

# Modelling Macroeconomic Resiliency in Response to External Incidents

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**Abstract.** This paper derives a macroeconomic resilient control framework that provides the optimal feedback fiscal and monetary policy responses in response to a potentially large negative external incident. We simulate the model for the U.S. under the conditions that prevailed throughout the 2020 economic crisis that occurred due to the government lockdown that was caused by the Covid-19 pandemic. We develop a discrete-time soft-constrained linear-quadratic dynamic game under a worst-case design with multiple disturbances. Within this context, we introduce a resilience feedback response and compare the case where the policymakers counter in response the external incident with the case when they do not counter. This framework is especially applicable to large-scale macroeconomic tracking control models and wavelet-based control models when formulating the magnitudes of the policy changes necessary for the unemployment rate and national output variables to maintain acceptable tracking errors in the periods following a major disruption. Our policy recommendations include the maintenance of “rainy day” funds at appropriate levels of government to mitigate the effects of large adverse events.

**Keywords:** Linear-Quadratic, Minimax, Resilience Control, Wavelet Analysis

**JEL classifications** C61 . C73 . E58 . E61