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Abstract

The substantial delay in publishing national accounts (namely the Gross Domestic Product, GDP) and thus economic growth (g) in developed and developing countries cripples financiers' and statesmen's ability to take critical, timely monetary policy, fiscal policy, and investment -decisions. This market gap is partially corrected with delayed GDP data, knowing that GDP has been the primary macroeconomic measure to assess the health of an economy. However, a modern yardstick known as the Purchasing Managers' Index (PMI), also emerged as a leading indicator to forecast economic (GDP) growth. Such a finding may improve quantitative assessments of any economy's health and facilitate the international comparison of related data. Yet, historically, academic scholars have recorded controversial input on how much the GDP measure is representative and accurate in capturing the health of an economy.

This paper aims to tackle the existing data gap in the market as it analyzes the correlation of PMI to economic growth. The study will scrutinize existing literature on the topic and apply the findings on Lebanon's PMI figures from 2013 to-date. By doing so, the study will derive and calculate Lebanon's national growth rates and cross-compare them with the existing official statistics and projections for verification purposes.

The Purchasing Managers' Index

The Purchasing Managers' Index (hereafter: PMI) is a modern business confidence yardstick believed to have predictive powers of GDP growth. The GDP has historically been the godfather of all macroeconomic variables and used by academics and policy-makers as a primary measure of economic activity and serving as a gauge for the country's standard of living. However, economists and politicians began to adopt alternate indices to overcome the lack of official, timely data in the market. Namely, the PMI is a modern, influential business confidence measure that enables applied

economists, bankers, financiers to directly measure the growth of economic activity in a country's private sector. In-depth empirical studies also revealed that the monthly PMI can offer an optimal prediction of economic growth in the whole economy.

The PMI model is a composite index. The PMI is a business confidence indicator released by IHS Markit (Nasdaq: INFO), a global leader in the provision of critical analytics and expertise solutions for major industries (markets) driving global economies. The PMI is constructed from monthly surveys targeting the private sector and is constituted of five major sub- indicators: New orders, Factory orders (production), Employment environment, Suppliers' delivery times, and Inventory levels. Markit's PMI is available every beginning of month, the reason why many researchers confirm that PMI can carry useful information predictions of GDP growth as will be explored in the literature review section.

Some scholars confirm that PMI is a leading indicator of economic activity because of its timeliness and monthly availability. The PMI is a leading indicator that's available monthly, comparable on a quarter-to-quarter basis, and can thus offer central bankers, players of the financial markets, and policy-makers an accurate snapshot on how factories are coping with the existing economic environment. The PMI can be: a Manufacturing (industry) PMI, Services PMI, or a Global PMI measure. In short, an index reading of "50.0" or above generally indicates that the number of respondents who reported "improved" economic conditions compared to the previous month, is larger than those reporting "deteriorated" business activity. In other words, PMI above 50 signifies an expansion in the private sector, while readings below the 50 mark signal a slowdown.

Literature Review: PMI, a tool to forecast output growth?

The literature reviewed on PMI and its ability to accurately predict economic growth mainly used either univariate or multivariate methods to explore the correlation empirically. In details, the majority of the works revealed a strong and significant positive correlation between the two economic barometers. This verifies that PMI is a crucial leading indicator of GDP growth and can therefore partially restore the official data market gap. Nonetheless, a smaller number of scholars empirically proved that the correlation is not perfect and even absent.

The PMI conveys useful information about real GDP growth. According to Koenig's univariate analyses (2002), the PMI's two advantages are: timeliness and preservation of "real time" data, both of which drive optimal performance of any GDP-growth forecasting models applied. In addition, Koenig empirically proved PMI is a valuable tool to track the health of the US manufacturing sector and thus GDP growth.

Rising PMI levels engender stronger (positive) GDP growth. Koenig's findings (2003) also reveal that above certain thresholds, PMI spurs positive growth. In fact, Koenig delves into the data gap that policymakers face with the considerable delay in the publication of official statistics (namely GDP figures) while leaders' national decisions necessitate accurate, timely data for optimal monetary and fiscal decisions. Therefore, statesmen resort to the exploitation of alternative

techniques for the “best” GDP estimate, such as PMI, which turned out to be only “*seasonally*” adjusted, if at all. So the PMI bears no risk of “*large revisions*” and thus the findings’ consistency is safeguarded from economic distortions.

PMI data is real-time which creates reliable forecasts for output growth. Orphanides (2002) corroborated Koenig’s findings. He explains that PMI is the only variable available “*consistently*” every beginning of the month, given it utilizes collected responses from the private sector managers from the month before. Such regularity makes the PMI unique, as it ensures that the parameter’s monthly values preserve their “*real-time nature*”- a feature crucial for accurate results in almost all forecasting models.

Moreover, the US manufacturing PMI gauges the overall US economic activity. The works of Harris et al. (1991 and 2004) complemented by Rogers’s studies (1992) explored the expediency of PMI indicators, whereby Harris, consistent with Koenig, particularly brings forth evidence that PMI is a good gauge for the US economic activity. Harris further argued that the PMI’s sub-components capture output growth trends, filtering out the transitory variation. By doing so, it can largely anticipate the US economic activity.

As per Kilink and Yusel (2016), “[...] PMI can serve as a strong candidate to provide information for GDP growth forecasts.” D’Agostino and Schnatz (2012) also conducted a real-time forecasting exercise whose findings demonstrated the PMI’s efficacy in assessing the USA’s real economic activity in the current quarter (method known as ‘nowcasting¹’) by conveying valuable and timely information on the USA’s GDP and industrial production.

In addition, some literature moves beyond univariate benchmark models to judge the PMI’s effectiveness vis-a-vis dynamic factor models’s forecasts (multiple variables). Key evidence is presented by Lahiri and Monokroussos (2013) and Lindsey and Pavur (2005) on this. These scholars unanimously agreed that PMI’s “*marginal contribution*” to predicting GDP changes was actually “*substantial*”.

On PMI in the Euro Area, some studies highlighted the predictive power of PMI on GDP growth. A strand of literature by Akkoyun and Gunay (2012), Vermeulen (2012), and Eren (2014) proved PMI is among the most important leading indicators carrying significant information that can infer a “reliable growth forecast”. Their works also empirically proved that beyond a particular PMI threshold (50.0 as per their studies), GDP growth is positive.

For some academics, PMI is not a “perfect” indicator of a country’s economic condition. For instance, Chien and Morris (2016) from the Federal Reserve Bank of St. Louis examined how well PMI tracks GDP. They particularly compared the PMI and growth indicators in each of China and the USA. As such, bottom line findings showed that the PMI levels and GDP growths were positively correlated, yet the correlation is not perfect.

¹In economics, the term “nowcasting” refers to methods that forecast the current state of the economy and developments in the short term, and it has become increasingly popular since Giannone, Reichlin and Small (2008) and Evans (2005).

On the counterpart, a minority of academics refuted the correlation between PMI and GDP growth. For instance, Sabnavis and Ranadive (2017) in their study inferred that relying completely on the manufacturing and services PMI falsifies judgement on economic growth. They add that sentiments gauged via PMI and GDP are disconnected.

Global PMI Correlations: Reference Level & GDP Growth

In parallel to the presented academic backdrop that mainly proves PMI is a good predictor of growth, Markit conducted a study on its Global PMI measure per region in Q1 2017 through which it revealed interesting contrast between PMI reference levels and GDP growth rates among the different regions of the world.

The PMI 50 threshold effectively correlates on average with zero GDP growth, yet the correlation does not hold across countries. According to Markit, the widely accepted PMI postulate states that the 50 reference level represents the economic expansion threshold and therefore correlates on average with zero-GDP growth in the USA and the United Kingdom (UK).

By contrast, this correlation does not hold in emerging markets (EMs) or the Eurozone. In EMs, Markit's study demonstrates that the 50 balance corresponds to a positive 4.3% growth. Similarly, in the Eurozone alone, the 50 mark corresponds to a growth rate at approximately 0.3% to 0.4%.

China and Japan's 50 mark accounts for positive growth rates reflecting their robust economies. The estimated growth rates in each of China and Japan for the 50 PMI benchmark stood at approximately 6.8% to 6.9% and 0.8% to 1% positive annual growth rates, respectively, as per Markit. It is interesting to note that China's growth has been so strong in the past two decades so a PMI of 50% which explains the aggressive 6.8% growth associated to it.

PMI in Lebanon & Economic Growth "g"

In Lebanon, the PMI's importance as a leading indicator is magnified and crucial. Official data on Lebanon's GDP is annual and its publication is much delayed. Moreover, quarterly data on Lebanon's GDP is non-existent. Therefore, the importance of a leading indicator which can measure economic growth in the country is magnified, given such a measure can offer decision makers the timely data needed for national decisions and actions.

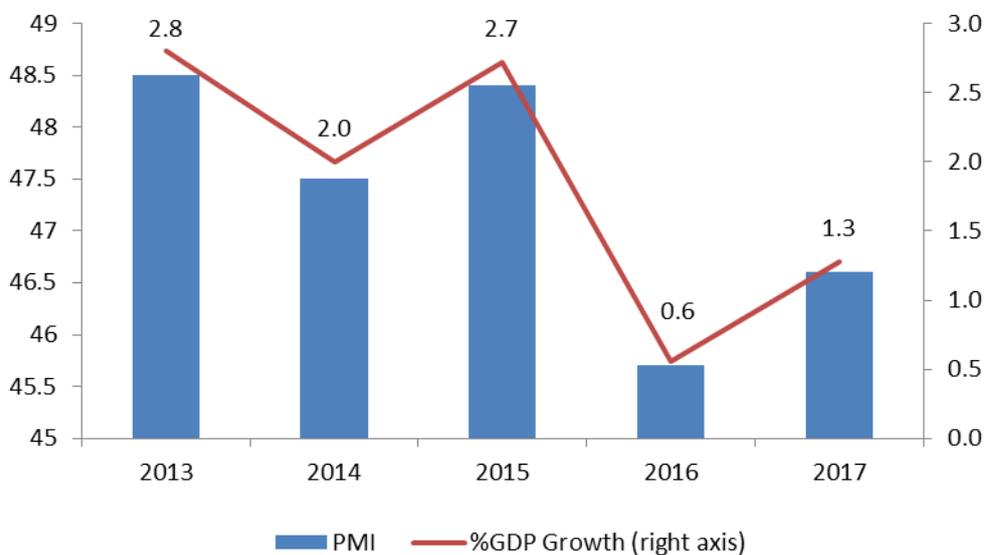
The BLOM Lebanon PMI (compiled by Markit) is calculated as a weighted average of five individual sub-indices. The weighted sub-components are: New Orders (30%), Output (25%), Employment (20%), Suppliers' Delivery Times (15%) and Stocks of Purchases (10%). Similar to the PMI barometer used globally and discussed earlier in the paper, a PMI reading above 50.0 in Lebanon signals an "improvement in business conditions" on the previous month, while readings below 50.0 show "deterioration".

The BLOM Lebanon PMI basically surveys the purchasing managers of more than 400 private sector companies. Released one week before the end of every survey period, the BLOM Lebanon

PMI provides the earliest indication every month of business conditions at Lebanon’s core private manufacturing, services, construction and retail companies. It is also worth noting that the PMI questionnaire targets the private sector only, knowing that the public sector also plays an eminent role in nurturing or curbing economic growth.

Applying Markit’s 2017 postulate on PMI reference levels onto Lebanon, the zero growth mark corresponded to a PMI mark of 45 rather than 50. Using the emerging markets’ PMI 50 mark, corresponding to a growth rate of around 4.3% (Markit, 2017), we deduce that the zero GDP growth correlates to a PMI mark of 45, as per the following:

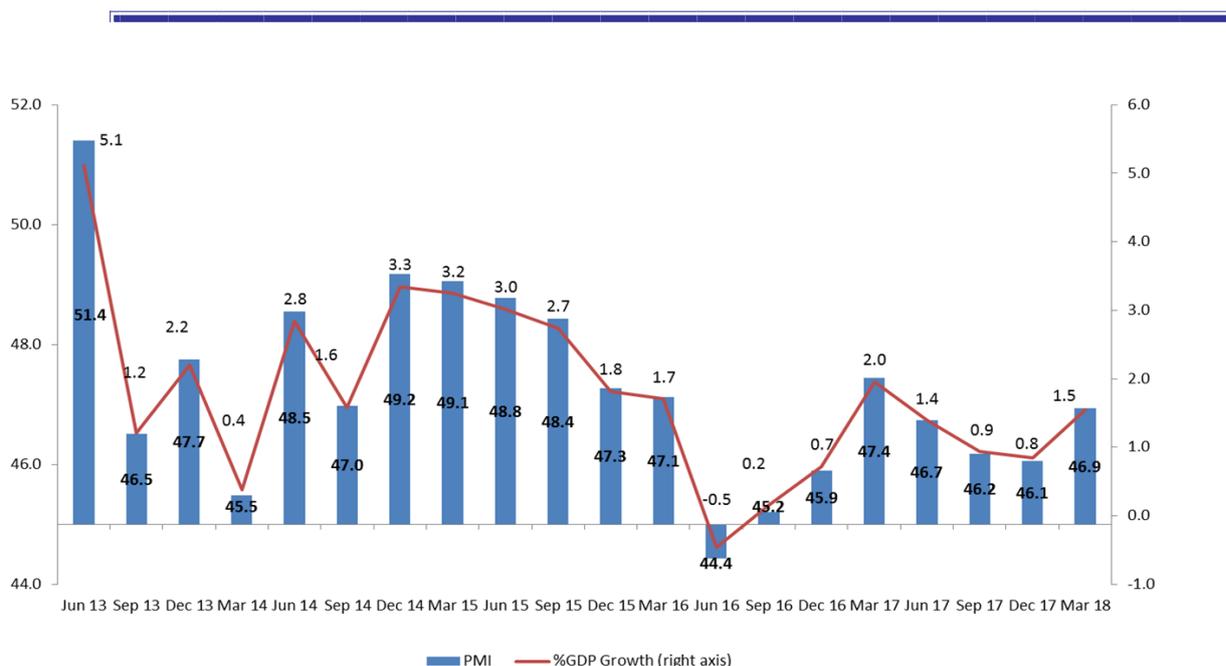
Lebanon: Annual PMI predictions of GDP growth



Source: BLOM Markit PMI; BLOMInvest Calculations

In fact, at the PMI “45” benchmark in Lebanon, the GDP growth rates in light of the paper’s findings computed for 2013, 2014, and 2015 stood at 2.8%, 2%, and 2.7%, respectively. In comparison, the rates recorded by Lebanon’s Central Administration of Statistics (CAS) for the same years stood at 2.6%, 2%, and 0.8%, respectively. As such, we conclude that only 2015’s rate diverged from the figure provided by CAS, but this last is expected to be revised once 2016’s data for Lebanon’s GDP is available. As for economic growth in the subsequent years where national accounts are not available, the computed rates are very close to the IMF’s 1% and 1.2% GDP growth for 2016 and 2017.

Lebanon: Quarterly PMI predictions of GDP growth



Source: BLOM Markit PMI; BLOMInvest calculations

Testing the paper’s findings on Lebanon, the quarterly data on the PMI indeed emulated the economic growth projected for the period. In Q2 2016, Lebanon was witnessing heightened pressures from the Syrian spillovers on the economy alongside elevated political bickering regarding the election of a first president since 2014. As such, economic growth registered a -0.5% contraction in real GDP and the PMI slipped from 47.1 in the previous quarter to 44.4 by June 2016. In contrast, Q1 2017 recorded a 2% growth rate on the back of the positive ramifications of the election of a president in Q4 2016. Meanwhile, the PMI followed suit as it grew to 47.4 compared to 45.9 in the previous quarter. Similarly, Q1 2018 recorded a PMI of 46.9, up from 46.1 in the previous quarter, given the growth rate rose to 1.5% by March 2018 from 0.8% in the previous quarter.

However, the information capacity of PMI is asymmetric, which results in different responses of GDP to PMI below and above threshold. Analyzing the quantitative potential of PMI to forecast GDP growth, studies partly justify why growth rates sometimes are in negative territory while PMI is positive or vice versa. In Lebanon, it is not the case but some of Markit’s 2017 figures in the US especially show this discrepancy. In fact, this can be partly linked to seasonal changes or one-off items (like particularly high exports). It may also be partly justified by the fact that PMI is a soft variable based on the biased, subjective input of business managers on their own firms which may outweigh the shrinking economic activity.

Wrap Up

The PMI seems to provide a solid base to estimate GDP growth. It can constitute an important indicator for policy-makers to take action based on the PMI level rather than waiting for delayed or insufficient official data especially on annual and quarterly GDP figures.

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