

PUBLIC CAPITAL BUDGETING AND MANAGEMENT: THE CONCEPT AND ITS APPLICATION IN THREE IMPORTANT FEDERATIONS

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ABSTRACT

This paper reviews the literature on national government capital budgeting approaches, identifies the standard features expected to be found in such processes, and compares how the procedures are applied in three large and significant federations, the German Federal Republic, the Russian Federation, and the United States. The study uses a comparative case study approach to uncover contrasts, similarities, and patterns of capital budgeting in these countries. This paper examines infrastructure status and gaps and how capital budgeting procedures identified here can help resolve problems. The main finding is that effectively managing and budgeting capital expenditures are among the most pressing challenges to contemporary governments and the effort requires comprehensive and systematic planning, centralized execution and project management, and infrastructure maintenance.

Keywords: capital budgeting, capital management, capital infrastructure, capital resources, federal budgeting, state and local budgeting

1. INTRODUCTION

Public infrastructure is critical for economic growth and development and for comfortable life. This infrastructure contributes directly to the production of desirable government outcomes (like facilities used in public education or hospitals), as well as serves as an input to production of goods and services by

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private entities (like harbors and waterways). At its best, the capital budget process provides a means for evaluation, choice, management, renewal, and development of core public physical assets. When it functions properly, the process contributes to the common good. When it malfunctions, the public can be endangered by an infrastructure that does not meet the standards for delivery of safe, convenient, and efficient service to the public.

Underinvestment in public assets has proven to be a problem in many nations, including the three federations examined in detail here. The problem is considerable in the United States (Chen, 2014, 2016, 2017; Chen and Bartle, 2017; Ermasova, 2013; Ermasova and Ebdon, 2019; Srithongrung, Ermasova, and Yusuf, 2019). Chen (2018) found that “declining quality and poor performance of public infrastructure system impose huge costs on US businesses and individuals and create bottlenecks that constrain economic development” (p.126).

Germany faces similar issues. Due to decreasing capital investments, Germany fell from third on a list of countries with the best infrastructure in 2008 to seventh place in 2013 and tenth place in 2017 (German Council of Economic Experts, 2018; German Finance Ministry, 2014, 2015, 2018; Ermasova, 2019, Van der Putten, 2017).

These problems are also particularly significant in the Russian Federation. In Russia current levels of investment funding are far below what is needed to properly maintain, improve, and expand public infrastructure to avoid economic costs and inefficiencies (Ermasova, 2019). WEF Global Competitiveness Report (2018) shows that the lack of capital investments over the last 20 years has dropped Russia to 35rd place globally in quality of overall infrastructure. Because there has been mounting disquiet about the status of public infrastructure in the United States, Germany and Russia, it is particularly appropriate to reassess their capital budgeting, asset acquisition and management systems so that these resources may serve their appropriate functions.

Four sections follow. The first section examines the thoughts and theories about capital budgeting that have developed over roughly the past half century. In light of the significance of capital infrastructure, it is no surprise that there are many views on the topic, not all consistent with each other. The second section considers the practice of public capital budgeting by comparing capital budgeting across three important federations – the Federal Republic of Germany, the Russian Federation, and the United States – to provide a sense of how ideas are implemented in countries with apparent organizational similarities but with great differences in practice. The third section considers the problem of asset underinvestment and approaches that have been developed to attempt to remedy the problem. The final section identifies important gaps in academic and practical understanding of capital asset investment and management and how

the capital budgeting process might be revised to improve the condition of society. The article provides a greater understanding of capital budgeting in different countries and identify avenues for fruitful future research.

2. LITERATURE REVIEW

Capital budgeting, in common with budgeting overall, is partly political, partly economic, partly accounting, and partly administrative (Hyde, 2002, p.1). As a political process, capital budgeting allocates the scarce resources among different government departments, agencies, and investment projects. Because capital projects are place-specific, political debates can become particularly intense. As an economic and fiscal process, capital budgeting serves as the primary instrument for evaluating needs for capital improvement, analyzing the condition of infrastructure, and assuring that the program can be financed. As an accounting process, it tracks government spending on capital projects. The process itself is the part of the fiscal management system focused on capital assets.² Finally, as a managerial and administrative process, capital budgeting establishes criteria by which public services are monitored, measured, and evaluated (Khan and Hildreth, 2002).

Many scholars (Ammar, Duncombe, and Wright, 2001; Boex, Martinez-Vazquez, and McNab, 2000; Chen, 2017; Chen and Bartle, 2017; Bland, 2007; Beckett-Camarata, 2003; Ermasova, 2012, 2013; Ermasova and Ebdon, 2019; Halachmi and Sekwat, 1997; Kovner and Lusk, 2010; Mikesell, 2007; O'Toole and Stipak, 1988; Srithongrung, 2008, 2018; Srithongrung, Ermasova, and Yusuf, 2019) have explored whether strategic practices can be integrated into capital processes. Premchand (2006, p.29) agreed with the importance of the multi-year budget framework and highlighted the necessity of following changes in expenditure management: (1) preparation of a medium-term fiscal outlook; (2) preparation of medium term rolling expenditure budgets; (3) formulation of functional or program resource ceilings; (4) recognition of risks and associated measures; (5) formulation of priorities and strategies; (6) explicit recognition of performance links; (7) fundamental or periodic reviews; and (8) introduction of accrual budgeting and accounting.

A large number of studies analyze how capital spending decisions have been made (e.g., Temple, 1994; Balsdon, Bruner, and Rueben, 2003; Chudhury, Clingermayer, and Dasse, 2003; Srithongrung, Ermasova, and Yusuf, 2019). Poterba (1995); Gordon, Kleiner, and Natarajan (1986), Srithongrung (2008),

2. The Office of Management and Budget (OMB, 2017a) defines federal capital assets as "land, structures, equipment, intellectual property (e.g., software), and information technology (including IT service contracts) used by the Federal Government and having an estimated useful life of two years or more."

Srithongrung, Ermasova, and Yusuf (2019) focused on the impacts of administrative institutions, including the use of a separate capital budget. Halachmi and Sekwat (1997) found that the use of separate capital budgets leads to strategic practices, including capital planning and infrastructure inspection, in local governments. In contradiction, Spackman (2001, p.34) pointed out that capital and current budgets should be considered together:

“(1) budgeting and decision-making processes for capital and current spending must be considered together; (2) capital spending within the budget, once it is set, must be clearly identified separately; (3) investment proposals should be subject to processes for appraisal (of the capital and all the associated operating costs); (4) strong procedures should be in place for capital asset procurement and for project management, and for subsequent monitoring and management of capital assets.”

Dorotinsky (2008) argued that “the well-designed public financial management system supports each aspect of the system, including capital spending. In summary, an effective capital budgeting process should form an integral component of a sound over-all budgeting system” (p.20). Many authors find that public capital management practices enhance the quality and quantity of public infrastructure systems (Ermasova, 2012, 2013, 2019; Kovner and Lusk, 2010; Orszag, 2008; Srithongrung and Kriz, 2012; Srithongrung, 2010, 2018; Srithongrung, Ermasova, and Yusuf, 2019).

The government institutions play a crucial role in determining the scope of government capital spending. Questions such as "Is the fluctuation in spending considered optimal or an under-investment, relative to the public needs?" and "What should be an objective guide for public investment?" are of particular concern. However, some models focus on factors other than budget procedures in assessing public infrastructure choices. The alternatives include the bureaucracy model (Berry and Lowery, 1987, Courant, Gramlich, and Rubinfeld, 1979; Niskanen (1971), the fiscal illusion model (Buchanan and Wagner, 1977; Dollery and Worthington, 1996; Rogers and Rogers, 1995), public policy literature (Gramlich, 1994) and political economy literature (Glazer, 1989, 1993; Crain and Oakley, 1995). According to the bureaucracy model, bureaucratic self-interest is the main cause of public sector expansion beyond the optimal level (Berry and Lowery, 1987). Niskanen (1971) suggests that bureaucrats are likely to expand the government budget and to control information in their relationships with legislators. According to fiscal illusion theory, government revenues are not completely transparent and the true costs of government may be consistently misconstrued by the citizenry of a given fiscal jurisdiction (Buchanan and Wagner, 1977; Dollery and Worthington, 1996; Rogers and Rogers, 1995).

Liu and Mikesell (2014) highlight that “politicians, as vote maximizers, tend to propose new government programs as much as possible to attract new voters, which makes government bigger” (p.348). The political economy literature on pork barrel politics suggested that capital projects are allocated to politically powerful legislators or based on election considerations, rather than on productivity criterion. Glazer (1989) wrote, “the rational voters will show a consistent bias in favor of building durable projects” (p.1207) and it depends on commitment effect and efficiency effect. Glazer (1993) suggested that a fundamental aspect of collective decision-making in choosing capital projects should be recognized. Glazer (1989) highlighted that durable project “forces government to provide some services that voters in the future may prefer it did not” (p.1212). Liu and Mikesell (2014) analyzed the impact of public officials’ corruption on state spending and found that “show that real per capita state construction expenditures tend to be larger in states with higher levels of corruption, and the impact is statistically significant. This finding is consistent with the view that corrupt public officials increase expenditures on construction, expecting bribes from construction companies” (p.353). Poterba (1995) considered state capital investment as a political process bounded by presence or absence of a formal capital budget process and by aggregate fiscal controls and found that “suggest that states with separate capital budgets spend more on public capital projects than comparable states with unified budgets” (p.165).

The literature on the economic returns from infrastructure spending, for example, suggests that such public spending often has positive returns, but that both the average return and the range of returns among projects vary significantly and depend on a number of factors (Orszag, 2008). Research suggests that the returns to early public investments, such as expanding the interstate highway system, can be large but that the economic payoff depends on the amount of infrastructure that is already in place. Aschauer (1990) proved that public capital is productive at both state and national levels. First, Aschauer (1990) found that public capital was highly productive during the period 1949–1985. Second, public capital appeared to be more productive than private capital at the margin. Finally, he traced the productivity slowdown in the United States during the 1970’s and 1980’s to the decrease in spending on public infrastructure.

According to Aschauer (1990), the decline in public capital formation, and in particular the decline in what he terms “core” infrastructure (which consists of streets and highways, airports, electrical and gas facilities, mass transit, water systems and sewers) is an important reason behind the productivity slowdown experienced by the US economy since the early 1970s. Ford and Poret (1981) have applied Aschauer's framework to OECD countries with mixed results, the effect of infrastructure on total factor productivity being always significant in five cases (the USA, Germany, Canada, Belgium and Sweden), never significant in three cases (the UK, Norway and Australia), and sometimes significant

in the last three cases (France, Japan and Finland). Further evidence has also been provided by Berndt and Hansson (1992) for Sweden, Lynde and Richmond (1992) for the USA and Otto and Voss (1992) for Australia.

Farazmand and Neill (1996) argue that the theory of capital budgeting exists “at a crossroad in which the traditional quantification techniques have yet to be reconciled to the qualitative influences on the budgeting process” (p.429). Doss (1987) pointed out that “projections of future local government income are typically based on both market factors- health of the economy and political "climate" factors including state and federal spending decisions” (p.58). Many scholars found evidence of large private sector productivity gains from public infrastructure investments (Aschauer, 1990; Department of the Treasury and the Council of Economic Advisers, 2010; Dabla-Norris, et al., 2012; Moomaw, Mullen, and Williams, 2002; Munnell, 1990; Lobo and Rantisi, 1999).

According to Doss (1987), an accurate determination of the economic well-being of a local government cannot be made unless information about the status of the infrastructure and the effectiveness of the capital maintenance system is included in the formula. Burchell and Listokin (1981) express another view: “if a city fails to maintain and replace its inherited capital facilities, it in effect liquidates capital assets by converting them to cash”(p.260). In their view, the cash savings take the form of lower levels of new capital investment and smaller outlays for upkeep and maintenance. Srithongrung (2008) pointed out that “capital management processes based on systematic and strategic practices should result in an effective infrastructure system that can attract private investment and new residents” (p.91).

Many scholars found that asset maintenance is the weakest area in capital management at the state and local levels (Chen, 2014, 2016, 2017; Chen and Bartle, 2017; Ebdon, 2007; Ermasova, 2012, 2019; Marlowe, 2013). Ebdon (2007) suggests: “Capital assets need to be maintained in good working order to prevent excessive long-term costs and safety hazards. This requires good information systems and regular, comprehensive condition assessments to determine the status of assets, the cost of maintaining them in good condition, and the financing available to pay for the maintenance needs” (p.66). According to Marlowe (2013), it is common to defer funding for maintenance in difficult economic times because it is less visible than other priorities.

3. NATIONAL CAPITAL BUDGETING IN PRACTICE

Governments do not implement the process of constructing and maintaining their public capital infrastructure in the same way, even when there are similarities in the basic logic of governments in the nation. The following section compares the public capital process for the German Federal Republic (GFR), the Russian Federation (RF), and the United States (US) to see how the practice

matches the principles. These countries provide an ideal standard for comparison because each is constitutionally organized as a federation, because each governs an important country, and because the practices in each influence those in other countries, sometimes because of formal technical assistance programs (e.g., USAID or GIZ) and sometimes because of long-standing links that influence practice (e.g., the USSR). Importantly, the three countries are also substantially different in their structures and governance and that makes for particularly useful contrasts.

Some of the differences between the countries are these. First, federal governments in the three countries are of dramatically different ages with the U.S. being almost 250 years old, the GFR being around three-quarters of a century old, and the RF being roughly 25 years old. That provides a considerable experience range for experimentation and adjustment as fiscal, economic, environmental, and political realities have changed. In some respects, the federal governments may be at differing points in their life cycles.

Second, the three federal governments have considerably different governance structures. The US is characterized by a balance of power between executive and legislative branches with a separately elected head of government (the president); the GFR employs a parliamentary system in which the head of government is a member of the legislative branch and there is no clear distinction between heading the legislature and leading parliament; and the RF has two legislative bodies (the Federation Council and the Federal Assembly) with a prime minister but also has an elected president with considerable formal and informal powers in the legislative process.

Third, each of the countries has multiple levels of government, with none serving only as a regional branch of a higher level. However, in the US, the states have considerable sovereignty and protected powers (possibly because the states created the federal government and were cautious about keeping important powers for themselves) but states do not directly have a role in federal legislation. In the RF, the federal government exercises considerably greater control over what subordinate governments are permitted to do and the subnational units have no authority over federal actions.

There is regular concern about the “power vertical” and some concern with “horizontal federalism,” the relationship between regional governments, both concepts almost completely foreign to American observers. In the GFR, lander have considerable power to influence what the federal government is permitted to do. In terms of what tiers of government are expected to do, in the US, the national constitution does little in terms of assigning fiscal roles, options, and responsibilities to the tiers of government. There is greater attention to direct assignment in the fundamental national law of GFR and RF.

Finally, subnational governments in each of these countries face somewhat different public service expectations and, crucially, different expectations about how their spending will be financed. In the US, the standard presumption is that spending by subnational governments will be primarily financed by subnational taxes and charges. In the GFR, subnational governments have financing responsibilities but there is also a substantial federal flow of general financial assistance provided these governments. In RF, the federal government exercises great control over fiscal resources that subnational units might employ, it administers any subnational taxes, and provides considerable fiscal assistance and control in subnational government programs.

For the reasons outlined here, the choice of US, GFR, and RF for the comparison provides important insights into the workings of a process for capital budgeting and management. Several important features of the capital budgeting and management process differ between the three federations.

Dual or Unitary Budgets

The US and Germany federal governments employ a unitary budget. Capital investments do not have a separate framework and the budget makes no distinction between capital investments and operating expenses. Capital spending, social insurance outlays, and operating expenses are treated the same. US budget documents provide details on physical infrastructure expenditures, but there is no special consideration or budgetary path for this spending and normal appropriation rules apply. Russian Federation has dual budget. Until 2008, the budget formulation process in Russia was divided between appropriations for current expenditures (coordinated by the Ministry of Finance) and appropriations for capital expenditure (coordinated by the Ministry of Economic Development). The Russian government transferred the supervision of capital spending from the Ministry of Economic Development to the Ministry of Finance in 2008. The government asset investments are controlled by the Budget Code and approved through the annual budget process.

Term of Appropriation

The US federal government normally makes a series of annual appropriations for capital expenditures, although there are also sometimes multi-year, no year, or program appropriations. Germany federal government also makes a series of annual appropriations to cover capital expenditures. Russian Parliament is authorized to approve amendments to the budget that are submitted by any subject of legislative initiative based on Article 213 of the Budget Code. The appropriation framework allows some possibility for the government to change and reallocate the funding within the investment portfolio during budget execution.

Role of Executive

In the USA, there is separation of powers between legislative and executive branches, so shared roles. The President of the United States is both the Head of State and Head of the Government. The president is head of the executive branch, which is independent of the legislature. Legislative power is vested in the bicameral Congress, which is composed of the Senate (the upper house) and the House of Representatives (the lower house). The judiciary consists of the Supreme Court and the lower federal courts, with their role to interpret the U.S. Constitution, federal laws, and regulations, and to resolve disputes between the executive and legislative branches.

Germany is a federal parliamentary republic. The laws and key institutions are grounded upon a Basic Law (Grundgesetz). The Federal President is the Head of State, and the Federal Chancellor is the Head of the Government. The legislature of Germany are the bicameral German Parliament that consists of the Federal Legislature (the Bundestag), and the Federal Council (the Bundesrat). Each of the regions (Länder) has its own government, premier, and legislatures with significant powers and jurisdiction over many areas of governance.

In Russia, the Head is the President, who is also the Supreme Commander in Chief, and holder of the highest office. The President determines the basic course of domestic and foreign policy. The Government of Russia is the highest organ of executive power, the members consisting of the Prime Minister (the Head Government), the deputy prime ministers, and the federal ministers and their ministries and departments (Ermasova and Ermasova, 2019). The legislature of Russia is the Federal Assembly of the Russian Federation, a bicameral Parliament, consisting of State Duma (the lower house), and Federation Council (the upper house).

Subnational Governments

The U.S. structure differs from many other countries in the relationships between the federal government and other levels. According to U.S. Census Bureau (2012), there are 90,106 state and local governments in the United States. This includes 50 states, 38,910 general purpose governments (cities and counties), 12,880 school districts, and 38,266 special districts (e.g., fire protection or water supply districts). For example, Illinois has 6,963 local governments with numerous jurisdictional boundaries and overlapping special districts. States are responsible for capital assets such as state highways, university facilities, parks, prisons, and office buildings. Local governments and special districts have a great deal of autonomy and responsibility for capital related to the services that they provide. Local governments are responsible for jails, courts, local streets and bridges, school buildings, police and fire facilities and equipment, local airports, public hospitals, local parks, libraries, parking garages, water and sewer systems.

The German general government comprises federal, regional (the *Länder*), local governments, and social security funds. Germany consists of 16 states (*Länder*) that have a high level of autonomy. The *Länder* are responsible for regional roads, hospitals, museums, courts, police, culture, sports, education, and water management (Gamper, 2012, p.4). The federation and the *Länder* are autonomous on managing their budgets. Municipalities are responsible for the local registry, the administration of living and social subsidies, construction planning, waste management, spatial planning, children day care, libraries, museums, and retirement homes. The districts are responsible for cross-municipal tasks like transport systems, museums, nature reserves, district roads, waste management, hospitals, and primary schools (OECD, 2006, 2014, 2015a, 2015b, 2017, 2018).

In Russia, governments are structured in three layers: federal, regional, and local. The Russian Federation has 85 subjects (regions) that include: 22 republics, 46 *oblasts* (provinces), 9 *krais* (territories), 4 autonomous *okrugs* (areas), 1 autonomous raion (county), and 3 federal cities (Moscow, Sevastopol, and St. Petersburg) (Ermasova, Ijose, and Ermasov, 2018). The Russian Federation has more than 24,000 local governments with dramatically different levels of economic strength and development (Ermasova and Ermasova, 2019; Ermasova and Mikesell, 2016; Zhuravskaia, 2000). For example, City of Moscow has 25 % of total gross regional product (GRP) and 8 % of population of the country. The Russia's fiscal federalism is more centralized than in Germany and the USA.

Public Spending

In the USA, the major supported functions are national security (22 %), pensions (25%), health care (27%), welfare (9%), education (3%), transportation (2%) in 2018 (U.S. Department of the Treasury, 2018; US Government spending, 2018). The subnational governments are responsible for 76.5% of direct public expenditures (OECD National Accounts Statistic, 2016).

In Germany, general government spending focuses on social protection (34%), defense (5%), healthcare (18%), transport (5%), and environment protection (2%). The subnational governments are responsible for 47 % of public expenditures (OECD National Accounts Statistic, 2016).

In Russian Federation, the major supported functions are defense (17.2 %), protection (7.7%), social protection (20.8%), economic development (12.8 %), education (3.3%), health care (2.2%), and environment protection (0.4%) in 2017 (Federal State Statistics Service, 2018; Ministry of Finance Russian Federation, 2017, 2018a,b). Subnational governments are responsible for 58.4% of public expenditures (OECD National Accounts Statistic, 2016).

Roles of Governments in Capital Expenditure

In the USA, public capital expenditure is divided between federal (31%), state and local (69%) governments (Ermasova and Ebdon, 2019). State and local governments spend more on capital investment than does the federal government. The public capital spending on three levels of governments was \$483.4 billion that includes \$334.2 billion of state and local governments' capital spending in 2014-2015 (U.S. Census Bureau, 2015, Office of Management and Budget, 2017a, 2017b). The direct federal spending for capital investment was \$172.4 billion in 2017 that includes \$134.0 billion for defense and \$38.4 billion for nondefense. Federal budget provided \$38.4 billion for investment grants to state and local governments (Office of Management and Budget, 2018).

In Germany, public capital expenditure is divided between federal (31%), lander (29%), and local (30%) governments (German Finance Ministry, 2015; Statistisches Bundesamt, 2018; Trading Economics, 2018). The federal investment spending was around 2 % of the total federal budget in 2017 (Ermasova, 2019).

Table 1. Total capital spending and economic performance data in Germany, the USA, and Russia

Country	2015 Total public capital spending (\$billion)*	2015 Population (million)**	2015 Total public capital spending per capita (\$billion)	2015 GDP (\$billion)***	2015 Per Capita GDP	1990 Per Capita GDP****
Germany	80.34	1.1	990.67	,618	44,615	19,433
United States	483.4	21.2	1,504	6,940	52,740	23,955
Russia	13.7	44.3	0.69	,363	23,303	8,013

Source: Created by authors based on Srithongrung, Ermasova, and Yusuf (2019)

* From Office of Management and Budget, USA (2017a, 2017b), Federal Ministry of Finance Germany (2018). Ministry of Finance of Russian Federation (2018b)_

** For mid-year 2015; from Population Reference Bureau (2015)

*** Financial data are in real USD based year 2011; from IMF (2018)

**** 1990 Per Capita GDP is in current USD; from The World Bank (2018)

In Russian Federation, public capital expenditure is divided between federation (61.7%), regional governments (31.1%), and local (7.2%) governments (Finance of Russia, 2016). The federal government plays a major role in capital investments in Russia (Ermasova and Ermasova, 2019). According to OECD (2016a,b,c), the government provides around 65 % of infrastructure investments. According to Chakrabarti (2016), the share of the private sector, as a percentage of cumulative infrastructure investments in in the US was 29%; in

Germany around 90%. Table 1 presents the public capital spending and economic performance data: the International Monetary Fund (IMF) income group, total population in 2015, total GDP in 2015, per capita GDP in 2015 and per capita GDP in 1990.

Conditions of Public Infrastructure

According to the Global Economic Forum (2017), USA was ranked ninth, Germany tenth, and Russia thirty fifth on a list of countries based on their infrastructure conditions (WEF Global Competitiveness Report, 2017). Table 2 demonstrates the ranking of federal countries based on conditions of their infrastructure in 2017.

Table 2. The ranking of federal countries based on conditions of their infrastructure in 2017

Ranking	Countries	Score
81	Argentina	3.9
28	Australia	5.3
14	Austria	5.7
24	Belgium	5.4
16	Canada	5.7
115	Ethiopia	2.7
10	Germany	6.0
66	India	4.2
35	Russia	4.9
61	South Africa	4.3
12	Spain	5.9
6	Switzerland	6.3
5	United Arab Emirates	6.3
9	United States	6.0
117	Venezuela	2.6

Source: WEF Global Competitiveness Report. (2018). More information is available at <http://reports.weforum.org/global-competitiveness-index-2017-2018/competitiveness-rankings/#series=GCI.A.02>

There is evidence of specific gaps in American, German and Russian capital infrastructure (American Society of Civil Engineers, 2013, 2017; Chen, 2014, 2016, 2017; Chen and Bartle, 2017; Ermasova, 2012, 2013; Ermasova and Ermasova, 2019; Ermasova, 2019, Ermasova and Ebdon, 2019; Fratzscher, 2014, 2015, 2018; Ganelin and Vasin, 2014; National Association of Manufacturers and Building America's Future Educational Fund, 2013).

Capital Planning and Forecasting

The long-term plan should clearly describe an entity's performance gap, the resources needed to bridge it, and a clear justification for new acquisitions proposed for funding with links of proposed investments to an organization's long-term strategic goals.

In the USA, a long-term capital investment plan covers from 5 to 6 years (Ermasova and Ebdon, 2019; OMB's *Capital Programming Guide* and GAO's *Executive Guide*, U.S. General Accounting Office, 1998). Presidential policy estimates for the nine years following the budget year enable an analysis of the long-term consequences of proposed long-term capital programs (Office of Management and Budget, 2016). Germany has fifteen-year and five-year investments plans that prepare the basis for the budgeting for specific investment projects. In the Russian Federation, the Ministry of Economic Development of the Russian Federation prepares the 15 years' macroeconomic forecasts for the federal budget (Ermasova and Ermasova, 2019). The Ministry of Economic Development publishes two scenarios: (1) an optimistic, (2) pessimistic macroeconomic scenario (Ministry of Economic Development, 2013). These scenarios are based on the oil price, the exchange rate, and global economic developments.

Public Investment Project Analysis

In the USA, capital projects must be approved by the OMB based on benefit-cost assessment, total life-cycle costs and benefits (OMB, 1992). Federal agencies and departments use a performance-based management system for estimation of cost, schedule, and performance goals for the investment throughout the acquisition process (Office of Management and Budget, 2016a, 2016b, Ermasova and Ebdon, 2019). In Germany, the analysis of a public investment project is also based on a cost-benefit analysis and includes the following components: reduced transportation costs, travel time, safety benefits, security, regional economic and social impact, job creation, and derived economic effects (OECD, 2014, p.55). There are following ranking principles: safety, reduced transportation costs, travel time, security, regional economic impact, job creation, social impact, and derived economic effects (Ermasova, 2019). In Russia, public capital investment projects are selected on the basis of economic and social impact for whole country not one region (Ermasova and Ermasova, 2019). The Government Commission selects investment projects based on national, regional, and interregional importance (Ermasova and Ermasova, 2019).

The political level plays a key role in deciding which projects will be part of the portfolio appropriation in the USA, Germany, and Russia. In all three federations, the political support for a project can be more important than cost-benefit estimates. Table 3 provides summary of capital budgeting and management in Germany, Russia, and the USA.

Table 3. Summary of capital budgeting and management in Germany, the USA, and Russia

Normative Recommendations	Practices		
	Germany	The USA	Russia
Long-term Capital Planning			
Strategic Capital Planning	National Development Policy; The Joint Task for the Improvement of Regional Economic Structure; Twenty-Year, Ten-Year, Five-year framework investment plans There are following infrastructure and network plans in Germany: Federal Transport Infrastructure Plan; Federal Regional Policy Plan; Trans-European Transport Networks; Energy Network; EU-Habitats Directive; 16 Länder-level plans, regional development plans and programs, regional project plans; Sector-specific plans such as energy plan or mining in North Rhine-Westphalia.	The OMB 1997 <i>Capital Programming Guide A-11</i> to provide agencies a foundation for establishing a long-term capital investment plan that covers from 5 to 6 years to guide the implementation of organizational goals and objectives	The Ministry of Economic Development issues long-term projections for the economy, 100 page document presenting medium-term macroeconomic assumptions, objectives of fiscal policy, projection of general government finances, breakdown of budget expenditure, and sources of financing
Capital Improvement Program	15 year CIP for transport infrastructure investments; 5 year CIP	The short-term orientation of the yearly (operating) budget cycle influences Congress to systematically under-invest in public infrastructure in favor of the more politically popular consumption-based programs.	5 year CIP
Capital Budgeting and Financial Management			
Systematic Priority Ranking	Investment projects are ranked according to cost-benefit analysis, the expected need for the project, and the assessed urgency in constructing the asset	Investment projects are ranked according to cost-benefit analysis, the expected need for the project, and the assessed urgency in constructing the asset	Investment projects are ranked according to cost-benefit analysis, the expected need for the project, and the assessed urgency in constructing the asset
Capital Budgeting Process	Resource-allocation process from the outset, resulting in a distinctive form of "top-down budgeting" since 2010. The budgeting for capital projects are integrated into the ordinary budget process in Germany.	The U.S. federal government does not have a separate capital budget. The budgeting for capital projects are integrated into the ordinary budget process in the USA.	Three-year budgeting framework. The government's budget submission to parliament.
Debt Management Policy/Disclosure	The German <i>Schuldenbremse</i> ("debt brake") as debt ceiling, Binding borrowing constraints	Pay-as-you-use finance	Annual borrowing is limited to 15 % of revenue net of federal grants for regions and 10 % for municipalities
Infrastructure maintenance			
Maintenance Planning	Planning through National Reform Program and Federal Transport Infrastructure Plans	Deferred maintenance and repairs are measured using one of three methods: <i>Condition assessment surveys</i> ; <i>Life-cycle cost forecasts</i> and <i>Management analysis</i>	N/A
Maintenance Funding	Funding through National Reform Program and Federal Transport Infrastructure Plans	OMB use the asset priority index (API) and facility <i>condition index (FCI)</i>	No mid-term, no long-term policy of maintenance funding

Source: Created by authors based on Ermasova, 2019, Ermasova and Ermasova, 2019, Ermasova and Ebdon, 2019

4. RECOMMENDATIONS AND CONCLUSION

Public infrastructure makes an important contribution to the economic and social life of a nation. National governments develop and manage their part of this system of capital assets through capital budget processes of varying degrees of formality, as the analysis of the three federations reported here show. The processes for capital investment planning are complicated and not well coordinated within the budget process in the USA and Russia. Separate planning of capital expenditure and related current expenditure for maintenance has led to negative consequences in both countries, such as uncompleted construction projects, prolongation of construction terms, and high exploitation costs of completed projects. Based on example of Germany's national capital improvement plan (CIP) that requires the government to establish a 5-year rolling capital plan based on budget forecasts, this study suggest implementing strategic rolling capital plan at the national level in the USA.

In the USA, the short-term orientation of the yearly (operating) budget cycle influences Congress to systematically under-invest in public infrastructure in favor of the more politically popular consumption-based programs (Congressional Budget Office, 2015; Ermasova and Ebdon, 2019; Frankel and Wachs, 2017). The USA could use Germany's long-term capital budgeting and management approach. The German Federal Republic, the Russian Federation, and the United States have decline of public investments in last twenty years. To solve the problem of investment activity decline, the government's stimulus programs were established in Germany. A special investment and redemption fund was created in Germany in 2009 which gave a particular boost to government investment. The USA and Russia could use this approach to improve public investment environment.

Crumbling infrastructure appears to be an issue in these three federations, regardless of the state of their capital budgeting processes. Asset maintenance has been found to be the weakest area in capital management in all three countries. Germany, Russia and the USA had faced problems in maintenance funding as public investment slowed and the countries experienced infrastructure aging and backlog. For example, around one million jobs are expected to be lost due to the economic impacts of deteriorating transportation infrastructure in the USA by 2025 (American Society of Civil Engineers, 2017). Ebdon (2007) suggests that "capital assets need to be maintained in good working order to prevent excessive long-term costs and safety hazards. This requires good information systems and regular, comprehensive condition assessments to determine the status of assets, the cost of maintaining them in good condition, and the financing available to pay for the maintenance needs" (p.66). Maintenance planning should involve asset management and accounting for public capital assets based on historical records of investment, major repairs, and depreciation rates that would help guide capital resource allocation and project selection. According to

Afonso (2014), if the government would use dedicated revenues to finance public facility depreciation, the government would be able to ensure annual appropriation for regular maintenance schedule. Maintenance funding could help to avoid accumulating public infrastructure backlogs because annual repairs would extend the useful life of a project.

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