiency. Competition on the supply side forces sellers to sell the good at the minimum supply price that they are willing and able to accept. This means, sellers are forced to operate at their most efficient point, where unit costs are lowest. From the whole economic system perspective, competition bolsters productivity and international competitiveness of the business sector and promotes dynamic markets and economic growth. The most obvious benefit of competition is that it results in goods and services being provided to consumers at competitive prices.

The goal of market system development efforts is to increase competition in the agricultural inputs sector (e.g., seed, fertilizer, credit, tools and equipment) and output markets. A more competitive farm input sector would benefit farmers in the form of low input costs; and a more competitive output market would benefit farmers in the form of securing competitive prices for their produce. This rationale for competitive markets on the input and output side holds for all actors in the market system from farmers to aggregators to processors to wholesalers to retailers. Ultimately, competitive markets benefit consumers in the form of low prices for the products and services they purchase. Several measures of market competitiveness are proposed at the level of system actors and the market system (Table 2). Some are simple count measures such as number of buying and selling options available to a market agent and number of sellers/firms operating in a specific segment of the economy. Availability of contracting mechanism, especially to smallholder farmers for key products, can be also an indicator of market competitiveness and thus suggested as a measure of market performance under column 1 in Table 2.

If markets are competitive, that should lower retail prices for products compared to its cost (this is also related to lowering marketing margins, a proposed indicator under efficiency). Thus, at the system level changes in retail prices relative to costs is proposed as a measure of market performance under this category at the system level. Measures of market concentration are often used in the economics literature to assess the competitiveness of the market structure. Most commonly used measures of market concentration are the Herfindahl-Hirschman index (HHI) and the concentration ratios (CR(n)). These two are known as the traditional structural measures of market concentration (based on market shares). They are easy to compute if data on some measure of size (e.g., revenue, sales, membership / number of clients, etc.) for each firm in the market is available for a focused product or industry. They are also easy to interpret and compare across industries and sectors of the market system. Data for most of the indicators under this category can be sourced from surveys and data generated by a market information system.

4.4 Performance measures for provision of nutritious food

The ability of a marketing system “to provide the possibility of nutritionally adequate diets for all” is one of the generalized market performance objectives in Jesse’s (1978) framework (Table 1), and one of the cornerstone objectives of FTF. Under this category, we have identified several measures of market performance both at the level of individual market agents and at the aggregate system level. Some are standard measures of nutrition outcome used to assess consumer level outcomes (i.e., food consumption and dietary diversity), and population or system level outcomes (i.e., food insecurity experience scale, prevalence of stunting, wasting, underweight, overweight, obesity, etc.). Market systems that can make nutritious food available to all at all times are hypothesized to have a positive effect on these food consumption and nutrition outcomes.

Three measures proposed under this category relate to food safety, which is directly linked to health and nutrition outcomes. These include, incidence of food related illnesses observed at the consumer level, and incidence of food borne outbreaks and recalls of contaminated food at the system level. These are important indicators of whether a market system can provide safe food to consumers.

Market systems capable of producing, processing, and distributing food products to final consumers with nutrient fortification or least depletion of nutritional content of food are a sign of markets performing effectively. Thus, two indicators (one each in columns 1 and 2) are included in Table 2 as measures of market performance for this nutrition related objective.

Affordability is as much a virtue of a well performing market as availability. Thus, an indicator, we refer as a ‘Nutrition Affordability Index’ is proposed as a crude measure of affordability. It is similar to the ‘ratio of retail price of major products and average wage rate’ included under the category of market growth, efficiency and sustainability. But instead of a specific product, the idea here is to measure the affordability of a basket of locally available and culturally adapted foods that meet daily recommended nutritional composition of a healthy diet for a person relative to the daily wage rate. A ratio of changes in the index and the changes in the wage rate over time can measure how the market system is performing in achieving this objective at the system level.

Another measure proposed under this category at the system level relate to changes in the food environment. The rapidly changing food system can have a positive and negative impact on diet quality of consumers. The idea behind proposing this measure is to monitor trends in product forms/types available in the market with respect to nutrient composition and to trigger actions to avoid the extreme scenario of a market system performance where the market is flooded with product forms with low nutrient levels and consumers are exposed to excessive influence of advertisement of empty calorie product forms or products detrimental to health.

Like previous categories, data for most of these measures will require program led data collection or partnership with ongoing data collection efforts to ensure appropriate questions are incorporated in the instruments to help estimate some of these measures for a representative sample. The Demographic and Household Surveys (DHS) can be a good source of data for some of the long-term measures of nutrition outcomes. The monitoring of changes in the food environment will require innovative methods and sources of data. Mobile phone-based survey method remains an untapped resource for collecting such market performance data.

4.5 Performance measures for consistency in availability and accessibility of goods and services

Availability and accessibility of goods and services are other two characteristics of a better performing marketing system, and thus an important objective of FTF. We suggest several indicators to measure this dimension of market performance both at the level of market system and market system actors (Table 2). The existence of a well-functioning market information system is not only necessary to generate data to measure market performance (as noted above for several categories), but also a measure of market performance. The existence of such information, if widely diffused, helps level the bargaining power among different actors in the food system (farmers, traders, consumers) and contributes to more informed government market policies. So, availability of market information to market agents and the existence of a functioning market information system are included as measures of market performance under this category. Similarly, availability of a service (e.g., financial, advisory, marketing) and frequency with which a product/service is absent from the market are proposed as measures of market performance, respectively, at the level of market agent and market system.

Some of the widely used measures of market access proposed under this category at the market agent level include distance, time, and travel cost to point of sale/purchase, access to and use of mobile phones for market information, and access to advisory services. ‘Types of marketing services provided to farmers at the farmgate’ is not commonly used as a performance measure and was highlighted as a gap in the literature by Chamberlin and Jayne (2013). They argued that this indicator captures an important dimension of rural markets that is not necessarily correlated with typical distance measures of market access. The same observation and argument holds for the proposed indicator of market performance at the system level that measures concentration or density of traders/service providers at some geographic scale.

Another indicator which is often associated with progressiveness of market system that is proposed is an indicator that tracks the emergence of new products or services that meet consumer needs and demand. A market system that is able to respond to consumers’ needs and demand by making new products and services available in the market place would be a measure of good market system performance.

Same types of primary and secondary data sources described for other categories of market performance would also be needed to measure the proposed indicators under this category.

4.6 Performance measures for inclusiveness

Since markets interact in many ways with the structure of our material lives, making markets work for poor and other underserved segments of society is an explicit focus on market systems development efforts of many donors, including USAID. In fact, inclusivity of underserved segments of society in the market system is one of the three pillars of market systems development strategy of FTF. This objective is related to the broader goal of equity, fairness and social justice that most

development efforts aim to promote. A market system that serves the needs of underserved groups (defined either based on age, gender, income, education, or ethnicity) can directly or indirectly help to reduce poverty, boost social cohesion and reduce political conflict.

To measure inclusivity, we propose that key measures from other categories discussed above should be disaggregated by the underserved group criteria as appropriate for the specific purpose of performance evaluation. This should be done both for the measures at the level of market system and market actors. In addition, at the system level, a proposed measure of inclusivity could be expressed as a disparity index measured as a ratio of the performance measure of the most underserved segment to the performance measure of the least underserved segment of the market system. This could be calculated for any measure of performance in other categories, depending on the specific context of market performance evaluation. The aspiration of market system development efforts would be to see the disparity go down or the ratio go up.

Since the two types of suggested measures for inclusivity (i.e., disaggregation of key measures from other categories by some criteria of underserved segment, and a disparity index) rely on other measures, data collected for those measures will serve as sources of data for this performance objective. A point to note, however, is that if age, gender, income, education, etc. becomes the unit of disaggregation of a measure, it will have implications on the sample size of the overall data collection effort. It will require stratified sampling method, which would increase the sample size by a factor of n for each stratification variable $i=2, 3, \dots, n$.

5. CONCLUSION

The overarching goal of the GFSS that guides the U.S. government's FTF initiative is to sustainably reduce global hunger, malnutrition, and poverty. Central to achieving these goals is the existence of a competitive, inclusive, and resilient market that engages a variety of actors, provides nutritious food, and ensures consistent availability and access to goods and services to all. Strengthening agriculture and food market system that results in durable systemic changes is thus foundational to development efforts under FTF.

To understand whether and how market system development efforts are impacting systemic changes as per the vision of FTF requires monitoring data. In this context, USAID and other development agencies are confronted with the challenge of how to monitor and measure market system performance and systemic changes in market systems. The purpose of this paper was to help address this question through the review of the literature with a general focus on the economics and agricultural economics literature. The paper gave an overview of the conceptual and theoretical underpinnings of why markets and market system strengthening matter, and described different performance measurement frameworks and approaches used through the long history of its application in the economics, agricultural economics, and development literature. Based on the literature, the paper identified some measures of market system performance and proposed them as potential indicators of systemic change in the context of FTF objectives of growth, efficiency and

sustainability; resilience; competitiveness; provision of nutritious food; consistent availability and access to goods and services; and inclusivity.

The review suggests that significant progress has been made in developing a better contextual and conceptual understanding of the complex and dynamic nature of market systems. There are diversity of indicators, measurement approaches, and tools that researchers and practitioners have used to measure market performance. While some of these approaches focus on the performance of the market system in terms of the desired outcomes related to agricultural productivity, incomes, employment, and nutrition, other approaches focus on indicators that measure the structure and conduct of the market system and the actors in the system. A few of the proposed measures are new and will require some piloting in a few FTF countries. However, most of the proposed measures are well-tested and widely used by market economists. In many developing countries a major challenge in operationalizing some of these proposed measures will be availability and access to data. If the required data are not available that would imply investing in program-led data collection effort. This can be a resource intensive endeavor that can limit the scope of the field implementation of market system performance measurement.

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Table 1. Objectives, indicators, extremes, and quantifiable measures of industry performance (Source: Jesse, 1978)

Generalized performance objective (Shaffer bill of rights)	Implied industry performance indicator	Performance extremes		Quantifiable measure	Measurability index \a
		Bad	Good		
1. To assure an abundant and reliable supply of food at economical prices. To stimulate the production and distribution of sufficient food to provide the possibility of nutritionally adequate diets for all.	A. Quantity of product	1. Monopolistic output restriction	1. Output consistent with prices rendering normal profits to minimum efficient firms	Price minus marginal cost of minimum efficient firm (measure of degree of monopoly)	9
		2. Chronic overproduction with low prices or product destruction		Percent change in price compared to percent change in quantity, period t to t+n \b	2
	B. Reliability of supplies	1. Large systematic intra- and inter-seasonal variability in supplies.	1. intra- and inter-seasonal variability in supplies related to weather and other random factors	Variance in quantity about trend line	1
		2. contaminants in food	2. Assurance of product safety	Proportion of total variability in supplies associated with price changes compared to that associated with weather conditions or other random occurrences	5
				Incidence of product recalls	1
	C. Price level and stability	1. Wide seasonal and intra-seasonal fluctuations	1. Stable prices	Variance in price about trend line	9
		2. Prices yielding subnormal or supernormal profits to minimum efficient firms	2. Prices consistent with normal profits of minimum efficient firms	(Price-marginal cost) divided by marginal cost (price-average cost) divided by average cost of minimum efficient firm (measure of inappropriate price level)	4
		3. price trends inconsistent with trends in costs of	3. Price trends consistent with trends	Changes in price compared to changes in production costs in long run	2

Generalized performance objective (Shaffer bill of rights)	Implied industry performance indicator	Performance extremes		Quantifiable measure	Measurability index \a
		Bad	Good		
		production and trends in consumption	in production costs and trends in consumption		
		4. price discrimination in time or space or among product forms	4. Temporal, spatial and product form price efficiency	Price change compared to changes in CPI, WPI, or alternative crop prices	2
	D. Nutritional adequacy	1.Extensive production of product forms with low nutrient levels	1. Research expenditures to improve nutritional levels of existing products and develop more nutritious products	Trends in product forms with respect to nutrient composition	6
		2. Attempts to influence increased consumption of 'empty calorie' product forms or products detrimental to health	2. Advertising keyed to nutritional information	Changes in nutritional composition from grower to consumer	4
		3. Lags in producer-to-consumer product movement permitting quality deterioration	3. Expeditious product movement	Level and content of advertising	9
		4. Product form price differentials which promote inadequate diets	4. Price differentials which promote nutritional adequacy	Correlation between product price per unit and nutritional level	3
2. To facilitate and promote the production and distribution of that combination of foods and related services which best reflect the preferences of	A. Market signals	1. Inverted market communication; consumer demand influenced by producers rather than production influenced by consumers	1. production decisions dictated independently by consumers	Number and type of identifiable product forms and grades	2

Generalized performance objective (Shaffer bill of rights)	Implied industry performance indicator	Performance extremes		Quantifiable measure	Measurability index \a
		Bad	Good		
consumers and the real relative costs of production		2. Grades and standards inconsistent with consumer preferences	2. Grades and standards reflecting relative consumer preferences	Grade aggregation-incidence of grade mixing at retail level. Identifiability of grower-level distinctions at retail	3
		3. Over-processing: limited availability of unprocessed product forms	3. Wide selection of product forms	Consumer preferences compared to existing grades and standards	8
				Quality, availability of market information and understanding	8
	B. Relative price relationships	1. Product form price discrimination; relative prices inconsistent with production costs	1. Grade and product form price differentials equal to differences in value added	Cross-price elasticities among product forms and grades	8
		2. Grade price differentials inconsistent with relative production costs		Retail prices of product forms compared to costs	6
	3. To create incentive for increased productivity in each activity of the total system	A. Productivity	1. Stagnant production process, investment limited to replacement of depreciated plan and equipment	1. Frequent process innovations and rapid adoption of new technology	Output per man-hour time
2. No new product development or product proliferation with no distinctions except as created through advertising			2. Periodic introduction of new products or product forms in response to consumer desires	Level of investment over time relative to changes in demand	3

Generalized performance objective (Shaffer bill of rights)	Implied industry performance indicator	Performance extremes		Quantifiable measure	Measurability index \a
		Bad	Good		
		3. Production per man hour stable or declining	3. Increasing production per man hour	Output relative to industry capacity	9
		4. Extensive excess capacity	4. Production facilities used at or near capacity	Rate of adoption for productivity increasing innovations	3
		5. Unexploited size economies	5. Plant size distribution consistent with known size economies	Plant size distribution relative to minimum efficient size	5
				Number of new product forms introduced	2
				R&D expenditures relative to sales	3-4
		4. To provide productive and rewarding employment opportunities in the system	A. Level and type of employment	1. Declining domestic employment; heavy use of illegal aliens	1. Expanding total employment with job mix heavy on rewarding positions. Mechanization of menial or undesirable tasks
Distribution of jobs with respect to required skills and type of work	6				
Extent of labor organization	1-2				
B. Level of employee compensation	1. wages at or below federal minimum		1. wage schedules consistent with values of marginal product	Wage rates and benefits relative to comparable jobs in locale	7
	2. substandard housing and other perquisites		2. wages at or above payments for comparable work in the same locale	Changes in wage rates relative to CPI	2-3
				Changes in wage rates relative to changes in output per man-hour	2

Generalized performance objective (Shaffer bill of rights)	Implied industry performance indicator	Performance extremes		Quantifiable measure	Measurability index \a
		Bad	Good		
5. To distribute rewards of the system fair and equitably. To especially assure that the consequences of government policies and programs are in the aggregate, fair and equitable	A. Level of price spreads	1. value added or margins in-consistent with input costs	1. value added consistent with costs and normal profits	Grower returns and marketing margins relative to production and marketing costs	6-7
		2. vertical exploitation; inappropriate use of market power at one or more levels	2. equal market power of each vertical level	Flexibility of price spreads with changing costs of goods sold --a) increases; b) decreases	5
		3. sticky prices -- prices at retail unresponsive to changes in supply and demand	3. prices adjust rapidly and completely with changes in supply and demand		
6. To discourage uneconomic uses and wastage/contamination of natural resources and the environment	A. Resource conservation practices	1. use of production practices relatively wasteful of natural resources	1. rapid adoption of innovations which result in decreased use of natural resources	Extent of adoption of resource conserving innovations relative to comparable activities in the in the locale	8
				Waste	
	B. Extent of environmental externalities	1. No recognition of social costs associated with production	1. Complete internalization of externalities	Degradation of environmental quality relative to comparable activities	6
				Environmental progressiveness-- rate of adoption of pollution-reducing innovations	4
7. To encourage socially desirable population settlement patterns	A. Location of production	1. All plants located in one populated area	1. All plants located in Fallon, Nevada	Assembly and distribution costs relative to spatial minimum	9
8. To encourage a sense of belonging and	A. Morale	1. Substantial inter-seasonal instability in employment	1. Stable employment levels	Inter-seasonal variation in employment	1-2

Generalized performance objective (Shaffer bill of rights)	Implied industry performance indicator	Performance extremes		Quantifiable measure	Measurability index \a
		Bad	Good		
effectiveness among participants in the system		2. Frequent suicides, among industry participants	2. Frequent celebratory events among industry participants		

\a Measurability based on a scale of 0 to 10: 0=easily measured by direct observation of secondary data; 10=impossible to measure.

\b If quantity is constant or declining and prices rising rapidly, it may be an evidence of declining competition. Might use prices deflated by appropriate cost index. Would need to adjust for productivity changes.

Table 2. Proposed measures of market performance at the level of system actors and system level by performance objectives (or attributes of 'good' performance)

Measures of changes at the level of system actors (e.g., farmers, aggregators, traders, SMEs, Retailers, consumers)	Measures of systemic change (at the level of a value-chain, sector, industry or economy)
Market Performance Objective: Growing efficiently and sustainably	
<ul style="list-style-type: none"> • Rate of adoption/use of productivity/efficiency increasing innovations / products / services • Extent of adoption of resource conserving innovations • Quantity produced • Marketing volumes • Income/gross margins • Marketing margins relative to production and marketing costs • Changes in per unit gross marketing margins • Transfer costs (transportation, loading/unloading costs, trader's profit) 	<ul style="list-style-type: none"> • Means, slopes of trend lines, and coefficients of variation in quantity produced between different time periods (measure of growth and sustainability) • Employment and GDP over time (measure of growth) • Changes in wage rates relative to consumer price index (CPI) (measure of real wages) • Changes in wage rates relative to output per person-hour (measure of labor productivity) • Inter-seasonal variation in employment (stability measure) • Percent change in price compared to percent change in quantity, period t to t+n (measure of efficiency of supply response to demand) • Ratio of retail price of major products and average wage rate (measure of price affordability for consumers) • Price spreads between producer and consumer prices (for the same product) (measure of market integration) • Ratio of the domestic price to the import parity price (measure of market integration) • Correlations of prices across different markets for the same product (measure of market integration) • Differences in maximum and minimum producer prices (measure of efficiency) • Price change compared to changes in CPI, wholesale price index (WPI), or alternative product prices (measure of efficiency) • Ratio of price of processed product and price of raw product (measure of efficiency)

Measures of changes at the level of system actors (e.g., farmers, aggregators, traders, SMEs, Retailers, consumers)	Measures of systemic change (at the level of a value-chain, sector, industry or economy)
	<ul style="list-style-type: none"> Measures of price incentive (e.g., price gap, nominal rate of protection, effective rate of protection, nominal rate of assistance) (measure of efficiency)
Market Performance Objective: Resilience	
<ul style="list-style-type: none"> Storage capacity Availability of close substitutes Diversity of products Access to risk sharing mechanisms (e.g., warranties, insurance) Number of time units (days, weeks, months) after a shock, it takes for system actors' welfare indicators (e.g., production, sales, income, consumption) to return to at least x% margin within the levels observed before a shock 	<ul style="list-style-type: none"> Changes in grain stocks Number of days (or an appropriate unit of time) after a shock, it takes for food prices to return to at least x% margin within the price level observed before a shock Indicators of price volatility, such as: Correlations between price instability and income or yield instability; Coefficient of variation (CV) of price indexes; Variance or standard deviation of price series over seasons or a time period
Market Performance Objective: Competitive	
<ul style="list-style-type: none"> Number of options/outlets available to sell/buy products Availability of contracting mechanism for key products 	<ul style="list-style-type: none"> Retail prices of products compared to costs Number of sellers operating in a given market segment Measures of market concentration (e.g., Herfindahl-Hirschman index, concentration ratios—CR(n))
Market Performance Objective: Provide nutritious food	
<ul style="list-style-type: none"> Per capita food consumption Dietary diversity scores Incidence of food related illnesses (measure of food safety) Number of food products regularly consumed that are fortified 	<ul style="list-style-type: none"> Changes in food insecurity (e.g., Food Insecurity Experience Scale (FIES)) Changes in stunting, wasting and underweight (for young children) and BMI for adults Incidence of foodborne outbreaks Incidence of recalls of contaminated food Changes in nutritional composition of food from grower to consumer

Measures of changes at the level of system actors (e.g., farmers, aggregators, traders, SMEs, Retailers, consumers)	Measures of systemic change (at the level of a value-chain, sector, industry or economy)
	<ul style="list-style-type: none"> • Changes in “Nutrition Affordability Index” (change in the index of prices of a basket of locally available and culturally appropriate nutritious foods to meet daily recommended healthy diet relative to change in average daily wages) • Changes in the food environment for consumers (e.g., trends in product forms in the market with respect to nutrient composition)
Market Performance Objective: Consistent availability and access to goods and services to all	
<ul style="list-style-type: none"> • Availability of market information • Availability of a service • Distance, time and travel cost to point of sale/purchase facility • Access to and use of mobile phones for market information • Access to advisory services • Types of marketing services provided at the farmgate 	<ul style="list-style-type: none"> • Functioning market information system • Frequency with which a major product/service is absent from a given market • Number and type of identifiable product forms and grades • Trader/service provider concentration/density • Evidence of emergence of new products (e.g., processed grain products; “instant” foods) or service that correspond to emerging consumer needs
Market Performance Objective: Inclusiveness	
<ul style="list-style-type: none"> • Key measures from other categories disaggregated by age, income, gender or other underserved segments <p>For example:</p> <ul style="list-style-type: none"> • Percentage of contracted volume generated through smallholder farmers (or a specific underserved group) • Proportion of producing households who sold a product or participated in a promoted activity 	<ul style="list-style-type: none"> • Key measures from above categories disaggregated by sectors, locations, or other indicators that are correlated with gender, age, income, etc. • Disparity in key measures of performance between the most and least underserved segments of the society (expressed as a ratio, for example)

Source: Author’s compilation

