Consumer Data Research Centre

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Barbour ABI

Providing construction intelligence to UK businesses

Analysing Output and New Orders Time Lags in the Construction Industry with Gated Recurrent Units

Surana, Nipun
The University of Leeds, Barbour ABI

1. Background and Motivation

In the UK's construction industry, there's limited understanding of the time gap between **new orders** and the actual delivery of construction (**output**) work. These gaps vary across *sectors* and *financing methods*. It's crucial for stakeholders to comprehend the dynamics of new construction work, particularly in light of **economic shocks, with** two in the last two decades: the *2008 global financial crisis* and the *COVID-19 pandemic*.

For instance, a new housing project in an area with limited competition can be a lucrative opportunity for a retail grocery chain, though with a *delayed realization* of benefits.

Barbour ABI, a prominent provider of construction market intelligence in the UK, is dedicated to analysing how output timelines differ across sectors and financing models. This analysis provides valuable insights to its customers who rely on data-driven decisions.

2. Data and Methods

Barbour ABI's new orders data is categorized by sector and financing methods. This data, along with macroeconomic indicators such as **Gross Value Added** (GVA) and **Construction Output Price Indices** (OPIs) from the Office for National Statistics (ONS), is used to model the ONS's construction output data for the quarterly period spanning from **2000 to 2023 Q2**. All data points have been adjusted for *seasonal variations*, and additionally, new orders and output are adjusted for *inflation*.

The construction output data is sporadic and is influenced by exogenous factors from previous time steps. To handle this complexity, the study employs deep learning models, specifically the Gated Recurrent Unit (GRU). Also, the **quarter-on-quarter growth** of GVA and OPI results in improved performance of the model. The data is scaled using normalisation. Given that different exogenous variables exhibit varying temporal effects on the output. For those exogenous variables with **short-term temporal effects**, we pad their input vectors with zero values. This **padding** is applied in consideration of our feature scaling methodology, enhancing the accuracy of our model's predictions.

3. Key Findings

a) Table 1 shows how many previous quarters are significant for the model in determining output.

Feature	Lag
Public Housing	8
Private Housing	4
Infrastructure	24
Other Work	8
Private Industrial	10
Private Commercial	5
Change in GVA	2
OPI	4

Table 1: Temporal effects of each feature

b) It was found that **public-funded** projects have **higher** conversion periods than **private** projects.

c) Through EDA, it was found that during economic shocks, funding from public housing is cut down to fund other works and infrastructure expenditures to stimulate economic activity.

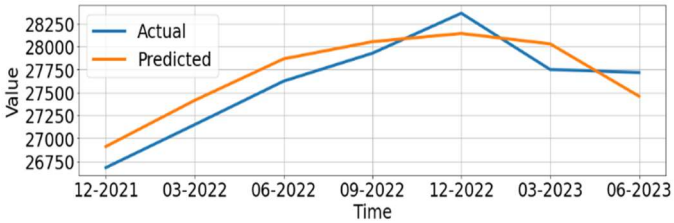

Figure 1: Actual vs. Predicted Output of the GRU model

d) Figure 1 shows model predictions are reliable to estimate and forecast construction output.

4. Value of the research

The findings are pertinent to Barbour ABI's diverse clientele, including both private and public entities seeking insights into the UK construction industry. This understanding and forecasting of construction activity empower clients to make informed, proactive, data-driven decisions.