

Towards a comprehensive assessment system of local government fiscal health

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Received 21 April 2021 | Accepted 16 August 2021 | Published 2 September 2021

Abstract

Understanding fiscal health, also commonly referred to as financial condition, is key to sound decision making and the proper functioning of local government. Nonetheless there is no agreed upon way to measure fiscal health. We argue that the use of a conceptual framework is essential in furthering our understanding of measuring and assessing local government fiscal health. In this study we offer a framework and a set of financial accounting indicators visualizing fiscal health on the short and long term, taking into account the existing liabilities and local government obligations towards its constituents. The study draws on the theoretical and empirical analysis of corporate bankruptcy prediction models and local government fiscal distress models. We develop a possible comprehensive set of fiscal health indicators and compare it with existing empirical studies of local government fiscal health.

The model captures current performance in four solvency dimensions (cash, budget, service-level and long term) and allows for predictions of future performance, taking into account risks (predictors of possible future financial stress) and capabilities (opportunities to strengthen future financial health). We tested our model by reviewing 33 empirical studies and found that we could allocate all indicators used to the dimensions of our framework. No empirical study appears to address all dimensions. The selection of performance dimensions is partly driven by the studies' research objectives.

Practical implications

The availability of a complete and coherent framework for measuring fiscal health is key to the sound use of indicators in local decision making processes and supervision of local government finances. It may help improving predictions of future fiscal health, identifying causes of fiscal distress and benchmarking fiscal policies nationally and internationally.

Keywords

fiscal health, local government, assessment of financial performance, financial distress, financial oversight

1. Introduction

The fiscal health of local government has historically always become an issue in the wake of financial crises such as the defaults in railroad bonds in the 1870s, the Great Depression in the 1930s (ACIR 1973), the financial difficulties of highly visible U.S. cities such as New York and Detroit, and the so-called 'Great Recession' of 2007–2009 (Justice and Scorsone 2012). Understanding and evaluating local government fiscal health is also key to sound decision making. When early warning signals of fiscal distress go unnoticed, local government may fail in

preventing fiscal distress and important public services may suffer (Trussel and Patrick 2012). As local governments are faced with an increase in responsibilities for providing essential services, the importance of a proper way to assess local government fiscal health increases as well (Cohen et al. 2012). In contrast with this historical pattern of financial crises and the importance of a sound local government financial condition is the lack of a commonly agreed upon comprehensive model to measure and assess local government fiscal health. Consequentially,

many different and often incompatible models have been developed (Kloha et al. 2005a; Wang et al. 2007; Maher and Deller 2012; Trussel and Patrick 2012). In some cases model choices have been driven by data availability constraints (Kloha et al. 2005a; Turley et al. 2015), and in some cases different models have been developed to adapt to specific local government institutional settings (Jacob and Hendrick 2012).

This lack of consensus is problematic as it leaves researchers and practitioners without proper guidance when measuring and assessing local government fiscal health. In this paper we find that more often than not argumentation for the inclusion of individual indicators in frameworks is absent. Furthermore, only few of the empirical local government fiscal health studies provide argumentation for the framework used. Some argue that fiscal stress cannot be measured by one single indicator because of the diversity of local government's institutional setting, its diverse activities and the multidimensional nature of its financial condition (Boyne 1998). A recent empirical study shows that specific financial indicators relate differently to the contracting out decisions of municipalities while some financial indicators only associate with contracting out decisions in combination with other financial indicators (López-Hernández et al. 2017). This indicates that financial health is a multidimensional construct and the indicators representing a municipality's fiscal health needs to be carefully selected. The lack of a well-defined framework makes it difficult to evaluate the appropriateness of the different research designs and the validity of their results. The results could even be susceptible to gaming by policymakers as they try to hide the real fiscal consequences of their decisions (Brixi and Schick 2002). For this reason we propose a framework that is directly tied into the concept of local government fiscal health that offers guidance in selecting indicators and allows comprehensive assessment of the results.

In this paper, we try to develop a comprehensive framework of local government fiscal health using insights offered by existing literature. We use the term fiscal health synonymously to financial condition as the ability of a government to meet its financial and service obligations (Hendrick 2004; Gorina et al. 2018). We draw on the theoretical and empirical analyses of corporate bankruptcy prediction models (Beaver 1966; Altman 1968; Ohlson 1980; Wu et al. 2010) and measures of local government fiscal health (Carmeli 2002; Clark 2015; Turley et al. 2015). Subsequently we compare our conceptual framework with existing empirical studies of local government fiscal health assessment. From this comparison we find that for most of the elements in our framework it is possible to identify appropriate indicators. However, few indicators appear to have been used in existing empirical studies to measure local government's exposure to risk due to contingent liabilities. Nor is it common to measure service output. Development and inclusion of these types of indicators improves the completeness of models to measure local government fiscal health and

may reduce the susceptibility of the results to gaming by policy makers.

This paper is structured as follows. First we discuss the importance of developing a comprehensive framework that is complete and tied into the concept of local government financial condition. Next we introduce our framework that describes the relevant aspects of local government financial condition. Subsequently we present the results of a literature review of 29 empirical studies demonstrating which type of indicators are suitable for measuring the various aspects of our framework. Finally we draw conclusions and make recommendations for further research.

2. Developing a framework for measuring fiscal health

For the development of a conceptual framework, we use two streams of literature: the first stream about corporate bankruptcy prediction models and the second about local government fiscal distress models generally developed and used by financial management institutes and oversight bodies, predominantly from the U.S. Most of the literature is based on empirical studies, because a pure theoretical approach of measuring fiscal health will not be able to capture all complexities of the real-life settings in which municipalities operate.

Corporate bankruptcy prediction models fairly consistently show that accounting measures of *profitability* (for instance annual profit or net income relative to assets), *leverage* (for example total liabilities to total assets) and *liquidity* (like working capital, the ratio of cash and short-term assets to total assets, and cash flow generation from operations measured by EBITDA) are predictors of corporate failure (Beaver 1966; Altman 1968; Ohlson 1980; Zmijewski 1984). The contribution of the three sets of variables in predicting corporate bankruptcy has been robust (Beaver et al. 2005). However, superior results are found when market-based indicators are added to complement or adjust accounting-based indicators (Campbell et al. 2008). Complementary measures are for instance market return on equity and standard deviation of stock returns. Accounting indicators may be adjusted for market developments by using the market value of (total) assets. Corporate entities' market-based information is considered to have more predictive power, because market prices incorporate new information about the firm's prospects or reflect more accurately the firm's intangible assets (Campbell et al. 2008). From the corporate bankruptcy literature we conclude that accounting information about profitability (the difference between short term revenues and costs), leverage (the level of the entity's indebtedness) and liquidity (the ability to generate enough cash to pay short term debts) are important predictors of corporate failure. Market information improves the predictive ability of accounting measures because it adds information about the corporation's prospects and intangibles.

A local government's financial condition or fiscal health can be defined as its ability to meet financial and service obligations (Jacob and Hendrick 2012; Leiser and Mills 2019). We define municipal fiscal distress as a failure to meet standards in the areas of operating position, debt, community needs and resources over successive years (Kloha et al. 2005a). In broader terms, fiscal distress is exhibited when a local government is no longer able to meet the needs of its community in the short and longer term (Kloha et al. 2005a; Maher et al. 2020). Insights from the corporate bankruptcy literature may be helpful in developing a framework for predicting municipalities' fiscal distress. They can however not be copied into the public domain, because public entities use different methods of measuring their results and public-sector objectives are different from private sector objectives and they are multiple (Maher and Nollenberger 2009). A large number of different fiscal distress models have already been developed. Some systems propose a set of financial indicators serving as early warning signals and that can be benchmarked among municipalities, like the ACIR (Advisory Commission on Intergovernmental Relations) system (1973), Kenneth Brown's "ten point test" (Brown 1993; Maher and Nollenberger 2009) and the IPSAS Revenue-Debt-Service dimensions model (IPSASB 2013). Other approaches combine separate indicators into a composite index score reflecting the level of fiscal health (Kloha et al. 2005a). Coe (2008) reports that 15 out of the 50 US states evaluate local governments' financial position. Most states use their own detection metrics, leading to 174 different indicators. These measures can be classified into accounting measures and non-accounting measures. The majority relates to accounting measures, and depict the *operating position*, like operating deficits, enterprise losses, fund balances and liquidity; *debt levels*, such as current liabilities, long-term debt, debt service and inability to make payments in a timely manner: *unfunded liabilities*, for instance current pension benefits payable, *revenues* and *expenditures*. Two additional categories have been identified: *legal or technical violations*, like late financial reports containing errors, being incomplete or having been filed late, and *community needs and resources*, such as real estate market value per capita, population change, per capita income and percentage of population older than 65 (Kloha et al. 2005b).

Both corporate bankruptcy literature and the financial indicators used in US local government oversight indicate that accounting information about liquidity, operating position and debt levels (leverage) are prime indicators of fiscal health. These indicators feature in the generic Financial Trend Monitoring System (FTMS) developed by Groves et al. (2003). The FTMS is one of the most widely used indicator systems (Kloha et al. 2005a) and additionally includes many other indicators for measuring revenue, expenditure, unfunded liability, capital plant, and community needs and resources of local government. It also introduces a framework that is directly grounded in the concept of local government fiscal health. This frame-

work consists of four different 'solvencies'. Two of which, that are labelled cash solvency and budget solvency are closely related to the categories of liquidity and operating position used in corporate bankruptcy literature. The FTMS adds two more solvencies, labelled service-level solvency and long-term solvency, depicting respectively the degree in which local needs can be addressed by the local government and the long-term financial outlook of local government. Unfortunately, the FTMS does not offer a clear link between these four solvencies and the indicators that make up the indicator system. A description of these solvencies is included in Table 1.

Table 1. Breakdown of financial condition into solvencies (Groves et al. 2003).

Solvency	Description
Cash solvency	Does local government have the ability to generate enough cash in the short term to pay its bills?
Budget solvency	Does local government generate enough revenues over its normal budgetary period to meet its expenditures and not incur deficits?
Service-level solvency	Does local government provide services at the level and quality that are required for the health, safety, and welfare of the community and that its citizens desire?
Long-term solvency	Does local government have the ability in the long run to generate enough revenues to meet its expenditures?

This breakdown into solvencies, however, does not yet differentiate between current performance by a local government and its prospects. Most oversight bodies are interested in predicting fiscal distress, which means that besides accounting information of current performance also predictive indicators of future financial performance need to be developed. Causal factors of local government fiscal distress are generally found to be drivers of future income reduction and drivers of future expenditure increase. Income reduction drivers can be tax base erosion and state revenue cuts (Pammer 1990; Rubin 1998). Tax base erosion occurs when real taxable value decreases significantly. This occurs in times of economic decline deteriorating the value of taxable properties, when a single large taxpayer leaves, or when municipalities experience significant demographic changes or sudden departure of a sizeable number of citizens (Kloha et al. 2005a). Sudden state revenue cuts may also produce immediate local financial difficulties. A large dependence on state funding may therefore signal a potential financial vulnerability. Future expenditure increases are generally driven by changes in local demands and local expenditures being too large for its tax base (Mackey 1993; Coe 2008). Local demands may increase because of changes in socioeconomic conditions per capita income, poverty or education, or from changes in physical conditions, such as the condition of infrastructure assets (ACIR 1985; Trussel and Patrick 2012). Local expenditures become too large for its tax base because of the absence of market signals or political vulnerability to local interest group demands (Kloha et al. 2005a). This may also lead to fund deficits or large long-term debt position relative to the government's ability to generate revenue. Local mismanagement may also increase the risk of fiscal stress, when local decision

makers are not capable of matching local government’s expenditures to its income capability (ACIR 1973; Groves et al. 2003). Widely used signals of local mismanagement are the use of poor accounting methods, faulty estimation procedures, errors or omissions in financial reports, delays in financial reporting procedures and critical audit reports (e.g. Dougherty et al. 2000; Ammar et al. 2001a; Murray and Dollery 2005; Navarro-Galera et al. 2015).

Hendrick (2004) and Jacob and Hendrick (2012) use three sets of predictors of future fiscal health, namely ‘balance’, ‘slack’ and ‘risk’. Balance reflects the extent to which a government’s financial position allows it to meet current demands and predicted future changes. Slack refers to the pool of resources available to a local government in excess of what is currently needed to provide the required current and future level of service. Risk is the local government’s exposure to adverse future fiscal shocks or changes in the environment. A comparable emphasis on prospects is also proposed in relation to monitoring national governments in which a distinction is made between sources of financial obligations and sources of safety (Brixi and Schick 2002). The International Public Sector Accounting Standards Board (2013) uses the terms capabilities and vulnerabilities for similar concepts. We will use the term *performance* for the local government’s current and past financial performance which is equivalent to Jacob and Hendrick’s balance variables. Performance information is represented by Groves’ four solvencies. We use the term *risks* for the set of variables predicting future financial stress and *capabilities* for the set of variables indicating the capabilities to strengthen future financial health. In Table 2 we present the combinations of solvencies, performance outcomes, risks and capabilities.

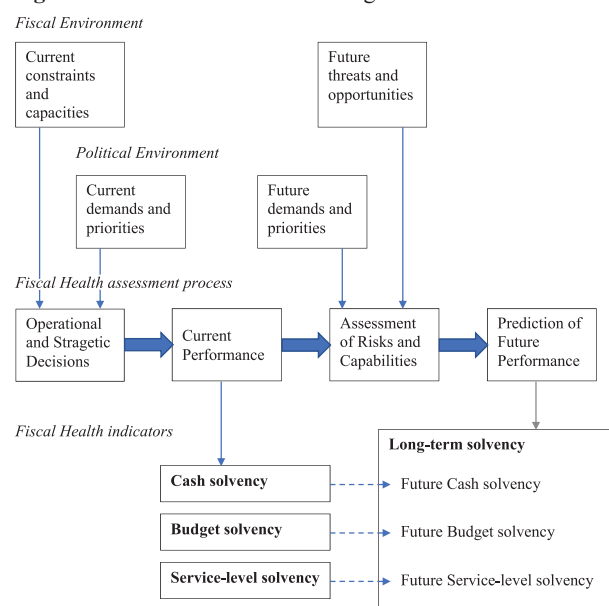
Table 2. A framework for measuring and assessing financial condition.

	Performance	Risks	Capabilities
Cash solvency	Whether current payment obligations can be met.	Exposure to events that may require substantial cash outflows in the (very) short term.	Ability of local government to generate additional cash to meet short term obligations.
Budget solvency	Whether current budget is balanced.	Exposure to events that may have a nonrecurring negative impact on current budget.	Ability of local government to address a deficit in current budget.
Service-level solvency	Whether local government services currently meet local demand.	Exposure to events that may negatively impact local demand for services or service delivery.	This dimension measures to what extent local government services exceed local demand.
Long-term solvency	Whether current long run outlook is balanced.	Exposure to events that may have a recurring negative effect impacting the long run outlook.	Ability of local government to address long run structural negative trends.

As already indicated, the listing of performance dimensions, risks and capabilities does not convey the relations between these elements and it does not yet provide a coherent framework in which current and future performance can be identified. Figure 1 provides a framework for measuring and assessing fiscal health. Central part of

the framework is the fiscal health assessment process: current and past operational and strategic decisions result in current performance, which can be measured by cash, budget and service-level solvencies. Risks and capabilities determine the prospects for future performance, which can be measured by long-term solvencies, which are partly based on extrapolation, trend analysis and prediction of future performance in cash, budget and service-level solvencies. Operational and strategic decisions are influenced by constraints and capacities defined by the fiscal environment, like institutional arrangements between government agencies and fiscal goals that are particular to the government. They are also influenced by the political environment in demands and priorities resulting from political decision making influenced by demands from elected representatives, citizens, businesses, and other stakeholders. Both fiscal and political environments also influence risks and capabilities. Fiscal arrangements may impose threats to and provide opportunities for future financial performance. Developments in the political environment may impose new demands and priorities which impact future financial performance.

Figure 1. A framework for measuring fiscal health.



3. Determining relevant types of indicators using the framework

As a next step, we will now use our framework to map out the indicators used in the empirical local government fiscal distress literature. For this analysis we reviewed 33 studies that have been published in the period 1967–2017. Our analysis serves three purposes: the first goal is to make an inventory of the specific indicators used in the literature to measure each of the 12 dimensions in our model. Our second goal is to see whether our framework is sufficiently complete and comprehensive to capture all the measurement models used in the studies reviewed.

And lastly we want to have an impression of the different perspectives the reviewed studies have taken in their approach to predicting fiscal distress.

Using the arguments and clarifications provided in these studies we identify types of indicators that are suitable for specific dimensions in our framework. Because often no arguments are given for the inclusion of specific indicators, the allocation is based on less than the 30 studies reviewed. When no argumentation was available we allocated indicators based on similarity to indicators for which argumentation was available. Additionally we also used argumentation in theoretical studies and handbooks to determine to which dimension an indicator may be best allocated. Furthermore, this allocation is not exclusive as the argumentation for certain indicators shows that these may apply to multiple aspects of local government financial condition simultaneously. Finally we were unable to allocate only a very small number of indicators (7) that were included in empirical studies as dummy variables for specific (geographical) characteristics. In Appendix 1 of this paper we provide an overview of all studies and guidebooks reviewed in relation to the 12 dimensions of our framework.

In our analysis, we were unable to find indicators representing short-term risks impacting short-term cash, budget and service-level solvencies. Most short-term risk factors lead to sudden changes in the environment, like natural disasters, socio-economic disruptions, or shifts in political decision making that have a substantial and non-recurring immediate impact on the local government's financial position. Most studies do include risk factors, but they are predictors of future fiscal distress and therefore play a role in predicting long-term solvency. Local governments may prepare themselves against the adverse impact of short-term and mostly unidentified risk factors, but they mainly do so by strengthening their cash, budget and service-level solvency capabilities. Reaching higher capability levels means local governments are less susceptible to the immediate financial impact of risk factors.

In the remainder of this chapter we report our findings per solvency dimension and report on each dimension's performance and capabilities indicators. For the long-term solvency dimension we also identify the long-term risk factors we found in the literature. The list of indicators identified must be viewed as indicative and non-limiting, as the work on the development of performance indicators is extensive and still progressing.

3.1. Cash solvency – Performance and Capabilities

This dimension focuses on the ability of a local government to meet current payment obligations. If this is not the case new sources of cash need to be found or local government will default on its payments.

Groves et al. (2003) propose an indicator based on the quick ratio. For using the current ratio Turley et al. (2015) reason: 'Liquidity is a measure of the ability to meet short-term debt obligations without having to liquidate assets or close down.' Turley et al. (2015) also use the average

collection period of receivables as an indicator for a local government's liquidity and ability to meet its short-term payment obligations. Cohen et al. (2012) include a measure in which short term liabilities are contrasted with own revenues to measure the extent to which these liabilities can be met by a local government. Following these arguments we included all indicators that traditionally are used to measure the ability to repay current liabilities (e.g. current ratio, quick ratio) in this dimension.

Various studies (e.g. Honadle and Lloyd-Jones 1998; Zafra-Gómez et al. 2009b) use only a single aspect of a local government's ability to meet its short-term payment obligations: the ability of local government to generate cash flows from its operations. For instance, Ncube and Vacu (2014) use an indicator which measures the cash balance of local government. Other studies include indicators measuring liquidity, and cash from local taxes.

Finally, we also found a number of indicators in studies (e.g. Zafra-Gómez et al. 2009b; Ncube and Vacu 2014; Navarro-Galera et al. 2015) that measure the size of cash surplus. In these studies we did not find explicit clarification of the indicators used but we chose to associate them with measuring free cash flows of local government (see Table 3).

Cash capabilities (see the lower panel in Table 3) focuses on local government's ability to access additional (cash) resources to meet unforeseen additional payment obligations. The amount of free cash flow available depicts the municipality's ability to quickly access additional cash. Another important source of such cash resources is access to capital markets. This is generally considered to be related to a local government's creditworthiness (Groves et al. 2003; Trussel and Patrick 2012). This is analysed by looking at the size of the debt, but also by measuring the size of debt in relation to local government revenues or proxies thereof (e.g. Carleton and Lerner 1969). Following this reasoning we included all indicators that either measure the size of debt or debt burden or that measure debt relative to a measure of local government's revenue (or proxies thereof).

Table 3. Indicators in empirical studies measuring Cash solvency Performance and Capabilities.

Performance categories	Indicators
<i>Ability to repay current liabilities</i>	<ul style="list-style-type: none"> ● Current ratio ● Quick ratio ● Current liabilities / revenues ● Average collection period
<i>Ability to generate a cashflow from operations</i>	<ul style="list-style-type: none"> ● Liquidity (index) ● Cash balance ● Cash from local taxes
Capability categories	
<i>Free cashflow</i>	<ul style="list-style-type: none"> ● Cash surplus index ● Cash coverage ratio ● Cash surplus for overheads
<i>Creditworthiness</i>	<ul style="list-style-type: none"> ● Debt service per capita ● Debt service as % of revenues ● Debt per capita ● Debt as % of revenues ● Debt to assets ratio ● Overlapping debt ● Credit rating

3.2. Budget solvency – Performance and Capabilities

The focus of this dimension is on the current budget year's financial result. Various studies use indicators measuring the operating results of a local government (Groves et al. 2003; Kloha et al. 2005a; Trussel and Patrick 2012). The operating result can be calculated at the entity level, but it may also be calculated at a sub-entity level. This eliminates the possibility that operating deficits and surpluses in different parts of the entity cancel each other out (Groves et al. 2003). Various studies also include indicators that measure budget performance in relation to other characteristics of local government. For instance by analyzing budget performance per resident (e.g. Carmeli 2002; Turley et al. 2015) or as a ratio to budget obligations (Cabaleiro et al. 2012). Following this reasoning we chose to include in this dimension all indicators that measure levels in total or sub-entity level budget performance or measure budget performance ratios (refer to Table 4). Although an operating deficit in itself may not be problematic as it can be the result of a spending policy to use up previously accumulated reserves (Groves et al. 2003), persisting operating deficits are considered a clear sign of financial difficulties (Groves et al. 2003; Kloha et al. 2005a). We therefore also include the current state of assets and liabilities, providing information about the capability of meeting short-term and longer term liabilities.

Budget solvency capabilities depict the ability of local government to compensate for negative non-recurring events. Typically local governments use reserves or funds to cope with such events (Kloha et al. 2005a) and balance the budget during times of fiscal distress (Hendrick 2004). In line with this reasoning we included all indicators measuring a local government's reserves or funds in this dimension.

Table 4. Indicators in empirical studies measuring Budget solvency Performance and Capabilities.

Performance categories	Indicators
<i>Budget performance</i>	<ul style="list-style-type: none"> ● Total revenues – total expenditures ● Operating result ● Charge to expense ratio ● Fund deficits or surpluses ● Budget performance as a ratio to: <ul style="list-style-type: none"> ○ Residents ○ Expenditures ○ Budget obligations ○ Government funding
<i>Short-term Assets and Liabilities</i>	<ul style="list-style-type: none"> ● Short-term term assets ● Short-term liabilities ● Total liabilities to total assets ● Non-current liabilities to total assets ● Debt to assets ratio ● Net debt
Capability categories	
<i>Reserves</i>	<ul style="list-style-type: none"> ● Size of general funds ● General funds as % of revenues ● General funds as % of expenditures ● Net asset ratio

3.3. Service-level solvency – Performance and Capabilities

This dimension focuses on whether local demands for public services are currently met by a local government. Whether this is the case, is difficult to objectively measure (Groves et al. 2003) and we did not find any indicators in the literature that explicitly measured current service-level solvency. Often demand for services is measured indirectly as this demand is considered to be determined by features of the local government's environment (Jacob and Hendrick 2012). Patrick and Trussel (2013) used various socio-demographic indicators as proxies for service demand. Following this reasoning we include all indicators that measure socio-demographic and economic features. Additionally the few indicators measuring actual levels and quality of output of services by the local government are also included in this dimension (see Table 5).

Service-level capabilities can be found in local governments that provide services at a higher level of quality or quantity than required by local demand. Such a surplus in service level solvency represents a capability as it will take longer before the current level of service provision is considered inadequate and allows cutting back on services to alleviate financial pressures. This capability is closely related to the current performance in relation to service

Table 5. Indicators in empirical studies measuring Service-level solvency Performance and Capabilities.

Performance categories	Indicators
<i>Socio-economic and demographic characteristics reflecting current demand for services</i>	<ul style="list-style-type: none"> ● Characteristics of population <ul style="list-style-type: none"> ○ Population size ○ Population density ○ Income ○ Education ○ Employment ○ Age ○ Immigrant / Non-immigrant ● Characteristics of housing <ul style="list-style-type: none"> ○ Occupied ○ Owner occupied ○ Age ● Socio-economic characteristics <ul style="list-style-type: none"> ○ Industry concentration ○ Economic activity ○ Building permits ○ Crime rate ○ Unemployment ● Specific service responsibilities <ul style="list-style-type: none"> ○ Fire district ○ School district ○ Service delivery access
<i>Output of services</i>	<ul style="list-style-type: none"> ● Service-level indicators ● Current budgetary receivables and capital budgetary receivables divided by current budget payables and capital budgetary payables (all figures nonfinancial) ● Quality index
Capability categories	
<i>Public borrowing and public spending in relation to current demand for services</i>	<ul style="list-style-type: none"> ● Surplus delivery of public services in relation to <ul style="list-style-type: none"> ○ Population size and composition ○ Socio-economic conditions

level solvency. Hence, the same type of indicators that would be suitable for measuring whether current service provision and demand is balanced, can also be used to measure the existence of a service level surplus (if any). Following this reasoning we included the same indicators for measuring socio-demographic features and indicators measuring service output. Empirical studies try to identify service-level capabilities by comparing service levels in relation to population characteristics using a cross-section of municipalities.

3.4. Long-term solvency – Performance

Indicators in this dimension focus on the long-term outlook. One way of doing so is by using indicators that measure trends in cash, revenues or expenditures. Increasing expenditures indicate an increased cost of providing services while decreasing revenues indicate a decrease in the community's ability to pay for services and the need for finding new sources of revenue. Using a denominator when calculating this type of indicator allows to compensate for other trends such as population growth or decline (Groves et al. 2003; DCED 2011). Following these arguments we include all indicators that measure long-term trends in revenues or expenditures. These may be indicators that measure the size of total revenues or expenditures as well as indicators that measure explicitly trends and may include a denominator. Finally we also chose to include indicators that measure trends in specific types of revenues or expenditures.

Another way of analyzing the current long-term outlook is by looking at over time changes in the municipal capital structure. A high (or increasing) level of debt relative to assets is considered a negative warning sign (Cohen et al. 2012). However, a too low level of debt is not necessarily positive as this may indicate underinvestment in capital facilities, leading to (future) service-level insolvencies (Groves et al. 2003).

Finally we found indicators that focus on measuring municipal long-term financial obligations. This includes indicators used to measure the state of capital assets. Assets, such as the local infrastructure, that are not properly maintained will become less useful over time and will become costlier to maintain. Decreasing capital expenditures and maintenance budgets may indicate neglect of capital assets and are considered to be a negative factor in the current long-term outlook (Groves et al. 2003; DCED 2011). Another focus of indicators measuring long-term financial obligations is on pension obligations. In its analysis of financial emergencies in U.S. municipalities, the Advisory Commission on Intergovernmental Relations (ACIR 1973) identified inadequate funding of retirement systems as a factor that can become a dominant problem in municipal budgets. Groves et al. (2003) use indicators that measure, separately, trends in pension assets and pension obligations. Another variant is an indicator which contrasts the pension obligation with the taxable

(property) assets to determine whether this obligation may become problematic. Table 6 displays the long-term solvency performance indicators.

Table 6. Indicators in empirical studies measuring Long-term solvency Performance, Risk and Capabilities.

Performance Categories	Indicators
<i>Over time changes in cash position</i>	<ul style="list-style-type: none"> ● % changes in liquidity ● % change in cash surplus ● % change in average collection period
<i>Over time changes in revenues and expenditures</i>	<ul style="list-style-type: none"> ● % change in intergovernmental revenues ● % change in (tax) revenues ● % change in (operating) expenditures
<i>Long-term assets and liabilities</i>	<ul style="list-style-type: none"> ● Long-term assets ● Long-term liabilities ● Debt service (principal + interest payments on long-term debt) ● Debt-to-assets ratio (long-term debt/total assets) ● Leverage (debt as a percent of assessed value)
<i>Long-term financial obligations</i>	<ul style="list-style-type: none"> ● Capital maintenance obligations (ratio) ● Capital expenditure (ratio) ● Pension obligations (ratio) ● Debt per capita (ratio)
<i>Over time changes in service-levels</i>	<ul style="list-style-type: none"> ● % changes in service-level demands <ul style="list-style-type: none"> ○ Population composition ○ Education level ○ Taxable income ● % changes in services offered <ul style="list-style-type: none"> ○ Funds availability ○ Borrowing capacity ○ Taxation opportunities
Risk categories	
<i>Dependency on sources of income</i>	<ul style="list-style-type: none"> ● Revenue concentration ● % of top 10 tax payers of total tax revenues ● Intergovernmental grants as % of total revenues ● Budgetary payables divided by budgetary receivables except grants
<i>Quality of management</i>	<ul style="list-style-type: none"> ● Budget accuracy ● Compliance ● Effectiveness of Organisational structure ● Audit opinion
Capability categories	
<i>Tax capacity</i>	<ul style="list-style-type: none"> ● Total tax revenues per capita ● Property taxes ● Income taxes ● Sales taxes ● Size of the tax base ● Property values ● Residential income ● Retail sales ● Tax collection ratio
<i>Flexibility in local government budget</i>	<ul style="list-style-type: none"> ● Debt service costs as % of total revenues ● Administrative costs as % of total revenues ● Capital expenditures as % of revenues ● Fiscal receivables divided by annual amortization payments (interest and principal)

3.5. Long-term solvency - Risks

This dimension focuses on the exposure to events that may negatively impact the long-term outlook (refer to Table 6, second panel). Overreliance on specific revenue sources is such an exposure. Local governments dependent on a limited number of revenue sources are more vulnerable to financial problems as they have limited

alternative sources of revenue (Trussel and Patrick 2012). This dependency can be measured by indicators that reflect the diversity of the economic base that may be tapped into by the local government through taxation (Lovisek and Crowley 1988). Also overreliance on tax income from a limited number of taxpayers represents a dependency (Groves et al. 2003; Kloha et al. 2005a). Another type of dependency is overreliance on intergovernmental revenues which may be reduced or withdrawn this dependency (Rivenbark et al. 2010). Following this reasoning we include in this dimension all indicators measuring concentration of revenue sources, either in concentration in the economic base or concentration in specific revenue sources in taxation or in intergovernmental revenues.

Also, a local government's long-term financial position is greatly influenced by the way local management and councils operate, decide and adapt to changes in the local government's external environment. If they fail, a local government's financial position may take a turn for the worse (Advisory Commission on Intergovernmental Relations 1973; Groves et al. 2003). Cluff and Farnham (1985) also use an indicator to measure the effectiveness of the local government's organizational structure as part of the 'administrative factors'. For this reason, we include in this dimension all indicators measuring either local management's performance or the effectiveness of the local organizational structure.

3.6. Long-term solvency - Capabilities

Capabilities illuminate the ability to structurally improve the long-term outlook (see Table 6, third panel Capability categories). This can be done by raising taxes (DCED 2011; Inman 1995). The potential for tax increases is closely related to the current taxes, the economic base and the jurisdiction of the local government to raise taxes (Wang et al. 2007; Jacob and Hendrick 2012). Additionally, difficulty in collection of taxes due may also imply a reduced potential for further increases in taxes (Groves et al. 2003). Following this reasoning we included indicators measuring elements of tax capacity such as the economic base, the tax burden and collection efficiency in this dimension.

The second way a local government may improve its long-term outlook is by cutting back on its expenditures. Trussel and Patrick (2012) and Brown (1993) for instance consider that administrative cost allow for easy

cutbacks. However more often types of expenditures are measured to determine the lack of flexibility ('fixity') of a local government budget (Rivenbark et al. 2010; Jacob and Hendrick 2012). Although not directly related to expenditures, restricted revenues are also considered to influence the amount of flexibility in a local government's budget (Groves et al. 2003). For this reason we include in this dimension indicators measuring specific types (or ratios) of expenditures and revenues that are related to (in)flexibility of a local government budget.

4. Testing the framework in a sample of empirical studies

We analysed the use of fiscal health indicators in a sample of 33 empirical studies published in the period 1967–2017 (see Table 7). We looked for studies that developed and tested fiscal health measurement systems. In these studies, a total of 608 performance indicators were disclosed, almost half of them (44%) are in the long-term solvency category, followed by service-level (27%), cash solvency (17%) and budget solvency (12%) categories. The sample is composed of studies aiming at predicting fiscal distress (16), explaining differences in credit and bond ratings (6), testing alternative fiscal health measurement systems (5), and analyzing the financial condition of specific cases in local government (6). We found that we were able, with a few exceptions related to dummy variables for specific geographical characteristics, to allocate all indicators to the dimensions of our framework. The results are summarised in Table 7.

Table 7 and the Appendix 1 show that all dimensions are represented in the empirical studies. The results show that the attention of the sample papers focuses on specific areas, depending on the research objective. Studies explaining differences in credit and bond ratings emphasize service-level solvency performance, long-term solvency risks and service-level capabilities more than other studies do. These studies focus on possible future risks and opportunities in financing local policy objectives and long term local revenue capacity. Studies testing alternative fiscal health measurement systems focus mainly on long-term solvency performance, risks and capacities, and on budget solvency performance and cash solvency capabilities. These seem to be the most promising areas in

Table 7. The use of Fiscal Health performance indicators in a sample of 30 empirical studies.

Sample studies	n	Cash solvency		Budget solvency		Service level solvency		Long-term solvency		
		Perform.	Capab.	Perform.	Capab.	Perform.	Capab.	Perform.	Risks	Capab.
Number of indicators used in each dimension	608	32	69	59	16	82	81	73	124	72
Number of studies using the dimension	33	17	26	25	10	16	16	24	24	25
Studies grouped according to research objective *)										
Prediction of fiscal stress	16	0.56	0.69	0.69	0.19	0.38	0.38	0.63	0.63	0.63
Explaining differences in credit and bond ratings	6	0.00	0.67	0.33	0.33	0.83	0.83	0.50	1.00	0.67
Testing alternative fiscal health measurement systems	5	0.60	1.00	1.00	0.60	0.00	0.00	1.00	0.80	1.00
Analysis of financial condition of specific cases in local government	6	0.50	1.00	0.67	0.17	0.50	0.67	0.67	0.67	1.00
Total sample	33	0.45	0.79	0.67	0.27	0.42	0.45	0.67	0.73	0.76

*) the use scores are the number of studies using the performance dimension divided by the total number of studies in the category.

which researchers expect to find new indicators that help predicting future fiscal distress.

5. Conclusions

Understanding financial condition is key to sound decision making and the proper functioning of local government. Nonetheless, despite a long history of research into local government financial condition, there is no agreed upon way to measure it. This can be observed in the great number of different indicators used in studies since 1967 to measure local government financial condition. These differences can be explained by valid reasons such as limited data availability or the heterogeneity of local government. However, few studies provide arguments for their selection of indicators. Without such argumentation it is hard to interpret the resulting measurements.

Furthermore we argue that in order to assess local government financial condition it is necessary to provide argumentation for the validity of the selection of indicators as a whole. Without a good understanding of the composition of performance dimensions, the overall results may be difficult to interpret. The different measurement choices across studies make it also hard to compare results. In particular it is difficult to determine whether a selection of indicators covers all relevant aspects of local government financial condition. Awareness of any blind spots is not only relevant from a scientific point of view, but is also key to the sound use of indicators in local decision making processes and supervision of local government finance.

A framework that describes at a conceptual level all relevant aspects of financial condition may resolve this issue as it provides guidance in measuring financial condition. Additionally, such a framework serves as a point of reference to discuss and interpret different results from different studies. As few studies provide argumentation for the selection of indicators, even fewer studies use a conceptual framework. In particular discussion tends to focus on the individual components of the framework. The validity of the framework as a whole and its relation to other studies using (different) frameworks tends not to be discussed.

In this paper we set out to develop a conceptual framework that is grounded in a definition of local government financial condition. In our framework we distinguish both between the various time horizons relevant to a local government and between current performance and the exposure to events that may impact (positively and negatively) future performance. The resulting framework has been used to classify measurement instruments used by 33 empirical studies. Our results show that the framework is capable of capturing all instruments used, with the exception of seven dummies representing geographical characteristics. Groups of sample studies focus on specific dimensions, driven by the research objective pursued. Most performance dimensions have been developed in the long-term solvency area, indicating that most studies aim at predicting future financial performance, in order to help local government predict and prepare for possible fiscal distress conditions. The use of a conceptual framework may be helpful in improving our understanding of how to measure and assess local government's financial condition.

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Appendix 1. Review of the number of indicators in existing literature in relation to the dimensions of the framework for measuring local government fiscal health

Study reviewed	Study's objective	Cash solvency		Budget solvency		Service level solvency		Long-term solvency		
		Perform.	Capab.	Perform.	Capab.	Perform.	Capab.	Perform.	Risks	Capab.
Advisory Commission on Intergovernmental Relations (1973)	1	2	0	2	0	0	0	2	1	2
ACIR (1973)	1	1	2	1	0	2	2	2	2	3
Adv Com on IR (1973)	1	0	0	0	0	0	0	0	2	2
Kloha et al. (2005)	1	0	1	3	1	0	0	1	1	2
Murray and Dollery (2005)	1	1	2	0	0	1	1	5	4	1
Wang et al. (2007)	1	3	2	2	1	0	0	4	0	1
Wang and Liou (2009)	1	3	2	2	1	0	0	3	0	1
Zafra-Gomez et al. (2009b)	1	3	2	2	0	1	1	2	4	2
Zafra-Gomez et al. (2009a)	1	3	1	1	0	8	8	0	10	2
Cohen et al. (2012)	1	1	3	1	0	0	0	3	0	0
Trussel and Patrick (2012)	1	0	2	1	0	0	0	3	2	1
Navarro-Galera et al. (2015)	1	2	4	1	0	5	5	2	8	0
Rodriguez Bolivar et al. (2016)	1	0	1	2	0	10	10	0	10	0
Gorina, Maher & Joffe (2017)	1	1	0	2	0	0	0	2	0	0
Maher, Oh & Liao (2020)	1	0	0	2	2	6	6	0	0	0
Leiser & Mills (2019)	1	1	0	3	0	2	0	1	0	0
Carleton and Lerner (1969)	2	0	4	0	0	2	2	1	2	1
Rubinfeld (1973)	2	0	3	0	0	1	1	0	1	1
Cluff and Farnham (1985)	2	0	1	0	0	11	11	2	14	3
Loviscek and Crowley (1988)	2	0	0	0	0	3	3	0	4	0
Ammar et al. (2001b)	2	0	0	2	3	0	0	0	12	0
Ammar et al. (2001a)	2	0	8	2	2	15	15	11	17	13
Brown (1993)	3	0	4	1	1	0	0	5	0	1
Honadle and Lloyd-Jones (1998)	3	2	5	2	2	0	0	6	3	4
Rivenbark et al. (2010)	3	2	4	4	2	0	0	1	1	2
Cabaleiro et al. (2012)	3	0	7	8	0	0	0	4	1	5
Turley et al. (2015)	3	2	4	3	0	0	0	3	1	4
Congressional Budget Office (1978)	4	1	1	2	0	6	6	0	7	5
Carmeli (2002)	4	2	1	2	0	0	0	2	0	2
Hendrick (2004)	4	0	2	0	1	8	8	1	11	7
Ho and Huang (2014)	4	0	1	4	0	0	0	2	2	3
Ncube and Vacu (2014)	4	2	1	4	0	1	1	5	4	3
López-Hernández et al. (2017)	4	0	1	0	0	0	1	0	0	1
Total indicators per dimension of framework		32	69	59	16	82	81	73	124	72
Number of studies using dimension		17	26	25	10	16	16	24	24	25

Study's objectives:

- (1) prediction of fiscal stress;
- (2) explaining differences in credit and bond ratings;
- (3) testing alternative fiscal health measurement systems;
- (4) analysis of fiscal condition of specific cases in local government.