

# Empirical Evidence from the Financial Market: A Factor-Conditional GAN for Return Prediction

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We develop a Factor-Conditional Generative Adversarial Network (FC-GAN) for return prediction in financial markets. In contrast to conventional GAN frameworks, which are largely model-free, the proposed model embeds financial domain knowledge into the neural network architecture by conditioning on asset-pricing factors. The objective is to improve predictive performance by combining the flexibility of deep generative modeling with the economic structure provided by factor-based information. Empirical evaluation demonstrates that FC-GAN consistently outperforms standard benchmark models, including the Fama-French five-factor model, in return prediction accuracy. In addition, backtesting results show that portfolios constructed from FC-GAN forecasts achieve higher risk-adjusted returns than conventional investment strategies. Overall, the results indicate that FC-GAN offers an effective and scalable framework for combining financial domain knowledge with deep generative models in return forecasting.