

CHAPTER 11

Government Analytics Using Expenditure Data

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SUMMARY

Government expenditure data hold enormous potential to inform policy around the functioning of public administration. Their appropriate use for government analytics can help strengthen the accountability, effectiveness, efficiency, and quality of public spending. This chapter reviews where expenditure data come from, how they should be defined, and what attributes make for good-quality expenditure data. The chapter offers policy makers an approach to reviewing the adequacy and use of government expenditure data as a means to strengthen the effectiveness of government analytics that builds on these data. Case studies are used to illustrate how this can be done.

ANALYTICS IN PRACTICE

- Be clear about how *expenditure* is defined. *Expenditure* is a term that is often interpreted and used loosely. This can lead to confusion and misunderstandings in analytical assessments. The literature around public expenditure data is clear on a series of standard definitions and offers guidance as to their application. It is recommended to take advantage of this, where feasible, and to minimize the ambiguous use of terms, to the extent possible.
- Understand and document the origins of government expenditure data. Government expenditure data have enormous potential to inform the accountability, efficiency, impact, and equity of operations. It is important to understand and document how transactions across spending items in government are created, what control protocols they are subject to, how this information is stored, and how microdata are aggregated for analysis.
- Do not take data at face value. The usefulness of analysis from government expenditure data hinges upon the quality of the underlying microdata. It is recommended that the origins of government expenditure

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microdata be periodically reviewed for data provenance and integrity, comprehensiveness, usefulness, consistency, and stability. It is recommended that such work be publicly disclosed, to the extent possible. This can be used as a baseline upon which a reform program can be built to address deficiencies.

- Take a microdata-driven approach to expenditure analysis. An analysis of microlevel expenditure data can offer data-driven and objective insights into expenditure management practices and the impacts of expenditure policy. From this analysis, a government expenditure profile can be derived, which shows where large transactions with high fiduciary risks are taking place, how these compare to low-value transactions at points of service delivery, and where expenditure policy intentions are not being converted into the desired impact. Such analysis can offer operational insights for better expenditure management that serves expenditure control and service delivery objectives.

INTRODUCTION

Public resources are scarce. Increasingly, competing demands on the public purse make prudent and evidence-based expenditure decisions ever more important. This requires, among other things, accurate and timely government expenditure data. Government expenditure data are central to the social contract between society and elected officials. They provide an important basis for accountability, insights into whether resources are being used for budgeted priorities, and assessments of whether spending is sustainable and equitable.

Expenditure data are central to assessing the fiscal health of a country (Burnside 2004, 2005) and necessary for debt sustainability analyses (Baldacci and Fletcher 2004; Di Bella 2008). These are core elements of government operations and often accompany World Bank Public Expenditure Reviews (PERs) or International Monetary Fund (IMF) Article IV reports. A government's commitment to deficit targets can, for example, be measured by identifying whether large expenditure items in the budget are subject to necessary internal controls (Piatti, Hashim, and Wescott 2017).¹

Expenditure data can be used to assess whether spending is effective and efficient. They thus provide information about the functioning of public administration. Such assessments can be made at the very granular level of a department, unit, or even project. For example, budget data might indicate that a construction project is not disbursing as quickly as projected, limiting its progress. This is indicative of potential problems in expenditure management. Such analysis of government expenditure data is used by the executive branch, audit institutions, the legislative branch, and civil society to offer insights into the quality of the administration.

To get to the stage where expenditure data can effectively inform the functioning of government, a simplified, three-step logframe indicates two preparatory stages (see the figure 11.1; a detailed exposition of the stages in the creation of expenditure data is provided in appendix C). First, there needs to be clarity about what government spending means, who it involves, and what it covers. Second, there is the question of how spending is executed (for example, what controls it is subject to), where data are stored, how comprehensive they are, and what the quality of the data is. Third, high-quality expenditure data with high coverage can lend themselves to analyses that inform the effectiveness of government.

This logframe illustrates that the value of any analysis is a function of the quality of the underlying expenditure data. It is therefore important for practitioners to reflect carefully on how government expenditures are defined and where they come from and to critically assess the quality of government expenditure microdata (or transactions data). While there is a lot of guidance on how to analyze government expenditure data (step 3 in figure 11.1), the literature is relatively silent on how to assess the quality of expenditure data, as well as on how poor data may affect the validity of the conclusions drawn from such analyses (step 2). Despite clear guidance on definitions and coverage (step 1), the term *government expenditure* continues to be used to imply a multitude of different concepts that are frequently not well communicated, leading to confusion among analysts.

FIGURE 11.1 Use of Government Expenditure Data for Government Analytics



Source: Original figure for this publication.

This chapter walks through each of these steps as follows. It starts by discussing issues related to defining government expenditure data (step 1). It then reviews the attributes of good government expenditure data and makes observations about how data can be strengthened and made more reliable and useful for analysis. The chapter highlights the importance of data provenance and integrity, comprehensiveness, usefulness, consistency, and stability as critical attributes (step 2). Examples of how to pursue these characteristics are provided and illustrated through case studies. These case studies indicate that deficiencies in any of these characteristics constitute a risk to the ability of analysts to use these data to inform an understanding of government functioning (step 3).

WHAT ARE GOVERNMENT EXPENDITURE DATA?

Despite the centrality of government expenditure, definitional issues remain. The term *government expenditure* is often used with liberty among practitioners and analysts. For example, *budget*, *commitment*, and *expenditure data* are sometimes used interchangeably. Further, there is often insufficient differentiation between cash and accrual concepts. Suffice it to say, it is important to be clear and precise when using the term *expenditure* to allow for an effective dialogue and comparability over time and across countries.

Expenditure is defined by the Organisation for Economic Co-operation and Development (OECD) as “the cost of goods and services acquired, regardless of the timing of related payments.” Expenditures are, therefore, different from cash payments. Instead, “expenditures on goods and services occur at the times when buyers incur liabilities to sellers, i.e. when either (a) the ownership of the goods and services concerned is transferred from the seller to the new owner; or (b) when delivery of the goods and services is completed to the satisfaction of the consumer.” Conversely, the term *expense* “defines the set of transaction flows that reduce net worth over the accounting period” (Allen and Tommasi 2001, 452). This distinction reveals that while an *expenditure* may result in the acquisition of a capital item, an *expense* will apply to the use (depreciation) or care (maintenance) of the item.

Governments spend money as a result of a series of economic relationships. The main ones are as follows:

- To pay wages, salaries, and other emoluments for labor
- To purchase goods and services that are then used in the production of government outputs
- To purchase assets
- To transfer resources (unrequited) to other levels of government, households, or firms
- To meet the cost of servicing debts
- For various other purposes, such as meeting legal claims.

Expenses can be incurred for events that do not involve a same-time transaction—for instance, changes in the estimate of unfunded liabilities associated with government pensions or the impairment of an asset through its use (depreciation). The distinction considers an *expenditure* to acquire goods, with the *expense* occurring when the goods are used.

All expenditure transactions that are routed through a *financial management information system* (FMIS) are reflected in the government’s accounts, or *general ledger*, without exception, providing a comprehensive data source for analysis. Each transaction originates from a spending unit within the government, ensuring that each transaction can be mapped to a particular office. Because these transactions must be executed against the index of allowed payments agreed upon in the budget, or *chart of accounts* (COA), and must specify the amount, the details of the payee (including the recipient’s account number and the time of the transaction) are a natural component of expenditure data. Depending on the level of detail of the COA, the transaction may capture the source of funds, the organizational code, the purpose of the expenditure (economic classification or line item), the jurisdiction in which the transaction happened, and the program or subprogram it related to. The format that the data structure of financial transactions in an FMIS typically takes is given in table 11.1.

Transactions may also be processed manually, outside the FMIS, and then posted manually to the general ledger. These transactions are thus not automatically subject to the same set of FMIS internal controls, and the same level of transaction detail may not be available. Furthermore, these transactions may be aggregated and posted in bulk, making the desired analysis of microdata difficult.

ATTRIBUTES OF GOOD-QUALITY EXPENDITURE DATA

Understanding definitional nuances and assessing the quality and credibility of the underlying microdata both benefit from an understanding of the government information system’s architecture. There are multiple functions, processes, agencies, and associated systems at play. These include processes and systems for

TABLE 11.1 Example of Expenditure Data, by Transactions

Transaction ID	Time stamp (date)	Chart of accounts segment					Amount	Payee (and account number)
		Source of funds	Organization code	Purpose code (line item)	Location code	Program/subprogram code		
Transaction 1								
Transaction 2								
...								
Transaction <i>n</i>								

Source: Hashim et al. 2019.

macroeconomic forecasting; budget preparation systems; treasury systems; establishment control, payroll, and pension systems; tax and customs systems; debt management systems; and auditing systems. Together, these systems represent the information architecture for government fiscal management, underpinning government expenditure management, and are the basis for government expenditure data. A detailed account of these systems is provided by Allen and Tommasi (2001), Hashim (2014), and Schiavo-Campo (2017). Carefully designed, functional processes supported by adequate systems, and the good utilization of those systems, will yield good-quality government expenditure data that can be analyzed to inform policy. Weaknesses in any one of these processes, by contrast, will undermine the quality of expenditure data.

Spending, and the production of expenditure data, follows a process. Once the budget is authorized and apportioned to spending units, commitments can be made. The receipt of goods or services then needs to be verified before a payment order can be initiated. Bills are paid upon the receipt of the payment order. This is then accounted for against the full COA and provides the basis for expenditure data (figure 11.2). A full account of these processes, including differentiation by colonial history, is offered by Potter and Diamond (1999) and Shah (2007). Further details are provided in appendix C.

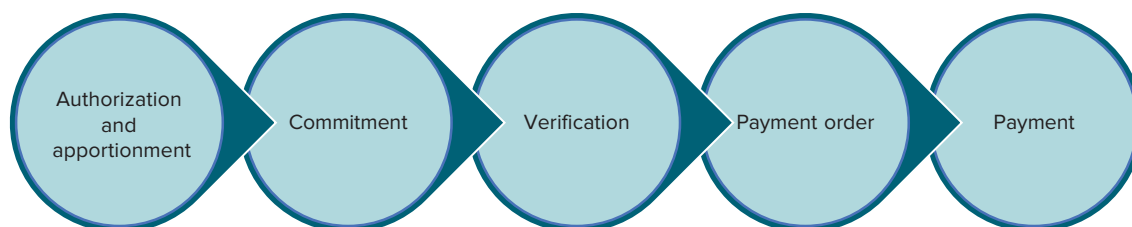
There are numerous agencies and processes involved in the production of government expenditure data. The quality and credibility of these data depend on how well the data production process is implemented across these agencies and processes. This chapter identifies five principles in the data production process that can help assess the adequacy of the data for further analysis. Each adds to the likelihood that expenditure is reliable. Unlike personnel data, discussed in chapter 10 of this *Handbook*, it is more difficult to present a “ladder” of quality for expenditure data. These five principles interact to determine the utility of the resulting data. For example, an incomplete data set that focuses on the 50 percent largest expenditure items is likely to cover a substantial portion of total expenditure. These principles should be seen as underpinning a high-quality expenditure-data-generating system, and what will yield the greatest improvement in overall quality will be specific to contexts and almost to data points.

Data Provenance and Integrity

Expenditure data are useful for analysis if there is confidence in their integrity. *Data provenance*—the documentation of where data come from and the processes by which they were produced—is necessary to have this confidence. There should be a clear sense of what systems data have come from, who was involved in the production of the data, and where the data are stored. Internal controls for systems should ensure data provenance and integrity. If systems are used, controls are applied, and data are immutable (or there is a clear trail in any changes), there can be confidence in data integrity. The use of an FMIS, for example, should guarantee data provenance and integrity—if transactions were executed through the system and, therefore, were subject to FMIS internal controls.

If expenditures are not routed through the dedicated government system, data provenance and integrity are more difficult to guarantee (Chami, Espinoza, and Montiel 2021; Milante and Woolcock 2021).

FIGURE 11.2 Stages in the Execution Process That Create Government Expenditure Data



Sources: Adapted from Potter and Diamond 1999; Shah 2007.

As evidenced in the literature, in many lower- and middle-income countries, such as Ghana, Pakistan, and Zambia, FMIS coverage remains limited (European Commission and IEG 2017; Hashim, Farooq, and Piatti-Fünfkirchen 2020; Hashim and Piatti-Fünfkirchen 2018; Piatti-Fünfkirchen 2016). In some instances, it may be for good reason that systems are not used. There may, for example, be information and communication technology limitations, a lack of access to banking services, or human capacity constraints in remote areas. In other instances, not using systems may be a purposeful choice to avoid said controls and, thus, clear data provenance. In either case, transactions posted manually to the general ledger are more susceptible to manipulation. In these cases, confidence that the reported expenditure reflects actual spending is likely to require a costly ex post audit. An example of how FMIS utilization helped resolve a major corruption episode in Malawi is illustrated in box 11.1.

Mixing good-quality data with questionable data calls into question the credibility of the entire data set because the provenance is not accurately tracked for each and every transaction. It is therefore important to understand which transactions were processed by the FMIS and where transactions that were *not* processed by the FMIS come from, as well as whether their integrity can be assured (Hashim and Piatti-Fünfkirchen 2018).

Comprehensiveness

Comprehensiveness is defined with respect to the reporting entity. If the desire is to review expenditure performance across the entire government sector, then this requires data to be comprehensive across levels of government, sources, and, preferably, time. Data comprehensiveness is complicated by mismatches between the institutional setup of a government (consolidated fund or public account) and the definition of *government*, which may include bodies that are outside the consolidated fund or a jurisdictional structure that clearly separates the levels of government, as is the case with federations. What is important for the

BOX 11.1 How Utilization of a Financial Management Information System in Malawi Supported Data Provenance and Helped Resolve a Major Corruption Episode

Adequate utilization of the financial management information system (FMIS) in Malawi helped ensure that most spending was transacted through the system and that expenditure data were recorded and stored on the general ledger. During a major corruption episode, data provenance—ensured through the FMIS—enabled the tracing of the transactions and events (Baker Tilly Business Services Limited 2014; Bridges and Woolcock 2017; Hashim and Piatti-Fünfkirchen 2018; World Bank 2016a).^a This, consequently, allowed authorities to follow up, identify collusion, and prosecute. In an environment where transactions are posted manually, it is easier to tamper with records, which undermines the integrity of the data and, thereby, the ability of authorities to ensure accountability. The increasing penetration of banking innovations, such as mobile money or smart cards, offers governments the ability to make electronic transfers or payments even in remote areas (where access to conventional banking services is unavailable), which leave a digital footprint. Even if the FMIS does not execute the transaction, posting these onto the ledger would strengthen data provenance, transparency, and accountability (Piatti-Fünfkirchen, Hashim, and Farooq 2019). This practice has been widely applied for cash transfers in some countries, such as Kenya, Rwanda, Uganda, and Zambia.

a. There was a misconception that the FMIS was at fault for not preventing the misappropriation of funds. Collusion among main stakeholders was a human, not a system, error. The FMIS should be credited with ensuring data provenance and supporting prosecution in due course (World Bank 2016a).

integrity of the analysis is that the comprehensiveness of the reporting entity can be established. If transaction coverage for a reporting entity is not comprehensive, the findings will reflect this and may fall short of their intended purpose.

Guidance on how the *public sector* is defined is available in the IMF's *Government Finance Statistics Manual* (IMF 2014) and in the *Handbook of International Public Sector Accounting Pronouncements* (IFAC 2022). However, the application of this guidance can vary across countries and institutions, making meaningful cross-country comparisons for reporting purposes difficult (Barton 2011; Challen and Jeffery 2003; Chan 2006). In some cases, the public sector may be narrowly defined, with asymmetrical representation of the general government and public corporations. Reporting on the public sector may be partial—even at the aggregate level—in sensitive sectors, such as defense, the police force, or space programs, or it may be partial due to the funding source. The budget sector (and within it, the various forms of annual and standing appropriations), the public account, the general government sector, and the broader public sector may all justifiably be the entity of interest for some analyses; what is important is to understand *why* a given entity is the entity in question and what activity it excludes relative to a more relevant entity. For example, when seeking to communicate restraint, a central government may highlight its total spending, including transfers to lower levels of government, whereas a subnational government may wish to distinguish the central government's spending for its own purposes and programs from the funds it transfers to lower levels of government. This distinction may reveal that a large portion of the central government's "restraint" comes from cuts to others' programs rather than restraint in the delivery of the central government's own work.

The comprehensiveness of spending can suffer from a lack of transparency on debt. As countries are increasingly indebted, this factor becomes increasingly important. Drawing from new databases and surveys, Rivetti (2021) finds that nearly 40 percent of low-income developing countries (LIDCs) have never published debt data on their websites or have not updated their data in the past two years. When debt data are available, they tend to be limited to central government loans and securities, excluding other public sector components and debt instruments. For some LIDCs, debt data disclosed across various sources show variations equivalent to as much as 30 percent of a country's gross domestic product—often because of differing definitions and standards and recording errors. Data in the debt management system should comprehensively reflect all loans and liabilities and actual debt servicing requirements. Actual spending should be comprehensively reflected in the FMIS. Even here, it is important that expenditure controls apply in order to avoid expensive short-term borrowing that has not been budgeted for (Hashim and Piatti-Fünfkirchen 2018).

Comprehensiveness is equally important for sector expenditure analysis. Health spending, for example, is frequently benchmarked against the Abuja Declaration target of 15 percent of the government budget (African Union 2001). However, how well one can proxy this indicator depends on a country's ability to credibly populate the numerator (health spending) and the denominator (general government spending), and the literature has shown this to be difficult (Piatti-Fünfkirchen, Lindelow, and Yoo 2018). Estimating health spending typically goes beyond just one reporting entity. Thus, reporting comprehensively on all health spending, including relevant off-budgetary funds, the use of internally generated funds (for example, user fees), development partners (Piatti-Fünfkirchen, Hashim, et al. 2021), and the use of tax expenditures (Lowry 2016) becomes important in a consideration of the resources dedicated to the sector.² Estimating the comprehensiveness of the denominator, then, is complicated by all the factors outlined above.

Comprehensiveness also requires comprehensive reporting over time. A timing mismatch between receiving a good or service and the payment of cash can lead to the creation of *payment arrears*—a liability that is past due. Accurate reporting on such arrears is important for comprehensiveness. The 2020 Public Expenditure and Financial Accountability (PEFA) global report notes that countries' stock of expenditure arrears was around 10 percent of total expenditure, well above the 2 percent considered good practice (PEFA 2020).³ If these are not adequately reported, any expenditure analysis will be inaccurate. The PEFA indicator for expenditure arrears (PI-22) is, however, one of the poorest-rated indicators in the framework (PEFA 2022). This is despite the fact that adequate expenditure controls tend to be in place, suggesting that these are frequently bypassed, leading to the aforementioned data provenance and integrity concerns.

Finally, many aspects of government expenditure are driven by trends that extend beyond the annual time cycle that generally applies to budgets. For example, changing demographics mean that societal needs for services such as education and health care change over time. Similarly, differences in timing between the creation of an obligation (such as a pension) and the payment of that obligation mean that it is important to consider the multiannual nature of spending to get a more complete picture. Spending (or not spending) today may create important obligations over time. Consumption- and investment-related spending are fundamentally different and need to be recognized as such. Yet annual expenditure reporting requirements tend to take a short-term perspective regardless of the nature of spending. Further, what is captured as expenditure may be influenced by what is not captured, which may nevertheless impact what is left to be performed by functions requiring expenditure—for example, regulation and its associated compliance and tax expenditures. If wider resource use is a concern, rather than narrow expenditure, then the analytical net should also be cast much wider (see, for example, the methods in Stokey and Zeckhauser [1978]).

Usefulness

In order to analyze and interpret findings in a way that meaningfully informs government administration, government budget data also need to be structured in a meaningful way. Budget and expenditure data are generally presented by administrative, economic, programmatic, and functional segments (see table 11.1). The purpose of the administrative segment is clear: it allows the government to allocate, monitor, and hold to account spending within its administrative structures. The purpose of the economic classification is also clear. It classifies the expenditure according to what inputs it has been spent on, which is necessary for accountability. Countries with a program structure require program classification in the COA because appropriations happen accordingly. Functional classification is appealing because it allows decision-makers to readily identify how much has been allocated and spent according to specific functions, such as primary education and basic health care. If expenditure items can be clearly mapped to functions, this type of classification offers substantial analytical possibilities. An example of a classification of the functions of government (COFOG) pertaining to the health sector is offered in table 11.2. Together, these set of classifiers should let analysts cross-tabulate expenditure data in many meaningful ways.

Business intelligence strategies and technologies can then be used for the analysis of the information stored in the data warehouse. Appropriate tagging and data structure allow for automated reporting and analytical processing following business needs. Dashboards can be developed to provide information to management in government agencies on issues such as budget execution, cash position, and audit, allowing for real-time, evidence-based decision-making (Negash and Gray 2008).

TABLE 11.2 Example of Classification of Functions of Government from the Health Sector

First level	Second level
Health	Medical products, appliances, and equipment
	Outpatient services
	Hospital services
	Public health services
	R&D health
	Health n.e.c.

Source: Eurostat 2019, 37.

Note: n.e.c. = not elsewhere classified; R&D = research and development.

However, classifying these functions may not be trivial. With reference to the health sector, the following issues may arise:

- **Classifying by some functions may not always be possible.** In the health sector, a hospital generally offers both inpatient and outpatient services. Unless it has dedicated departments drawing on distinct cost centers, it may not be possible to differentiate between these services. It may be possible to understand total hospital spending but not necessarily the functions to which spending was dedicated within the hospital. Furthermore, health staff may provide both inpatient and outpatient services, and it would be difficult to apportion wages without a robust time-recording system. Similarly, in countries where the region- or district-level administration is also the lowest spending unit, it can be difficult to apportion specific functions because district authorities (in health) generally need to offer primary and secondary care as well as public health services. Therefore, if the spending unit does not have a clear mandate that maps directly to the COFOG functions, it is necessary to make assumptions, and these may not always be helpful or appropriate. In case there is no clear fit, it may be more accurate to simply report by administrative segment than to fit a square peg into a round hole. A COA reform process can be pursued over time to make spending more meaningful from a functional perspective.
- **Reporting by function requires a discrete choice.** Spending can be classified as *either* health or education spending—but not *both*. However, there are teaching hospitals that could be classified as either. There may also be medical facilities managed by the defense sector where allocation could be contested. Further, it is unclear whether subsidies for enrolling the poor in health insurance should be considered a health or a social protection function.
- **Not all functions, per COFOG categories, can be clearly understood as government functions.** For example, in the health sector, the COFOG category of *medical products, appliances, and equipment* may more appropriately be classified as *inputs* in the economic classification rather than *functions*. This also raises the question of inconsistencies within classifications because these medical products also serve other functions in the COFOG, such as hospital care or outpatient services.
- **There may be an overlap between functional and program classifications** because programs are output oriented and should serve specific government functions. There can still be added value for having both, but this needs to be clarified.

Reporting by functional classification is useful as long as it can be done credibly. Whether and how this exercise is done should reflect local context, demand, and capacity. Recommendations to shift spending toward some functions will remain unhelpful if these cannot clearly be traced back to the government's administrative structures. For example, it may be appealing to recommend more spending on outpatient services (which tend to be more efficient than hospital services), but as long as the government cannot clearly differentiate between spending on inpatient and outpatient services at the hospital level, such recommendations will remain unhelpful. Furthermore, as long as functional classification remains subjective, based on the assumptions of the analyst, any recommendations to adjust spending will lack credibility. This problem was recognized by the *Rwanda Nutrition Expenditure and Institutional Review 2020*, which cautions that extensive allocative efficiency analysis will remain futile as long as it cannot be clearly mapped back to the budget (Piatti-Fünfkirchen et al. 2020). Instead, a COA reform process may be more meaningful to improve the functional classification toward what is needed for the easier interpretation of expenditure data (see box 11.2).

Data presented in a useful format with integrity will likely foster demand for analysis. To make data more useful to analysts, there are ongoing initiatives by development partners that systematically clean, process, and categorize FMIS data (see, for example, the World Bank's BOOST initiative).⁴ There has been a lot of demand for these initiatives because they support the various other analytical products that require government expenditure data in an interpretable format. However, as long as this work is not produced domestically through domestic systems, it is unlikely to be sustainable and will not undergo the required domestic checks and balances. This is an essential task of government data management—data storage in an adequate format in the business warehouse, from which a business intelligence system can pull meaningful reports—possibly requiring investments in institutional, systems, and human capacity.

BOX 11.2 How the Government of Rwanda Uses Budget Tagging to Implement a High-Priority, Cross-Cutting Agenda

The budget of the government of Rwanda, like in many countries, is organized vertically by ministry, department, and agency. This lends itself well to oversight and accountability. For some issues, such as climate change, gender, or nutrition, where implementation cuts across sectors and agencies, it can be difficult to identify what relevant activities were budgeted for and implemented. The government therefore introduced an upstream tagging process, in which ministries identify what interventions in the budget are related to these issues. This has provided a crucial management function because the financial management information system can now produce functional budget execution reports that reflect spending on these issues. At any point in time, it provides insight into what activities have been implemented, which activities remain to be implemented, and what the remaining cash flow requirements are. It thereby uses the budget as a tool for oversight, coordination, and mutual accountability for implementing a high-priority, cross-cutting agenda.

Consistency

Consistency in data management enables the production of data that can interface across systems and over space and time to allow for meaningful analysis. The COA's definition and use in government systems are influenced by different public financial management (PFM) traditions. PFM traditions can leave countries with the application of different COAs across levels of decentralization (Cooper and Pattanayak 2011). As long as this is the case, it is difficult to have a unified data set that allows for the analysis of expenditure information across the country, which complicates management and decision-making (PEMPAL 2014). One example of such a case is Indonesia, where a long-standing reform process has aimed to unify the COA across the country.

Consistency is also required across the system landscape in a country. This means that the same COA should be used throughout the FMIS and that taxes, debt management, and payroll should be classified according to the codes in the COA. Without unified use of the COA, adequate integration across systems to conduct government analytics will not be possible. For example, understanding the full fiscal health of an organization requires an integrated data set on the budget, debt, and payroll. If development partners are an important source of revenue, they should be encouraged to use the same classification structure so that comprehensive expenditure reports can be produced (Piatti-Funfkirchen, Hashim, et al. 2021).

It is equally important that the COA is used as intended. If activities are posted as line items, or vice versa, this creates problems for the quality of expenditure data and, subsequently, for analysis (Farooq and Schaeffer 2017). Similarly, it is important not to confuse programs with projects. A *program* is a set of activities that contribute to the same set of specific objectives, an *activity* is a subdivision of a program into homogenous categories, and a *project* is a single, indivisible activity with a fixed time schedule and a dedicated budget or activities. In some instances, development partners are responsible for the introduction of line-item codes into the COA in order to give a certain engagement more visibility or allow for the allocation of resources to one specific engagement area. This can come at the cost of coherence and consistency. For example, in Zimbabwe's health sector, there is a line item called *results-based financing*, one called *hygiene and sanitation*, and one called *malaria control*. All of these are important engagement areas but not inputs. They should be reflected as such in the COA. Similarly, in Rwanda, there is a line item called *maternal and child health*, which is also not a reflection of inputs but rather a target group.

Finally, it is important to be clear about nomenclature. Mixing budget data, release data, commitment data, and actual expenditure data within the same data set will lead to inconsistencies and problems.

Stability

The comparability of data over time is assisted by having a stable process to produce them and a stable classification system to parse and present them. But perfect stability does not occur: some degree of variation is natural and to be expected as conditions change, knowledge advances, and governments address evolving needs. Changes in reporting may be consequential, through the introduction of new spending agencies or the shift from input budgets to program structures. Stability does not require a static reporting structure, which would be unrealistic and unhelpful. It does, however, require the government to be able to connect current expenditure information to the past to be able to make use of trend data. This can be done by designing a coding scheme that can accommodate older and newer codes; by taking a sequenced, incremental approach to reforms; or by at least maintaining tables that form a bridge between data series to allow for reasonable consistency between the past, the present, and the future.

If such mitigation measures are not taken, change can be disruptive. For example, in Zimbabwe, the program structure in the health sector was substantially revised at both the program and the subprogram levels to accommodate an additional focus on research by the Ministry of Health and Child Care. A program and four subprograms were added, and four subprograms were removed. This meant that 35 percent of the approved 2020 budget had been allocated to programs that no longer existed in the 2021 budget. Instability in the classification of the program structure over time without adequate mitigation measures (for example, bridge tables) raises the question of what kind of actual reallocations accompanied these shifts. The possibility of multiyear analysis for costing or value for money remains severely limited in such scenarios. Similarly, the changes mean that performance targeting may be disrupted, as it was in the Zimbabwe health case, in which none of the 17 program outcome indicators in the 2020 budget remained available in the 2021 budget (World Bank 2022).

EXPLORING MICROLEVEL GOVERNMENT EXPENDITURE DATA

Developing comprehensive, appropriately structured, consistent, and stable data with a clear provenance provides a foundation for effective analytics. Though a large literature on the analysis of expenditure data exists (see, for example, Robinson [2000], Tanzi and Schuknecht [2000], and some discussion in appendix C), there is less discussion of how these data might be used to understand the functioning of government itself.

There are many examples of how government expenditure data can be used to inform the efficiency of government spending and better understand how a government is functioning. Expenditure information is necessary for an administration to explore opportunities for reducing the cost of the resources used for an activity or for increasing the output for a given input while maintaining quality (McAfee and McMillan 1989). The National Audit Office in the United Kingdom assesses how well the administration makes use of resources to achieve intended outcomes (NAO 2020). In Kenya, “data envelope analysis” is used to compare the efficient utilization of resources across counties (Kirigia, Emrouznejad, and Sambo 2002; Moses et al. 2021).

Information on differences in the amounts paid for goods between the public and private sectors is also frequently used to measure inefficiencies and can point to deep-rooted problems in the quality of an administration (see chapter 12). In Zambia, for example, such an analysis found that the rapid accumulation of payment arrears led to suppliers’ building in a risk premium and, consequently, to the government’s paying higher prices and suffering an unnecessary efficiency loss (World Bank 2016b). Generally, efficiency analyses are a central component of many analytical products of governments and development partners, such as Public Expenditure Reviews (PERs), and guidance on how to conduct these is widely available (Coelli et al. 2005; Greene 2008; Pradhan 1996; Shah 2005).

Government expenditure data can also be used to inform allocative choices, determining which groups, geographic regions, or sectors receive the most resources. Equity analysis allows for reorienting spending

to better follow needs if resources are not flowing to the areas identified as requiring the most resources. In the health sector, benefit and expenditure incidence analyses are commonplace (Binyaruka et al. 2021; Mills et al. 2012; Mtei et al. 2012; Wagstaff 2012) and often accompany PERs. They provide insight into who pays for services and, separately, who utilizes services. They can thus offer concrete recommendations about how to restructure spending to be more equitable. More broadly, Commitment to Equity Assessments offer a methodology to estimate the impact of fiscal policy on inequality and poverty (Lustig 2011, 2018).

Government expenditure data are used as a foundation for accountability (Ball, Grubnic, and Birchall 2014; Griffin et al. 2010; Morozumi and Veiga 2016). If government expenditure data can be made publicly accessible for analytical purposes, this extends the benefits further. Groups across society can use published data to undertake their own assessments of government functioning and the distribution of public resources. A growing body of research tests the notion that transparency facilitates accountability and leads to a host of developmental outcomes. Using the frequency of the publication of economic indicators, including those related to government expenditure, Islam (2003) finds that countries with better information flows have better-quality governance. Hameed (2005) analyzes indexes of fiscal transparency based on IMF fiscal Reports on the Observance of Standards and Codes (ROSCs) and shows, after controlling for other socioeconomic variables, that more-transparent countries tend to have better credit ratings, better fiscal discipline, and less corruption. Similarly, an analysis of the Open Budget index shows that more-transparent countries tend to have higher credit ratings (Hameed 2011). Looking at each of the six PFM pillars covered by the current PEFA framework, de Renzio and Cho (2020) find that the “transparency of public finances” and “accounting and reporting” have the most direct effect on budget credibility. The authors stipulate that this may be because more information and timely reporting allow for more direct, real-time control of how public resources are being used.⁵

To provide practical details of this type of data analysis, this chapter now focuses on some of the most basic but useful analyses of expenditure data that can assist in understanding the functioning of government administration, with particular reference to a case study in Indonesia.

Basic Descriptives from Government Expenditure Microdata

First, to gain a sense of the completeness of the data being used for analysis, analysts may wish to estimate the budget coverage, which requires the summation of the value of all expenditure transactions routed through the data source (usually an FMIS) in a given fiscal year and, subsequently, the division of this value by the total approved budget reported by the government. This is presented in equation 11.1, where t represents the fiscal year and i the individual transaction:

$$\frac{\sum_{t,i} (trans_{1,1} + trans_{1,2} + trans_{2,2} + \dots + trans_{t,i})}{Total\ approved\ budget} \quad (11.1)$$

Equation 11.1, in turn, provides inputs to a table of the form of table 11.3.

The FMIS budget coverage statistics can be calculated for the general government, subagencies, and provinces or other subnational levels of government separately. These calculations then give an idea of the

TABLE 11.3 Sample Output of FMIS Budget Coverage Estimation

	2019	2020	2021
Total approved budget			
Total volume processed through the FMIS			
Percentage processed through the FMIS			

Source: Original table for this publication.

Note: FMIS = financial management information system.

agencywide and geographic spread in the coverage of the FMIS, allowing analysts to assess what percentage of the approved budget is processed by the FMIS.

Second, budget expenditure data can be used to identify trends and patterns in *budget execution rates*: the proportion of intended expenditures that have been undertaken within a specific time period. Budget execution data are a basic but important representation of how an organization is using resources and, when coupled with other information, how well it is working. If it is spending well but producing no outputs or not spending despite important upcoming commitments, these are signals of problems within the administration. Execution analysis also serves as a foundation for accountability because it can shed light on whether funds have been used for their intended purpose.

The analysis of budget execution rates can be conducted for the government as a whole or for specific sectors, spending units, line items, or programs. The type of analysis done will depend on how analysts want to assess the effectiveness of the administration. The aggregate budget execution rate alone—say, at the agency level—only informs analysts of whether resources are being used in line with authorized amounts and spending within the budget. Such aggregate analysis can hide important details, such as overspending on some items and underspending on others.⁶ Disaggregation in the analysis frequently leads to insights. For example, overspending on the wage bill in the health sector is often associated with expenditure cuts on goods and supplies or capital expenditures (Piatti-Fünfkirchen, Barroy, et al. 2021). This undermines the quality of the health services provided.

Third, a *transactions profile* can be developed as a useful way to map out expenditure patterns and management (Hashim et al. 2019). The transactions profile is a measure that gauges how government expenditure transactions are distributed by size. The actual pattern of financial transactions can have significant implications for how activities are actually being executed and, hence, can be useful for understanding what is driving effective government functioning. To do this, analysts can calculate the number of transactions, the percentage of transactions, the cumulative share of the number of transactions, and the cumulative share of the amount processed through the FMIS for specific sets of transaction types. Table 11.4 provides a sample template.

TABLE 11.4 Template for a Government Expenditure Transactions Profile

Range (US\$ equivalent)	Number of transactions	Share of transactions (%)	Cumulative share (%)	Total amount of transactions (US\$)	Share of amount processed through FMIS (%)	Cumulative share of amount processed through FMIS (%)
<100						
100–200						
200–500						
500–1k						
1k–5k						
5k–10k						
10k–25k						
25k–100k						
100k–500k						
500k–1,000k						
1,000k–50,000k						
>50,000k						
Total						

Source: Hashim et al. 2019.

Note: FMIS = financial management information system.

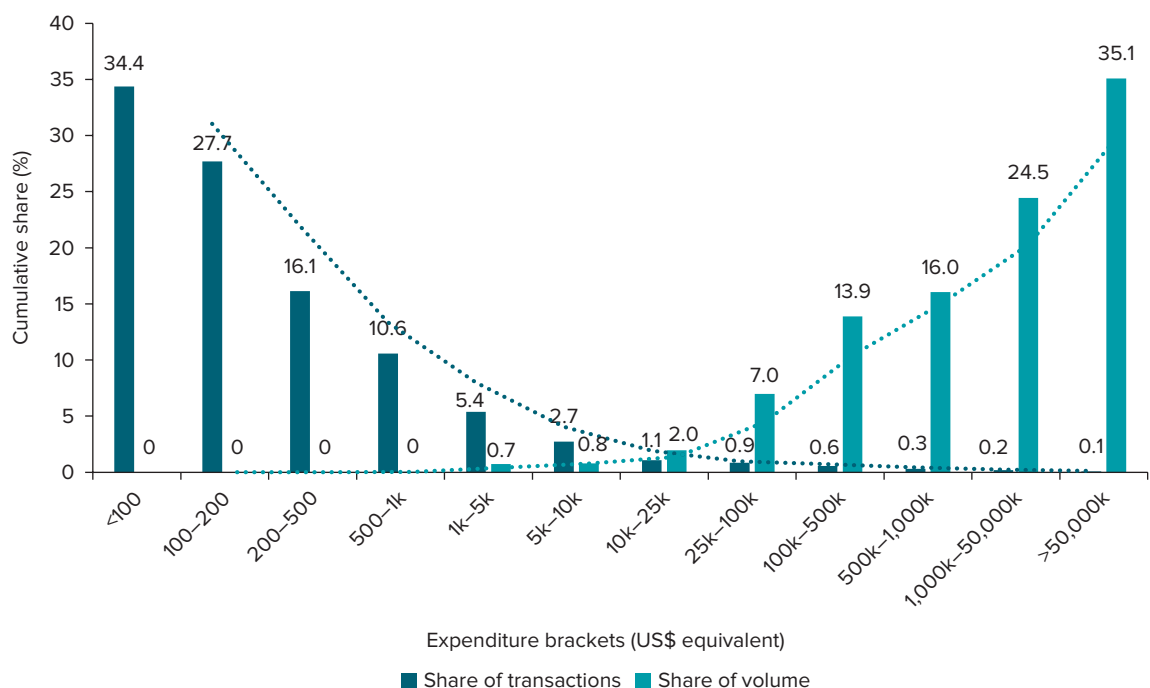
The transactions profile can then be displayed graphically (figure 11.3 provides an example from Bangladesh), where expenditure brackets are plotted against the cumulative share of the number of transactions and value of transactions. Typically, a larger percentage of transactions are small value transactions and even in sum cover only a small share of total spending. At the same time, high value transactions tend to be few in number but make up a large share of the total volume of spending.

Assessing the Attributes of Expenditure Data

As well as providing useful descriptions of basic patterns in the expenditure data, budget execution data, FMIS coverage data, and the transactions profile offer useful information for analysts on the expenditure data's attributes (see the section above on Attributes of Good-Quality Expenditure Data). Specifically, analysts may further probe the data in the following ways.

To assess *integrity and data provenance*, analysts may first wish to get clarity on how various transactions are processed and what kinds of controls they are subject to. For example, how are debt payments, subsidies, wage payments, or payments for goods and services handled, and is this equal across all expenditure items? A useful starting point may be to document which transactions are processed through the FMIS and which ones are not. Follow-up questions may then relate to whether the current process for how various transactions are treated is adequate from an integrity and provenance perspective. Does it suffice to merely post some transactions, such as wage payments or debt payments, to the general ledger? This also opens an important political-economic dimension because it may show the revealed preferences of governments that wish to control spending on certain line items (for example, not using the FMIS would make it easier to adjust spending by the executive without legislative approval). Therefore, discussing this openly and bringing transparency into the process would be a useful first step. Second, analysts may wish to identify technical challenges in routing certain transactions through the FMIS and then explore how advancements in

FIGURE 11.3 Expenditure Transactions Profile, Bangladesh



Source: Hashim et al. 2019.

maturing technologies (for example, financial technology innovations or the use of blockchain technology) could help strengthen the process.

As part of assessing the *comprehensiveness* of government expenditure data, analysts may wish to critically review how the government and the broader public sector are defined within the data. This should be followed by an assessment of whether these are appropriately reported across agencies. Identifying potential shortcomings in comprehensiveness, such as a lack of reporting on sensitive sectors or expenditure arrears, is another red flag for the FMIS data, as may be reporting against various select appropriation types. Such checks will minimize the risk of misinterpreting the findings and establishing poor indicators and targets that are poor representations of true spending patterns. These red flags are an opportunity for improvements in the comprehensiveness of expenditure reporting.

To assess the *usefulness* of government expenditure data, analysts may wish to explore what elements are captured and how they relate to government priorities. Do the data allow analysts to identify who spent funds, what they spent them on, and whether this usefully informs progress against the priorities set out in the agenda? On the question of who spends, it would be useful for the data to have sufficient detail in the administrative classification. Is it possible, for example, to know which hospital, health clinic, or school received what budget? What they spent it on should then be clear from the line item or activity segment. What purpose they spent it on (for example, malaria, primary education, and so on) can potentially be derived from the functional classification, but it can be difficult to establish this well. If the government has a functional classification, it may be useful to review how the mapping is generated and how well it serves its purpose. Given all of the above, the overarching questions for analysts will then be how well the established classification of expenditure data can be used to inform government priorities and what can be done to improve it.

To assess the *consistency* of the data, analysts can check whether there is consistency in the application of the COA across levels of decentralization and information systems across the government to allow for adequate integration. Analysts may also check for quality in the application of data entry to ensure the COA has been used as intended. Inconsistencies in the actual application can lead to problems in analysis and interpretation. Finally, in environments where development partners are an important source of revenue, analysts can review whether they have followed the same basis for accounting as the government to allow for the integration of expenditure data and comprehensive reporting.

Finally, to assess the *stability* of the data, analysts can review major changes in the expenditure data structure over time. If these are evident, analysts may explore whether tools to compare spending over time have been developed to give policy makers a multiyear perspective on important expenditure areas. With a solid understanding of the strengths and weaknesses of the underlying data, analysts can then use this expenditure and budget execution data to pursue efficiency, equity, or sustainability analyses to inform the effectiveness of government.

Case Study: Investigating Ineffective Capital Expenditure in Indonesia

At the request of Indonesia's Ministry of Finance, the World Bank conducted an institutional diagnostic to understand the causes of "low and slow" capital budget expenditure execution (World Bank 2020). The study is an example of the value of drilling down deep on expenditure data, with information from 11,589 spending units and survey responses from nearly 2,000 spending units. By matching spending data and survey responses, the study identified that over 80 percent of capital budget allocations were directed to only 3 percent of spending units, and 78 percent were directed to four ministries, all of which had lower execution rates than others.⁷

The survey indicated that line ministries found planning difficult because they were not provided with predictable indicative budget ceilings for the next three years. They therefore prepared capital projects to align with annual budgets. Only 6 percent of spending units used multiyear contracts. The rest split their projects across annual contracts, leading to inefficiencies in contract implementation that contributed to low budget execution. For example, in 2019, disbursements were bunched at the end of the year, with 44 percent being made in the fourth quarter.

Compounding this, annual budgets tended to be very rigid, with expenditure authority lapsing at the end of the year. This led to a stop-start approach to projects due to the annual cessation of appropriation approval, limiting the administrative ability of agencies to implement the capital works program, given the multiyear nature of many projects.

The analysis also allowed World Bank staff to assess whether preexisting reforms to confront these problems were working. They did not seem to be. The spending units of only one ministry—the Ministry of Public Works and Housing—made use of early procurement, which was supported by a ministerial decree. While there was a government regulation that enabled spending units to begin the procurement process in the preceding year, 60 percent of spending units prepared their procurement plans after the start of the new fiscal year, thereby introducing bunching and delays in the execution of the program.

At least part of the root cause came from the supplier side. Half of all spending units faced difficulties in ensuring that vendors submitted invoices within five days of finishing work. Further, 73 percent reported that incomplete proof in vendors' invoices was the main cause for delays in preparing payment requests. The analysis also identified other areas of concern. Some 42 percent of spending units reported that difficulties in obtaining land approvals delayed contract implementation. A particular blockage occurred in cases where the land value, determined in a quasi-judicial proceeding for land acquisition, was greater than the budget. There was also a concern that fiduciary (audit) control discouraged spending units' performance in project implementation. Some 14 percent of spending units said that auditors created a delay in implementation, and 32 percent of respondents preferred splitting activities into multiple contracts to avoid the audit of large contracts.

Overall, this detailed diagnostic enabled specific, practical recommendations for improved government management. It was only made possible by triangulating microlevel expenditure data at the spending unit with survey data.

CONCLUSION

Government expenditure data can assist our understanding of the functioning of government agencies, acting as a basis for conducting broader efficiency, equity, or productivity analyses.⁸ Such analyses can be valuable and informative for policy and for improving the quality of the administration. However, expenditure data are only useful for these ends if they also have the right attributes.

All technical solutions require an enabling environment of government commitment, actionable political economy, and resilience to shocks. It is important that strong systems for government expenditure data are in place and protected during times of adversity. Governments are encouraged to put in place processes that identify deficiencies in routines to allow for strengthening over time. The root causes of distortions may take considerable effort to uncover. Political leadership and a willingness to embrace transparency in the identification process are key.

This chapter has provided health warnings that should be considered when using expenditure data and has identified the following five attributes of good-quality expenditure data:

- Data provenance and integrity
- Comprehensive across space and over time
- Usefulness
- Consistency
- Stability.

How well government expenditure data meet the above attributes is rarely emphasized in analytical work or considered directly in its underlying methodologies. Instead, expenditure data are often taken at

face value, with the implicit assumption that the above conditions are met. If they are not, it can render the analysis incorrect and misleading.

This chapter suggests a periodic and data-driven review of these issues in all budgeting systems. For example, expenditure data can be used to estimate FMIS budget coverage. Such statistics provide insight into whether budget managers have incentives to avoid FMIS internal controls. This chapter advocates for estimating budget coverage periodically and making it publicly available in an effort to deepen the understanding of the incentives and the underlying political economy of budget controls. A step beyond this is to assess how variation in expenditure management relates to government effectiveness.

Budget coverage statistics could accompany analytical products that draw on these data to offer cautions in the interpretation of the data. Audit institutions can report on why FMIS coverage may be low and what can be done to strengthen it in their management letters and reports to the legislature.² Alongside this indicator, a transactions profile can be mapped to identify where risks in current expenditure management may lie and what types of reform may be warranted to improve expenditure control and service delivery objectives.

High-quality government expenditure microdata can be used by analysts to provide insight into expenditure management practices, functional effectiveness, and the related pursuit of public policy. A basic analysis simply assesses how capable expenditure units are at absorbing and spending funds.

The analysis of expenditure data benefits from triangulation with performance information on spending units to guide a dialogue on public sector effectiveness. Just as reviewing the calories one takes in without considering the activities undertaken may shed little light on the fitness and workings of one's metabolism, so, too, is the consideration of expenditure data limited if not aligned with the impacts of the activities being funded.

The strongest analysis frames the discussion of expenditure in terms of a logframe of expenditure (figure 11.1): where do expenditure data come from and how is expenditure defined, what are their quality and comprehensiveness, and how do they impact government effectiveness? Framing the discussion within government in terms of these steps is important because it facilitates noticing and learning (Hanna, Mullainathan, and Schwartzstein 2012). The “failure to notice” systemic problems may be a key binding constraint in reaching the production frontier if practitioners only excel at one aspect of the logframe—in this case, the analysis of data without sufficient regard to their origins and quality.¹⁰

It almost goes without saying that expenditure data may not be everything in the pursuit of government effectiveness. Some organizations spend very little but have very important public mandates, such as a policy, coordination, or regulatory function. However, for some of the most important government functions—such as the building of large capital projects—expenditure data can be a critical lens for understanding government functioning.

NOTES

1. Expenditure data can also capture governments' responses to shocks through reallocation and adjustments to their revealed preferences (Brumby and Verhoeven 2010). After the global financial crisis, expenditure analysis showed that countries were temporarily expanding safety nets, protecting social sector spending through loans, redirecting funding to retain social spending, and harnessing the crisis to achieve major reforms to improve efficiency and quality.
2. Lowry (2016) estimates that health-related tax expenditures in the United States involved almost US\$300 billion in 2019.
3. The PEFA program provides a framework for assessing and reporting on the strengths and weaknesses of public financial management (PFM), using quantitative indicators to measure performance. PEFA is designed to provide a snapshot of PFM performance at specific points in time using a methodology that can be replicated in successive assessments, giving a summary of changes over time.
4. More information about the BOOST initiative is available on the World Bank's website at <https://www.worldbank.org/en/programs/boost-portal>.

5. More broadly, Kaufmann and Bellver (2005) find that transparency is associated with better socioeconomic and human development indicators, higher competitiveness, and reduced corruption. They show that for countries with the same level of income, a country with a more transparent environment tends to have more-effective government agencies. Glennerster and Shin (2008) find that countries experience statistically significant declines in borrowing costs as they become more transparent.
6. PEFA assessments can offer valuable information on budget execution rates. Not spending as intended and spending more than intended are considered equally problematic. A 15 percentage point deviation from the original appropriation is considered poor practice by the PEFA because, at that point, it likely renders the budget not credible or effective.
7. Over 64 percent of the capital budget was allocated to spending units in Jawa.
8. Beyond governments, these data are also used by international organizations for Public Expenditure Reviews (PERs), Public Expenditure Tracking Surveys, Commitment to Equity Assessments, and Article IV agreements.
9. As blockchain technology matures, it may also offer a pathway to the immutability of records, making them less susceptible to manipulation.
10. The “learning through noticing” approach alters the standard intuition that experience guarantees effective technology use (see, for example, Foster and Rosenzweig 2010; Nelson and Phelps 1966; Schultz 1975).

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