# INTERNATIONAL MONETARY FUND

# QATAR

## SELECTED ISSUES

May 2014

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## SELECTED ISSUES

April 2, 2014

| Approved By **A. Kammer** | Prepared by H. Qu, C. Rochon, and B. Shukurov. |
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## CONTENTS

# ASSESSING EFFICIENCY OF QATAR PUBLIC INVESTMENT[1]

*While comparable to its GCC peers, the efficiency of Qatar's public investment appears to be lagging behind resource-rich advanced economies. Given the large size of the public projects and a compressed timetable ahead of the FIFA 2022 Championship, greater investment efficiency would provide better resource allocation and boost growth dividend for the Qatar's economy. Strengthening fiscal institutions, especially developing an integrated public investment management process and a medium-term budget framework, are key for improving public investment efficiency in Qatar.*

1.      **As in most other MENA/CCA oil-exporting countries, persistently high hydrocarbon prices have facilitated higher public spending in Qatar, including on investment projects.**[2] In turn, the Qatar economy has grown strongly; during 2004-11, total GDP growth and nonhydrocarbon growth averaged 16 percent and 19 percent annually, respectively. In 2012-13, growth declined on account of plateauing hydrocarbon production, but nonhydrocarbon growth was still strong at about 10 percent annually.

2.      **Despite these significant achievements, this paper suggests that there is room to improve spending efficiency.** Greater investment efficiency would provide better value for money, increase the growth dividend (including by raising total factor productivity), and accelerate progress toward fulfilling social objectives.  Further strengthening the medium-term focus of fiscal policy and enhancing the framework for managing public investment would be particularly important to help secure high growth returns on investment given their large size and a compressed timetable ahead of the FIFA 2022 Championship. This would entail putting in place well-defined and integrated public investment plans and/or sectoral strategies; clear appraisal standards; routine economic assessments of large projects; and independent checks of appraisals. Accurate data on the selection process, including bidding and ex-post evaluations, would also help improve efficiency.

3.      **To help assess the efficiency of public investment in the MENA/CCA, including in Qatar, several alternative methods were used**. Section A discusses the trends in public capital spending and the rationale for improving public investment efficiency. Section B outlines three alternative methods for analyzing efficiency, and presents the main results.[3] Section C reviews the successful experience of Norway in improving public project implementation. Section D concludes.

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[1] Prepared by Haonan Qu and Bahrom Shukurov. This paper is based on the forthcoming "Public Investment Efficiency in the Oil Exporters of the MENA/CCA Region" by Maria Albino-War, Svetlana Cerovic, Francesco Grigoli, Juan Carlos Flores, Javier Kapsoli, Haonan Qu, Yahia Said, Bahrom Shukurov, SeokHyun Yoon under the supervision of Martin Sommer. Juan Carlos Flores provided excellent research assistance.

[2] MENA/CCA stands for the Middle East, North Africa, and Caucasus and Central Asia.

[3] Country-specific results will need to be used with caution due to limitations of data and methodologies.

## A. Trends in Public Capital Spending and the Rationale for Improving Efficiency

**4.      As many other hydrocarbon exporters in the MENA/CCA region, Qatar's public capital spending was increasing already in the years prior to the global economic crisis.** Capital

spending grew by 45 percent on average annually in nominal terms in 2000-08, increasing by about 5 percentage points of GDP, on the back of a prolonged period of high hydrocarbon revenue (Figure 1). Qatar maintained high capital spending during the height of global financial crisis in 2008-09. This spending increase reflected the adoption of major investment programs to address infrastructure needs, but also new investments aimed at increasing hydrocarbon production and refining capacity. As a result, the Qatari economy was growing at double-digit rates.



**Figure 1. Public Capital Expenditure, 2001-12 1/**
(In percent of GDP)
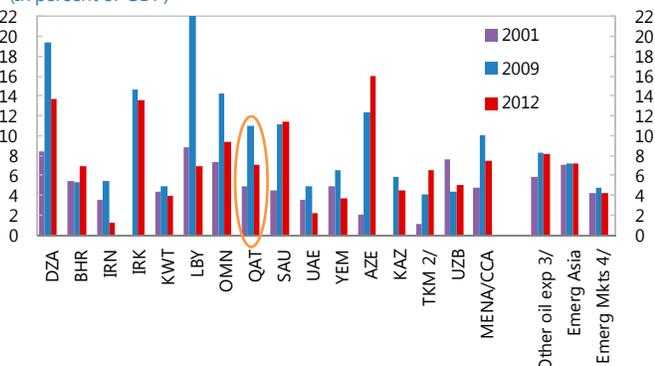
Source: IMF WEO database and staff calculations
1/ Refers to general government and excludes oil-related investment of public companies.
2/ TKM refers to state budget.
3/ Include countries where oil exports share in total exports is above 15 percent.
4/ Emerging markets in SPR definition excluding China and MCDOE.

**5.      While oil prices and revenues recovered in the aftermath of the global economic crisis, Qatar, as other oil exporters in the region reduced public capital expenditures.** Capital spending declined by 4 percentage points of GDP from 2009 to 2012, above the 1 percentage point drop observed in other advanced and emerging oil exporters outside the region. Nonetheless, the level of Qatar's public capital spending relative to GDP in 2012 was almost twice as high as public investment in other emerging markets excluding China.

**6.      Given the ambitious investment program envisaged under the National Vision 2030 and compressed timetable ahead of the FIFA Cup 2022, the focus on investment efficiency is essential.** The investment projects amount to some USD210 billion over 2014-21, out of which the government budget is expected to finance an estimated USD160 billion. The projects include the construction of a new airport, port, metro, residential areas, road and railway infrastructure, stadiums, petrochemical plants, and other. Higher efficiency in implementing these projects would increase "value for money" of the sizable capital spending programs and boost the growth dividend. In particular, recent IMF studies of resource-rich developing countries found that investment returns are usually negatively affected at high levels of investment.[4]

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[4] See IMF (2012c).

## B.  Assessing Efficiency of Public Investment

**7.      As a starting point, it may be useful to recall that Qatar's overall infrastructure quality is broadly at the same level as in other GCC countries, but remains lower than in other advanced countries** such as Germany, Finland, and Singapore, according to the World Competitiveness Indicators (2013) (Figure 2). While Qatar's air transport infrastructure appears to be relatively well-developed, according to this index, the quality of ports and roads seems to be relatively lower.

**Figure 2. Global Competitiveness Indicators, 2013**
(1 = minimum, 7 = maximum)
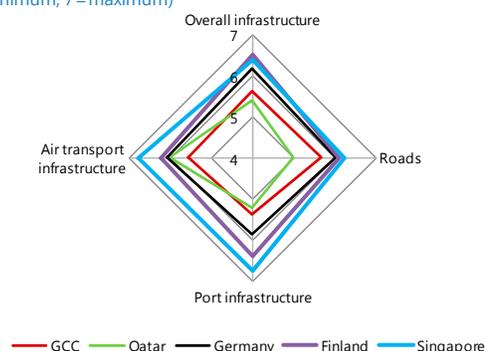


**8.      Another general point is that government effectiveness—crucial for any public sector activity, including investments—could be strengthened further in Qatar.** A broad World Bank measure of government effectiveness, a proxy to gauging how strong public institutions are, indicates that Qatar performs well overall, but lags behind countries with a similar level of income (Figure 3).

**Figure 3. Government Effectiveness and GDP Per Capita**
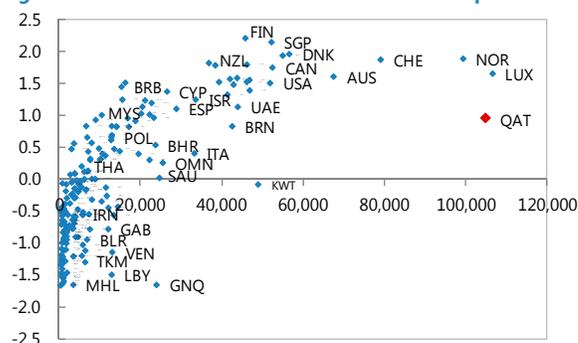


Source: World Bank Worldwide Governance Indicators; IMF

*Efficiency Frontier Analysis*

**9.      The efficiency of public investment in Qatar can be assessed using two alternative techniques measuring the effectiveness of countries in transforming inputs (money) into outputs (infrastructure). Specifically, the efficiency is measured using a *Data Envelopment Analysis (DEA)* and a *Partial Free Disposal Hull (PFDH)* (Figure 4, Appendix 1).** Output (the quality of infrastructure) was approximated using the infrastructure sub-component of the Global Competitiveness Indicators, while inputs were measured as the public capital stock, the non-oil public capital stock, or total capital stock (we call this a "one input-one output approach"). A second set of scenarios included GDP per capita as a control variable (we call this a "two inputs-one output approach"). In addition, an alternative efficiency assessment technique— the PFDH—was conducted to limit sensitivity to outliers.[5] A higher estimated score implies the stronger efficiency.

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[5] The main difference between these approaches is that the DEA compares each country against a fixed country sample, whereas the PFDH makes the comparison against repeated randomized sub-samples, thus reducing sensitivity to outliers.

**Figure 4. DEA and PFDH Scores**



◆Qatar w/ public capital spending input     ◆Qatar w/ public non-hydrocarbon capital spending input     ◆Qatar w/ total capital spending input

DEA Scores
(1-1 capital stock)

DEA Scores
(2-1 capital stock)

PFDH Scores
(1-1 capital stock)

PFDH Scores
(2-1 capital stock)

Source: IMF staff estimates.
1/ Oil exporting countries with strong institutions as determined by high WGI indicators (90+) - Australia, Canada, Chile, Norway, and Singapore.

**10.      The results suggest that the efficiency of Qatar public investment spending is broadly comparable to GCC peers, but could be improved further.** Qatar has attained a relatively high degree of infrastructure quality, having spent a similar amount of resources compared with other GCC countries. The DEA results under the both "one input-one output" and "two inputs-one output" approaches suggest that Qatar's score is broadly comparable to other GCC countries and is higher than in many non-GCC oil exporters.[6] But Qatar appears less efficient compared to some advanced economies with strong institutions such as Canada, Norway, and Singapore. The results derived from the PFDH assessment are broadly similar.

*Public Investment Management Index (PIMI)*

**11.      This section considers efficiency of public investment process at the four main stages (appraisal, selection, implementation, and evaluation) and discusses an index that captures institutional quality and efficiency in public investment management.** The PIMI was developed by Dabla-Norris et al. (2011) for 71 countries using diagnostics of countries' public investment management systems conducted by the World Bank, budget survey databases, donor assessments, and expert surveys (see the practices assessed and the benchmarks covered by the index in

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[6] Differences in scores such as 0.1 are minor and do not indicate a tangible variation among comparators. The results should be interpreted with caution because of the existence of measurement biases and sensitivity to outliers.

Appendix 2). We expanded the index to Qatar and other MENA/CCA countries, on the basis of the survey developed by Dabla-Norris et al (2011) and the responses provided by country authorities.

**12.      Qatar performs about average in terms of the PIMI scores, and there appears further scope for improvement (Figure 5).** Qatar's total scores are broadly similar to the average scores of MENA/CCA. While MENA/CCA tends to fare better than countries in Sub-Saharan Africa and is broadly at the similar level with Asia/Pacific and Europe, the Latin America and Caribbean region performs slightly better (see Appendix 3 for the list of countries included in these groups). The latter region's scores are boosted by relatively strong PIMI performers such as Brazil, Colombia, and Peru. The PIMI components also indicate that Qatar fares better in the implementation and evaluation stages compared to the appraisal and selection stages of the project cycle.



**Figure 5. Public Investment Management Index**

Source: Dabla-Norris et al, IMF 2011; Country authorities, and Fund staff estimates.
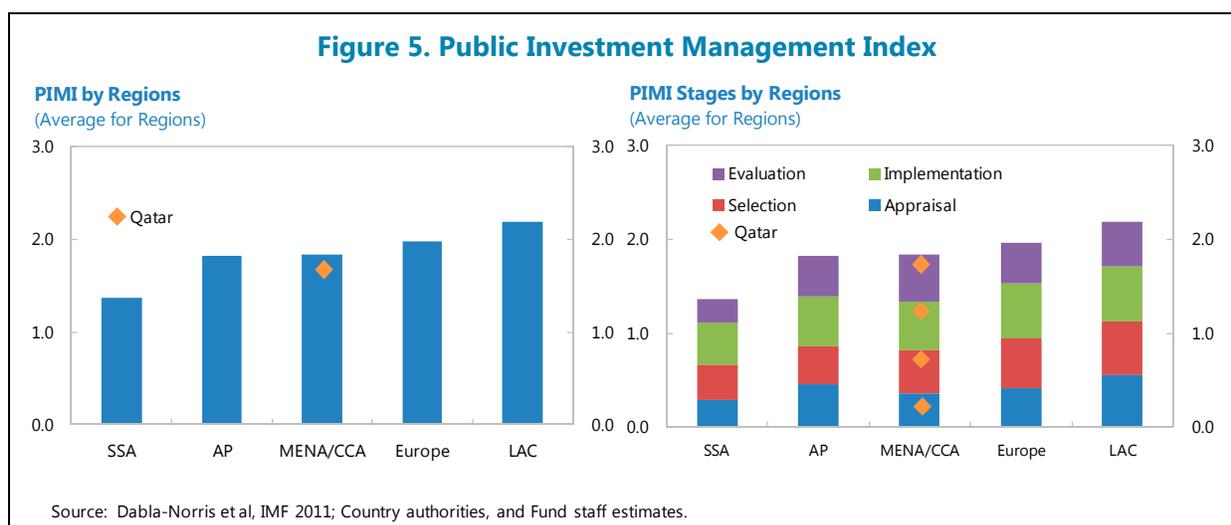
*Project-Level Investment Analysis*

**13.      The efficiency of public investment can also be assessed by examining the construction cost of large public infrastructure projects.** The cost estimates are based on the project-level data for MENA oil-exporting countries from the Zawya database. Given data limitations, the exercise focuses only on metro projects and large-scale road construction projects (i.e. roads longer than 20 kilometers). For metro construction, the data covers projects in Algeria (1), Iraq (1), Kuwait (1), Qatar (5), Saudi Arabia (4), and the United Arab Emirates (4). The included road construction projects are in Iraq (1), Kuwait (1), Oman (1), Qatar (4), Saudi Arabia (3), and the United Arab Emirates (6). The unit cost estimates are calculated on the basis of contracted prices and planned capacity. The main caveat to this analysis is that the other factors that could legitimately affect the unit cost (e.g. quality, technical complexities, etc) need to be omitted due to the lack of comparable information.

**14.     The contracted metro construction costs in Qatar appear relatively low at the moment, but are subject to the risk of cost overruns.** The per-kilometer cost estimates of metro construction projects based on contract values show that Qatar compares favorably to its neighboring countries (Figure 6). Nevertheless, the substantial cross country variation in these cost estimates, even within the GCC, could reflect large uncertainty in the final costs of the metro projects and suggest the risk of substantial cost escalation. Flyvbjerg et al. (2002) finds an average cost overrun of 45 percent for rail-related transportation projects, with a higher average (65 percent) for projects outside Europe and North America. The experience of Dubai provides a cautionary tale, with final costs exceeding the contracted spending by 75 percent.

**15.     Metro projects seem more expensive in Qatar when adjusting for its low labor costs, although the final costs estimates in Qatar still appear reasonable compared to selected global benchmarks.** The final costs of metro projects are estimated using the assumption of a 65 percent cost over-run from Flyvbjerg (2008), and are converted to the 2002 prices using the U.S. construction price index. The final cost estimate for Qatar is slightly higher than the average cost in the Asia and Latin American region, but is lower than the cost in the U.S. and Europe (Figure 7). Once the low wage costs are taken into account, Qatar still compares favorably to its MENA peers,

**Figure 6. Metro Construction Cost**
(Million US$ per KM)
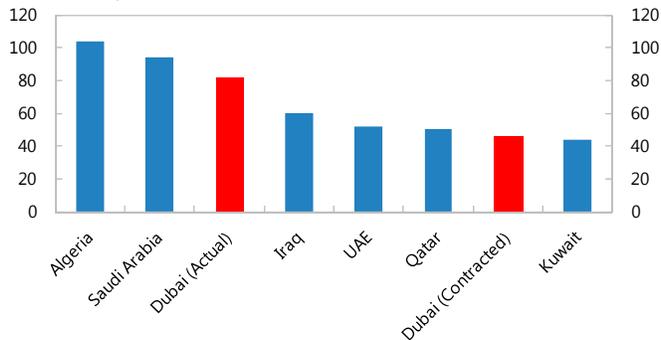


Source: Zawya Projects, Staff calculations.

**Figure 7. Metro Final Cost Estimates**
(Million 2002$ per KM)
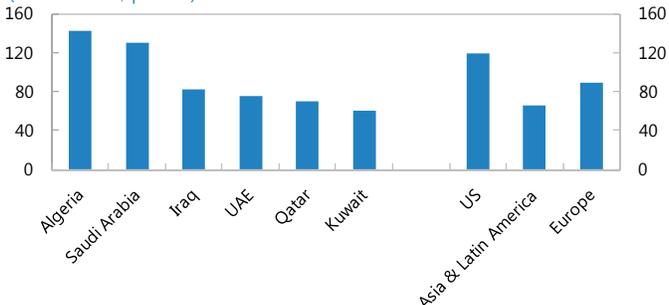


Source: Zawya Projects, Flyvbjerg et al (2008), Staff calculations.

**Figure 8. Metro Projects Final Cost Estimates, per KM**



Source: Zawya Projects, countries authorities, Flyvbjerg et al (2008), and staff calculations.

although it appears more expensive than the U.S. (Figure 8). However, an important qualifier to the comparison with the U.S. is that this calculation does not control for the different costs of raw materials that Qatar must import from foreign countries at an additional expense.

**16.** **The construction costs calculated from data on large-scale road projects appear expensive in Qatar, compared with other countries in the region (Figure 9).** The per kilometer per lane cost estimates of road construction projects in Qatar range from $0.7 million to $7.4 million. In contrast, the cost estimate per kilometer per lane is around $1.5 million in Oman, and less than $1 million for projects in other countries in the region. The high construction cost in Qatar could reflect a number of factors, including land values, quality, and technical complexities, which are not captured in these estimates due to data limitations. The literature[7] and the experience in the region suggest that the cost escalation of road construction projects is less of a concern comparing to that of metro projects. The Muscat Expressway in Oman completed in 2012 cost close to $350 million, compared to a contract value of $330 million, a six percent cost overrun.

**Figure 9. Road Construction Cost Estimates**
(Million $ per KM per Lane)

Source: Zawya Projects, staff calculations.

**17.** **An integrated public investment project management process is essential to reduce costs and contain the risk of significant cost escalation associated with public infrastructure projects.** In the past, public infrastructure projects in Qatar often suffered delays and rising costs. In particular, high levels of public investment have been usually associated with significant rise in construction prices in Qatar (Figure 10). Considering Qatar's high concentration of large infrastructure projects in the coming years, the authorities should carefully manage the investment pipeline through an integrated public investment management process to mitigate potential construction bottlenecks and ensure timely implementation.

**Figure 10. Public Spending and Price Change**

Source: country authorities, staff calculations.

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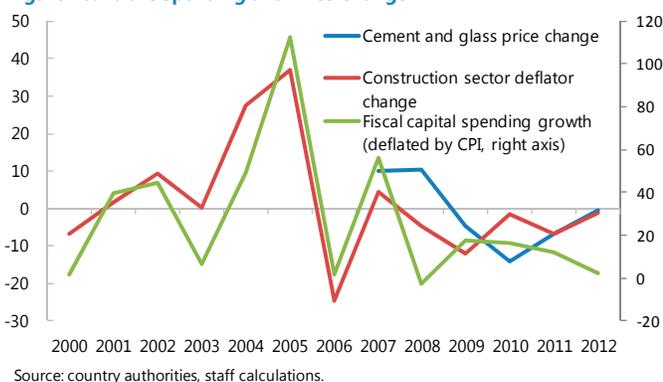
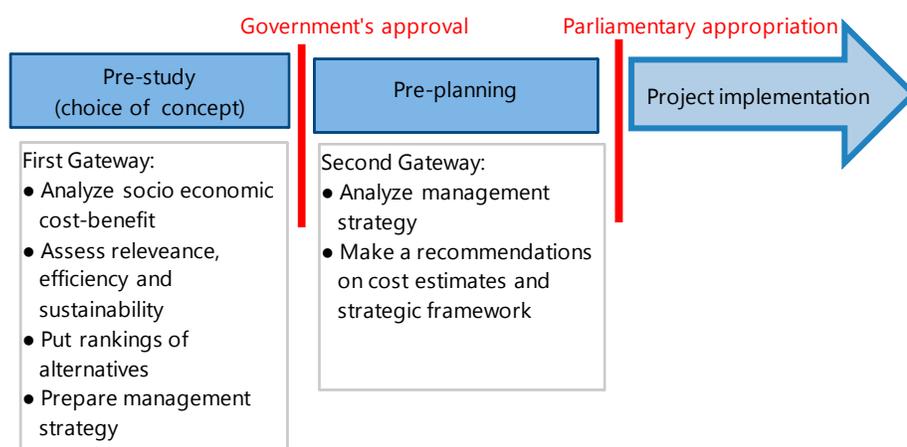[7] See Flyvbjerg (2002, 2007).

## C. Norway Governance Framework for Public Project Implementation

**18.      The Ministry of Finance in Norway initiated the development of an obligatory *Quality Assurance Scheme* (QAS) as a governance framework in 2000.** Norway faced a series of unsuccessful major projects and repeated project overspending during the 1980–90s. Following an investigation of unsatisfactory projects, the Ministry of Finance introduced a mandatory external assessment for all state-financed projects over USD 500 million. The goal was to ensure improved quality-at-entry by establishing a system where politics and administration is well divided, with the interplay between these two sides well understood. The QAS was stipulated in the national budget law. The scheme helped reduce cost for the state and better use of public funds, which turned into more successful project outcomes.

**19.      The QAS' two stages help ensure that any project undergoes a comprehensive analysis before being approved.** Measures are taken to ensure the quality of documentation (i) prior to the cabinet's decision regarding conceptual solution and (ii) prior to the Parliament's approval of the project's cost frame. The first "gateway" focuses on the rationale of the project. It covers the early choice of concept and strategy, and the decision to initiate project pre-planning and looking at many alternatives. It is performed by the end of the pre-study phase, before the government's decision is made. It consists of quality assurance of a series of strategic documents: a needs analysis; an overall strategy document; an overall requirements specification; and an analysis of alternatives. The second "gateway" is undertaken by the end of the planning phase, before a formal submission is made to parliament. It is documented in a report containing the consultant's advice on a cost frame for the project.

Government's approval          Parliamentary appropriation

| Pre-study (choice of concept) | Pre-planning | Project implementation |
|---|---|---|
| **First Gateway:** <br> • Analyze socio economic cost-benefit <br> • Assess releveance, efficiency and sustainability <br> • Put rankings of alternatives <br> • Prepare management strategy | **Second Gateway:** <br> • Analyze management strategy <br> • Make a recommendations on cost estimates and strategic framework | |

**20.      This two-stage process provides a tool for control from the top: parliament–government–ministry–agency**. In between the two stages, there are several coordination forums where the Ministry of Finance gathers key interested people for discussions, often resulting in common understanding and definition of terms and professional standards. As of 2013, the scheme has worked for 13 years involving 160 projects

**21.      Evidence indicates that the QAS has had a positive effect with a remarkable cost savings**. A research paper shows that 32 of the 40 projects submitted to QAS in the period 2000–09 and implemented during 2000–12, were completed within or below the cost frame.[8] The total net saving for the projects was estimated at about 7 percent of the total investment (Figure 11), which is a notable progress compared to the 1990s. Another study focused on 11 public investment projects, planned and implemented in the 1990s, had concluded that only three projects were delivered within the agreed cost frame, while the combined cost overrun was about 80 percent.[9]

**22.      Investment project performance shows that actual costs were lower than planned in many sectors**. Savings in road projects are particularly significant (Figure 12).While cost savings in the railway and construction sectors were lower than in the road projects, the former sectors still benefited from lower-than-planned actual costs.

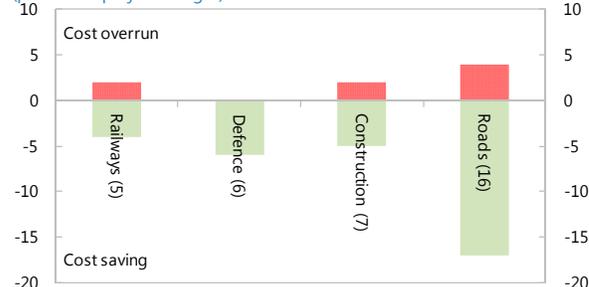**Figure 11. Norway: Deviation between Final Project Cost and Project Budget**
(40 projects in total, percent)
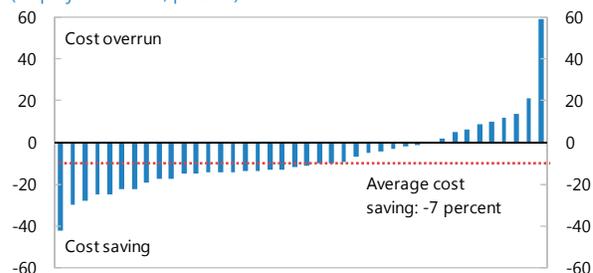


Source: Samset, *et al* (2013)

**Figure 12. Norway: Cost Overruns and Savings by Sector**
(percent of project budget)



Source: Samset, *et al* (2013)
Note: Figures in parentheses indicate number of projects.

## D.   Conclusion

**Strengthening fiscal institutions, particularly with an integrated public investment management process and a medium-term fiscal policy framework, is the key for improving public investment efficiency in Qatar.** While comparable to its GCC peers, the analysis has shown efficiency of public investment in Qatar lags behind resource rich advanced economies. Given the large size and a compressed timetable of the public projects ahead of the FIFA 2022 Championship, greater investment efficiency will provide better resource allocation and boost growth dividend for Qatar's economy. Further strengthening fiscal policy frameworks with medium-term horizons would be important, as well as enhancing the frameworks for managing public investment, which would entail establishing well-defined and integrated public investment plans and/or sectoral strategies; clear appraisal standards; routine economic assessments of large projects; and independent checks of appraisals. Accurate data on the selection process, including bidding and ex-post evaluations, is an inherent part of an efficiency improving process.

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[8] See Samset *et al.* (2003).

[9] Berg, *et al.* (1999), "Management of State Investments—Final Report of the Steering Group", Ministry of Finance in Norway

# Appendix 1. DEA and PFDH as a Non-parametric Methodology

**Efficiency is assessed using a cross-country approach that measures the effectiveness of spending in producing outcomes.** The relative efficiency of spending inputs and outcomes in each country is assessed using a Data Envelopment Analysis (DEA) technique. Based on the assumption of a convex production possibilities set, an "efficiency frontier" is constructed as the linear combination of efficient input and output combinations in the cross-country sample. The term "envelopment" stems from the fact that the production frontier envelops the set of observations. Figure 1 illustrates an efficiency frontier that connects points A through D as these countries dominate other input-output pairs, such as countries E and F in the interior. Efficiency score is computed by measuring the distance between a country and the efficiency frontier, defined as a linear combination of the best practice observations.

**Figure 1. Efficient Frontier under DEA Concept**
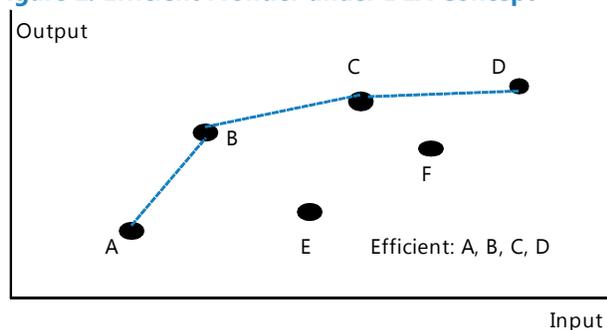


**While DEA does not require an assumption about the empirical distribution of the efficiency term, the approach has some shortcomings**. Thus, DEA is a powerful tool to assess spending efficiency. However, DEA as a non-parametric relative measure of efficiency is highly sensitive to sample selection and measurement error. As a result, outliers can exert a large effect on the efficiency scores and shape of the frontier. For this reason, proper sample selection is critical to ensure that cross-country input-output bundles are comparable.

**To deal with the issues of the sensitivity to measurement errors and outliers, the efficiency analysis can be supplemented by a partial frontier method**. This method generalizes a Free Disposal Hull (FDH) —a non-convex and staircase frontier—by adding a layer of randomness to the computation of the efficiency scores.  Instead of benchmarking a country relative to the best-performing peer in the sample, the method compares each country against the best performer in a sample of peers that produce at least the same amount of output. The sample is randomly drawn with replacement.

# Appendix 2. Components of the Public Investment Management Index (PIMI)[10]

**The index captures quality and efficiency across four main stages of the public investment management cycle: appraisal, selection, implementation, and evaluation.** The basic processes and best practices associated with the strongest score (4) in each stage are the following:

1. *Strategic Guidance and Project Appraisal*

- Nature of strategic guidance and availability of sector strategies.

- Transparency of appraisal standards.

- Observed conduct of ex ante appraisals.

- Independent review of appraisals conducted.

Maximum score requires a well-defined public investment plan and/or sector strategies for most sectors with full costing of recurrent expenditures and investment; a published document to detail appraisal standards; routinely undertaken economic appraisals for large projects; and independent checks by a regulator or office of appraisals.

2. *Project Selection and Budgeting*

- Existence of medium term planning framework and its integration to the budget.

- Inclusion in budget (or similar) for donor funded projects.

- Integration of recurrent and investment expenditures in budget.

- Nature of scrutiny and funding supplied by legislature, including its committees.

- Public access to key fiscal information.

Maximum score requires multi-year forecasts and the clear subsequent setting of annual budget ceilings; detailed information for a large share of donor-funded projects; consistently selected investments; coverage of fiscal policies and medium term fiscal framework by the legislature's review; and publicly available information on key fiscal aggregates, external audit reports, and contract awards.

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[10] Dabla-Norris et al (2011). See the paper for more detailed information on methodology.

3. *Project Implementation*

- Degree of open competition for award of contracts.

- Nature of any complaints mechanism relating to procurement.

- Funding flows during budget execution.

- Existence and effectiveness of internal controls, such as commitment controls.

- Effectiveness of system of internal audit.

Maximum score requires accurate data on the method used to award public contracts; an operative process for submission and timely resolution of procurement process complaints; the execution of more than 90 percent of the capital budget; broad expenditure commitment controls; and internal audits (that meet international standards) for all entities.

4. *Project Evaluation and Audit*

- Degree to which ex-post evaluations are conducted.

- Degree to which external audits are produced on a timely basis and scrutinized by the legislature.

- The maintenance of asset registers, and/or asset values.

Maximum score requires ex-post evaluations routinely performed by the auditor general or the executive; audited expenditures (should comply with auditing standards), including capital investments; and a complete and operational asset register.

# Appendix 3. Countries in the PIMI by Regions

**List of Countries in the PIMI**

| Asia/Pacific | Europe | Latin Americal and Caribbean | MENA/CCA | Sub-Saharan Africa |
|---|---|---|---|---|
| Bangladesh | Albania | Belize | Armenia | Benin |
| Cambodia | Belarus | Bolivia | Azerbaijan | Botswana |
| Indonesia | Kosovo | Brazil | Egypt | Burkina Faso |
| Lao PDR | Macedonia | Colombia | Iraq | Burundi |
| Mongolia | Moldova | El Salvador | Jordan | Chad |
| Philippines | Montenegro | Haiti | Kazakhstan | Congo, Republic of |
| Solomon Islands | Serbia | Jamaica | Kuwait | Cote d'Ivoire |
| Thailand | Turkey | Peru | Kyrgyz Republic | Djibouti |
| | Ukraine | | Libya | Ethiopia |
| | | | Mauritania | Gabon |
| | | | Pakistan | Gambia |
| | | | Qatar | Ghana |
| | | | Turkmenistan | Guinea |
| | | | Yemen | Kenya |
| | | | | Lesotho |
| | | | | Madagascar |
| | | | | Malawi |
| | | | | Mali |
| | | | | Mozambique |
| | | | | Namibia |
| | | | | Nigeria |
| | | | | Rwanda |
| | | | | Sao Tome and Principe |
| | | | | Senegal |
| | | | | Sierra Leone |
| | | | | Swaziland |
| | | | | Tanzania |
| | | | | Togo |
| | | | | Uganda |
| | | | | South Africa |

Source: IMF 2011

# ENHANCING QATAR'S EARLY WARNING SYSTEM[11]

*This paper discusses the set of tools that the authorities in Qatar could implement to enhance their current internal risk assessment. A comprehensive early warning system including regular stress testing and scenario analysis is key to maintaining financial stability. Given the IMF staff's assessment of risks facing the Qatar economy, as well as the Qatar Central Bank's (QCB) risk perception survey, more emphasis should be placed on early warning tools that focus on intersectoral linkages (e.g. the Balance Sheet approach). Deeper analyses of external, corporate, financial and fiscal sectors, asset prices, and enhanced data collection efforts would support the development of Qatar's early warning system.*

## A. Introduction

**23.      The IMF-FSB Early Warning Exercise—a prominent example of an early warning system—comprises a number of analytical tools and indicators along with qualitative analysis to survey systemic risks and vulnerabilities across advanced and emerging economies, across sectors, and financial institutions.[12]** The analysis is meant to signal trends that could potentially render countries or markets vulnerable to shocks. The early warning exercise studies the channels of transmission and the impact of contagion, and provides policy recommendations regarding tail risks. One of the value-added of this exercise is that it is by construction a multi-country approach. It provides an international view on risks and vulnerabilities that are helpful at the country level for own identification of vulnerabilities.

**24.      The building blocks of the early warning system involve the conduct of quantitative and qualitative analysis, vulnerability exercises, establishing key risks, and detecting the potential for spillovers and understanding their impact.** The toolkit includes indicators, models and judgment. It includes fiscal and external sector analysis, asset valuations, and crisis risk models. It focuses attention on systemic risk and contagion, and analyses financial sector vulnerabilities, and tail risks.  Spillover analysis involves the study of trade links, bank channel links, and network analysis. Finally, simulations via multi-country models complete the array of tools.  The list of tools and indicators by sectoral vulnerabilities is summarized in Appendix 4.

**25.      The risk assessment matrix produced for Qatar by the IMF team highlights a number of potential risks.** The principal sources of risks for Qatar are implementation risks related to infrastructure investments, prolonged period of slower growth in advanced and emerging markets, a surge in global financial market volatility related to exit from unconventional monetary policy, financial stress in the Euro area re-emerging due to delayed or incomplete delivery of Euro area policy commitments, and finally sustained decline in oil and gas prices due to deceleration of global demand and coming on stream of excess capacity in the medium term. The detailed account of the

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[11] Prepared by Céline Rochon.

[12] International Monetary Fund - Financial Stability Board (2010).

expected impact on the Qatar economy should these risks materialize are found in the accompanying Staff Report.

**26.** **The analysis below suggests that the Qatar authorities should implement an all encompassing approach to the early warning system which goes beyond their current study which focuses mainly on the financial sector.** In particular, it would be desirable to deepen the analysis of the external, corporate, financial and fiscal sectors, monitor the interlinkages across sectors, analyze asset prices, and enhance data collection efforts. The detailed recommendations can be found in section C.

**27.** **The overall exercise highlights a series of trade-offs: first regarding complexity vs. efficiency, but also time consistency vs. relevance, and absolute vs. relative vulnerabilities.** The early warning exercise is meant to identify vulnerabilities, but it is not meant to call the next crisis. Crisis prediction models have proven to be rather unsatisfying and the exercise must be thought of as a flag raising exercise, rather than an exercise in crisis prediction.

## B. Qatar's Context

**28.** **The macroeconomic and financial sector backdrop remains favorable.**

- Qatar has maintained strong growth over the last several years; the current account balance, trade balance, and budget surplus all remain high as a share of GDP.

- The banking sector is sound and robust, with adequate capital provisions. Delinquent loans are contained. Asset growth in the banking sector is driven by high public credit growth linked to the financing requirements for large scale infrastructure projects. That said, concentration of banking sector assets is high, with the top 3 banks accounting for about 64% of banking assets in 2012.

- Capital flows have been an important factor affecting liquidity conditions in a large number of economies, including Qatar, but on the whole, spillovers from global events have been limited since the hydrocarbon prices have remained high.

- Qatar has built substantial financial buffers through its sovereign wealth fund.

**29.** **The QCB conducts a survey among 18 banks to assess the perception of financial institutions regarding a variety of risk factors affecting the domestic economy.** These include: a) Global/regional factors, b) Macroeconomic conditions, c) Credit risk, d) Liquidity risk, e) Market risk, f) Operational risk. The results of the 2012 survey show that most banks have confidence in the stability of the banking system as compared to the previous year, and more than a quarter of banks felt that systemic risk to the domestic banking system has declined and will continue to decline. The political unrest in the MENA region and the global slowdown are major global/regional risks. Slowdown in the domestic economy and declines in real estate prices are prime macroeconomic risks. Default in repayment by top borrowers and default by real estate contractors are principal credit risks. Uncertainties in the international interbank markets represent the main liquidity risk.

**30.     The QCB's own risk assessment in the latest Financial Stability Review is consistent with these findings.** The strongest risk to growth outlook is seen as coming from oil demand and prices, which is in turn conditional on the recovery in the global economy. External financing risks could emerge as another important challenge, since interest rate differentials encourage corporations or households to borrow in foreign currency. However, global liquidity conditions could as well tighten from increased risk aversion due to fiscal problems in advanced economies, which would adversely impact project financing in Qatar.[13]

- **The QCB's risk analysis is supported by the newly** established **Financial Stability and Risk Control Committee (FSC)**. The FSC, which includes the two other key regulators (Qatar Financial Center Regulatory Authority and Qatar Financial Market Authority) is set to play an important role in Qatar's early warning system as it (i) studies emerging and potential risks of all financial services, operations, activities and markets and sets out solutions and proposals; (ii) coordinates between regulatory, control and supervisory authorities in the State of Qatar and works on enhancing cooperation and information exchange between these institutions; and (iii) proposes policies on regulation, control and supervision, financial services, operations, activities and markets, and submits its recommendations and proposals to the Board of QCB for approval and implementation.

**31.     The QCB uses four indices to measure the banking sector's resilience to liquidity stress.** (i) The Liquidity Stress Ratio (LSR), which provides a measure for the banking sector's dependence on the liability side liquidity,  allows to monitor risks to volatilities in short-term funds; (ii) the Core Funding Ratio (CFR) provides a measure of the proportion of core funds available to fund the total funded assets (i.e., total assets less equity); (iii) the Illiquid Asset Ratio (IAR) looks at the level of illiquid assets in the system; (iv) the Net Illiquid assets Funding Ratio (NIFR) examines the sufficiency of core deposits to fund net illiquid assets.

**32.     The QCB monitors financial depth and intermediation.**  The growth in the financial sector is assessed by computing bank asset to GDP, bank credit to GDP, and loan-to-deposit ratios, the latter providing a good measure of liquidity available for credit expansion.

**33.     The QCB Review examines the systemic importance of banks operating in Qatar**. This is done by analyzing four parameters:  asset share, share in domestic interbank liability, share in daily average volume of high-value payments in the Payments and Settlement system and the level of cross-border activity (share of individual bank's total assets outside the country). Some banks appear to dominate in terms of their cross-border presence, while others are important in terms of interbank activity or asset size.

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[13] Macroprudential measures such as higher risk weights, tighter loan-to-value ratios, and limits on foreign currency lending can mitigate the potential for default risk. Capital and reserve requirements may limit surges in credit growth.

**34.     The QCB has started to compute a Real Estate Price Index (REPI).** This index has been developed based on sale transactions registered with the Ministry of Justice, and information on REPI is published on a quarterly basis.

**35.     As part of its stability analysis, the QCB computes a banking stability index**.  This is an overall index of risk for the banking sector, constructed based on five risk factors of soundness, fragility, liquidity, profitability and inefficiency.

**36.     The QCB surveys a number of financial stability indicators**. It monitors leverage, credit growth, capital adequacy of banks, non performing loans, lending to government, cost-to-income and loan-to-deposit ratios, consumption credit in total private credit, credit to real estate in total private credit, net open position in foreign currency to Tier-1 capital.  In order to align with international standards, banks were advised to implement Basel III requirements pertaining to the Liquidity Coverage Ratio, Net Stable Funding Ratio and Leverage Ratio, and report on a monthly basis.

**37.     The QCB monitors credit, market, liquidity, concentration, exchange rate and systemic risks, and conducts various stress tests.**

- Credit risk is measured as the ratio of delinquent loans to gross loans, along with slippage ratios and incremental-ratios.

- For market risk, an earnings-at-risk exercise is used to assess the impact of an increase in interest rates on Net Interest Income of banks, as well as a study of the impact of a decline in equity markets on capital positions of banks.

- For concentration risk in customer deposits and credit accounts, the QCB measures the ratio of large exposures (total credit provided to top 10 customers except the public sector) to tier-1 capital.

- The QCB conducts a boom-bust scenario stress test of the banking sector.  This analysis allows the banks to adjust their capital base in light of the results.

- The QCB stresses the banking sector's credit portfolio. The test assumes high non performing loans levels to assess the impact on the household, services sector and real estate sector of external vulnerabilities.

- The QCB conducts a breakeven point analysis to test the banking sector's resilience to increases in credit risk**.** An increase in credit risk via increases in delinquent loans from the major private sectors - consumption, real estate and contractors - is assumed. Assuming banks have to provide provision at a given rate as a function of the total delinquent loans, the study examines the deterioration in capital level of domestic banks.

- The off-balance sheet exposures of the banking sector are subject to stress conditions to assess the associated movement in capital ratios of the banks and see whether the banks can maintain the minimum prescribed capital adequacy ratio.

- The QCB examines the customer funding gap, the public sector funding gap, and conducts a scenario stress test to assess the implications for bank liquidity of roll-over risk and risk of premature withdrawal.

- The QCB monitors systemic risk by conducting network analysis. The analysis shows that 5 out of 17 banks were systemically important within the system in terms of high asset exposures in 2012. It also monitors cross-border risks (cross border assets of domestic banks).

**38.      The QCB Review also considers SMEs, finance, investment and insurance companies**. The QCB performs corporate sector stress test involving the study of the impact of a 500bps interest rate shock, and monitors the depth and resilience of the equity market. In addition, Qatar Credit Bureau, a department within QCB, was established to collect credit information and improve access to credit.

## C.  Potential Areas for Enhancement and Recommendations

**39.      In light of the survey of the work conducted by the QCB in the previous section, a number of recommendations are gathered in this section.** One general observation is that the analysis of the QCB concerns different types of risk, or institutions, but it could go deeper in the assessment of intersectoral linkages. The recommendations below aim at providing a framework for the overall country assessment. To achieve this, the presentation of the tools will be done by sector, as in the IMF-FSB early warning exercise.

- **A first valuable exercise to perform is the Balance Sheet approach.**[14]  This approach provides cross-sectoral assessments of maturity, currency and capital structure mismatches, and it provides an indication of the likelihood that an adverse shock may get amplified in a systemic crisis. The exercise involves the simultaneous analysis of the balance sheets of the public, financial, non-financial and nonresident sectors to identify intersectoral linkages and transmission of shocks across sectors. For example, in the USA, the data needed to implement this approach could be found in the Federal Reserve's Flow of Funds statistics.[15]

- **External sector.** As in a number of emerging economies, capital flows have been a factor affecting liquidity conditions in Qatar during some specific episodes. The size and composition of cross border capital flows should be monitored frequently to assess the potential for reversals. Distinction between debt vs. non-debt creating flows, and public vs. private flows

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[14] See Allen *et al* (2002).

[15] See http://www.federalreserve.gov/releases/z1/current/z1.pdf

should be made. The impact of flows on financial sector reserves and domestic interest rates are worth assessing.

- **Fiscal sector.** The recommendations below are less relevant in the short term given the strong fiscal position of Qatar, but deserve consideration over the medium term.

  - Fiscal financing risk can be assessed by analyzing the amount of debt refinancing needs. The ratio of the stock of government debt to the average debt maturity monitors financing pressures.

  - The impact of shocks to growth, interest rates and the financial sector on the debt dynamics (fiscal balance and debt to GDP ratios) should be assessed.

  - Changes in banks' holdings of sovereign debt under a stress scenario can serve to assess the sovereign-bank linkages.

  - Volatility caused by the fiscal sector should be assessed by monitoring trends in government spending and their likely macroeconomic implications.

  - It may be useful to assess the probability of sovereign distress given distress in another country, using a measure of market-implied contagion (first compute marginal probabilities of default extracted from individual country CDS spread series, then compute joint and conditional probabilities of default, and finally compute a weighted sum of the probability of distress of each country given distress in the other countries)[16].

  - To ensure fiscal sustainability, the required fiscal adjustment to satisfy the intertemporal budget constraint and to stabilize the debt ratio in the long term can be computed.[17]

  - Debt sustainability analysis could also be conducted in order to determine the effect on the public debt to GDP dynamics of various shocks (e.g. interest rate, GDP). The data required for DSA includes GDP, inflation, public debt, public revenue and expenditure, interest rate on public debt and public debt composition.[18]

- **Asset price and corporate sector**. Upon collection of currently incomplete data, it would be advisable to deepen the real estate sector monitoring, by computing the ratios suggested in the IMF early warning exercise for the real estate sector.

  - For the residential real estate market, the analysis involves indicators of house price misalignment including the price-to-rent ratio, price-to-income ratio, and the use of a regression model of the changes in house prices, for example as a function of changes in

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[16] The methodology is described in Caceres *et al* (2010).

[17] International Monetary Fund (2012a).

[18] See International Monetary Fund (2002, 2003, 2011) for further details.

income per capita, short and long term interest rates, and the fraction of the working age population.

- Household balance sheet position (mortgage-debt-to-GDP, interest burden), mortgage market characteristics (loan-to-value ratio, lending standards), and the importance of real estate-related activity in the economy (estimated impact of house price drop on GDP) should be monitored. Data on housing vacancies by segment should be collected and monitored.

- For the commercial real estate market, capital value indicators (prime rents, vacancy rate), construction activity (permits, starts, and completions), construction value added and construction labor intensity are the main items to monitor.

- For the non-banking corporate sector, close monitoring (e.g. excess leverage, debt services burden, debt growth, lending standards and terms on credit) is important, and relies on balance sheet information for corporates. As an example, in the USA, the required information could be found in the Federal Reserve's Flow of Funds statistics.

- For listed firms, default probabilities can be computed using option pricing theory, by viewing the equity of a firm as a call option on the asset value of the firm. The method[19] requires traded equity data (equity value, equity volatility and equity return) or CDS, and balance sheet data (face value of debt and maturity structure).

- **Financial sector.** Credit growth needs to be closely monitored.[20] Crisis Prediction models provide measures of the probability of a financial crisis linked to excessive credit growth or private sector leverage, for example.

  - It would be important to establish a credit growth threshold as a function of, for example, liquidity and provisions, and potentially different for different groups of banks based on size, credit quality and corporate governance.

  - Increased reliance on market funding and increased issuance of debt securities lead to the need to monitor closely the evolving bond market.

  - Although stress testing for interest rate, exchange rate and asset price shocks is conducted by the QCB, aggregate measures of market volatility (e.g. regime switching volatility models[21]) could be considered. Such models rely on high frequency market-based financial time series to compute the probability of financial markets being in different regimes characterized by low, medium or high volatility.

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[19] See for example Kealhofer (2003).

[20] As a reference on credit booms, see for example  Bakker and Gulde (2010).

[21] Hamilton and Susmel (1994).

- In general, higher frequency risk monitoring may be advisable, as soundness indicators based on balance sheet data tend to be backward looking and do not account for default probabilities or correlation structures. Using models that integrate balance sheet data and market prices may be more adequate to estimate the impact of shocks on financial and real variables.

- **Contagion.** To complement its current analysis, the QCB could use Conditional-Value-at-Risk (Co-VaR, which measures the contribution of a financial institution to systemic risk)[22], joint distress indicators[23], and distress dependence analysis[24], based on the Selected Issues Paper on Financial Linkages across Banks in Qatar (IMF 2012b) where these methods were applied to Qatar. The first method requires high frequency market-based financial time series, the second relies on CDS spreads, equity prices, bond spreads, interbank financing cost spreads, while the third relies mainly on CDS spreads.

- **Other recommendations.** The QCB could collect data to better understand the liquidity and funding flows, and the sources and use of short-term funding. Secondly, the current systemic risk study of the QCB could be compared to the results of network analysis using the bank network framework of the IMF.[25] The data required to conduct this analysis include cross-border exposure data from the BIS. In addition, the results of the stress testing exercises could be used to assess the potential feedback effects from one sector to another, typically the financial sector to the macroeconomy. Also, the stress tests related to the fiscal sector could be corrected to account for the income generated by the Qatar Investment Authority. Finally, intensified cooperation among ministries and departments would facilitate enhanced data gathering and scenario analysis, and contribute to successful implementation of the early warning exercise.

## D. Conclusions

**40.     The Qatar's authorities have made substantial progress in developing their early warning system, but there is scope for further enhancements.** Given the IMF staff's assessment of risks facing the Qatar economy, as well as the Qatar Central Bank's (QCB) risk perception survey, more emphasis should be placed on early warning tools that focus on intersectoral linkages (e.g. the Balance Sheet approach). Deeper analyses of external, corporate, financial and fiscal sectors, asset valuations, and enhanced data collection efforts would also support the development of Qatar's early warning system.

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[22] See Adrian and Brunnermeier (2011).

[23] See Segoviano and Goodhard (2009).

[24] See Caceres *et al* (2010).

[25] See Espinosa-Vega and Sole (2010).

# Appendix 4. IMF-FSB Early Warning Exercise Toolkit: Models and Indicators[26]

| I- Sector and Market Vulnerabilities |
|---|

| A.  External Sector Risks and Vulnerabilities | |
|---|---|
| Cross-border capital flows | External financing gaps |
| External imbalances | Probability of an external crisis |
| Exchange rate misalignments | |

| B. Fiscal Risk and Vulnerabilities | |
|---|---|
| Rollover and financing risk | Sensitivity of public sector debt to adverse shocks |
| Market's perceptions of sovereign default risk | Contagion risk from fiscal distress |
| The required scale of fiscal consolidation | Probability of a fiscal crisis |

| C. Corporate Sector Risk and Vulnerabilities | |
|---|---|
| Leverage, liquidity and profitability | Stock valuation and default probabilities |

| D. Asset Prices, Market valuation and Bubble Spotting | |
|---|---|
| Real Estate Bubbles | Feedback loops between NPL & macroeconomic performance |
| Equity Market Bubbles | |

| E. Financial Market Risk Attitudes | |
|---|---|
| Global Financial Stability Map | Asset and Market Volatility |

| II- Country Risk Models |
|---|

| Crisis Risk Models | Crisis Duration Models |
|---|---|
| GDP-at-risk | |

| III- Drawing Systemic Implications |
|---|

| A. Spillover and Contagion Analysis | |
|---|---|
| Contagion/Spillover Tools using Financial Market Data | Contagion and Spillover Tools using Cross-Border Data |

| B.  Analysis of Large Complex Financial Institutions (LCFI) | |
|---|---|
| Vulnerabilities of Individual LCFIs | Country-level Measure of Bank Vulnerabilities |
| Systematic Risk and Distress Spillovers | |

| C. Global Scenarios | |
|---|---|
| The Global Projection Model (GPM) | Global Integrated Monetary and Fiscal Model (GIMF) |
| FISCMOD | A Panel Unobserved Components Model |

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[26] International Monetary Fund - Financial Stability Board (2010).

# IMF-FSB Early Warning Exercise Tools and Indicators[27]

- *External sector vulnerabilities*. These are detected by surveying external imbalances, notably trends in savings/investment balances at the country/sector level, current account balance, external debt thresholds, and cross-border capital flows. Balance sheets of Government, Central bank, and banks are scrutinized. For the study of exchange rate misalignments, the IMF uses the Macroeconomic Balance approach (MB), the Equilibrium Real Exchange Rate approach (ERER), and the External Sustainability approach (ES).

- *Growth and inflation risks*. Such risks are detected by observing whether growth is above or below potential, by analyzing output gap conditions, short term inflation forecasts and probability of growth slowdown.

- *Fiscal sector vulnerabilities*. Short term and medium to long term risks are studied separately. Short term risks are surveyed by using as indicators gross funding needs, market perceptions of sovereign default risk (via high frequency indicators based on sovereign CDS spreads and investors' expected losses in case of sovereign default), and distress dependence among sovereigns. For medium/long-term risks, the study focuses on medium and long term adjustment needs, vulnerability to growth and interest rate shocks, and medium term risks to public debt dynamics. The probability of large fiscal adjustment is computed.

- Asset prices and corporate sector vulnerabilities.

  - The analysis looks first at the real estate sector, both residential and commercial. For the residential real estate market, an index is constructed from indicators of house price misalignment (via the price-to-rent ratio, price- to-income ratio, and the use of a regression model), household balance sheet position (mortgage-debt-to-GDP, interest burden), mortgage market characteristics (loan-to-value ratio, lending standards), and the importance of real estate-related activity in the economy (estimated impact of house price drop on GDP). For the commercial real estate market, an index is constructed from capital value indicators (prime rents, vacancy rate), construction activity (permits, starts, and completions), construction value added and construction labor intensity.

  - *Equity price misalignment.* The equity price index is compared with model-implied values (dividend discount model, arbitrage pricing model), price-to-earnings ratio, cash flows, dividends, price-to-book value ratio, and deviation from historical average or from trend of fundamental variables that explain equity returns, and represent earnings risk (via forward earnings growth forecast), investor confidence risk (via monthly change in VIX), time horizon risk (via the slope of the yield curve), business cycle risk (via industrial

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[27] See International Monetary Fund - Financial Stability Board (2010) for complete details.

production index), inflation risk, exchange rate risk (via the nominal exchange rate), commodity price risk, market liquidity risk (via equity return volatility) and global market timing risk (via global market risk premium, not explained by the other risk factors).

- *Corporate sector balance sheets.* Indicators relate to profitability (return-on-assets), leverage (debt-to-asset ratio), liquidity (interest coverage ratio), default probability, and stock valuation (price to earnings ratio).

- *The financial sector.* The analysis is concerned by the credit cycle, where "growth" refers to the annual change in the credit/GDP ratio in percentage points (with a 5% growth rule of thumb) and "gap" refers to the deviation of credit-to-GDP ratio from a backward rolling trend, expressed in standard deviations. The analysis covers the deterioration of asset quality, fundamental bank credit risk, liquidity risk (with focus on spread between the term interbank rate (primarily LIBOR) and the OIS rate). An estimate of whether market is in low, medium or high volatility state (via a Markov-switching model) and a study of the level and volatility of the spread relative to pre-crisis experience complete the analysis.

- Large Complex Financial Institutions (LCFIs).

  - Fundamentals-based analysis for LCFIs involves selected financial soundness indicators to evaluate credit risk, models relating market CDS spreads to measures of risk on loan and trading books, profitability, cost efficiency of LCFIs to calculate fundamentals-implied CDS spreads, and debt maturity analysis to assess funding risks.

  - Market-based indicators for LCFIs include market CDS spreads (which provide the credit market investors' perspectives on distress risks), equity-implied CDS spreads (which provide the equity investors' perspectives on distress risks), equity options based measures of risk-reversals (which provide the market's assessment of future equity price changes -- buying or selling pressures).

- *Contagion analysis.* The analysis concentrates first on financial sector exposure/bank channel, and notably cross-border balance sheet exposures, off balance sheet exposures, rollover risk from cross-border and foreign creditors, and secondly on trade exposures, notably exposures to downturn in countries that supply imports, and export markets. Scenarios about the likelihood of crisis in countries of exposure are evaluated.

- *The global financial stability map.* The analysis combines an array of potential sources of instability and contagion among different segments of financial markets, including macroeconomic risk, credit risk, market and liquidity risks, emerging market risk and risk appetite. It also computes a measure of global price of risk, to assess whether an increase in the risk premium of an asset reflects a generalized repricing of risk or an increase in the riskiness of the asset itself.

- *Event risk.* The exercise considers three types of crises:

- Financial Crisis — defined as either a systemic banking crisis or a currency crisis[28].

- Growth Crisis — which corresponds to a significant slowdown in growth relative to trend (difference between year *t* and *t-5* to *t-1* average in the bottom 5 percent of the sample as a whole).

- Fiscal Adjustment — which is typified by an increase in the cyclically adjusted primary balance/GDP of at least 2.5 percentage points, from a negative balance of at least 2.5 percent, during the course of the year.

- *Scenario analysis.* This is based on the Global Risk Assessment Matrix risk scenarios. Shocks are calibrated, and simulations are conducted using global macro models: G20/G35, with emphasis on trade and financial spillovers.

- *Political risk.* Political stress, government instability and socio-economic conditions may each constrain policy (e.g. youth unemployment, ethnic tensions, internal conflicts, GINI index, democratic accountability), hence the need to monitor political risk as part of the exercise.

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[28] See Laeven and Valencia (2008).

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