Research Statement

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My research pursues three strands. The first concerns **weak identification in structural econometrics**. Any conclusion is only as strong as the assumptions that support it. Confidence intervals on parameter estimates rest on maintained assumptions about identification, sampling, and asymptotic theory; when the data carry little information about the structural parameters, i.e. they are only weakly identified, those assumptions are undermined and conventional inference is uninformative about the true parameter uncertainty (see e.g. Lewbel, 2019). This has been studied theoretically in the weak-IV and weak-GMM literature (Staiger and Stock, 1997; Stock et al., 2002; Andrews et al., 2019; Andrews and Mikusheva, 2022) and documented for the New Keynesian Phillips Curve (Mavroeidis et al., 2014) and DSGE models more broadly (Canova and Sala, 2009). My work detects these problems in structural settings and develops methods that deliver robust conclusions.

The second concerns **heterogeneous firms and macroeconomic dynamics**. Integrating heterogeneity into macroeconomic models has been a defining development of the past three decades. On the household side, the Krusell and Smith (1998) framework and its modern HANK descendants (Kaplan et al., 2018) form an active literature. On the firm side, evidence on rising concentration and markups (De Loecker et al., 2020; Autor et al., 2020) shows the firm distribution matters for aggregates, yet the firm-side equivalent is still developing: recent work embeds heterogeneous firms with financial frictions in general equilibrium (Ottonello and Winberry, 2020), but endogenous entry, exit, and strategic interaction remain computationally and conceptually challenging. My work contributes to this developing literature: I embed industry-dynamics models with endogenous entry, exit, and strategic interaction in general equilibrium to study how aggregate shocks and financial conditions reshape market structure and welfare.

The third concerns **microdata and macroeconomic aggregates**. This strand is closely related to the second but aims at empirical analysis. Many macroeconomic questions, e.g. how an energy-price shock transmits to aggregate employment, or why measured productivity differs across countries, cannot be answered from aggregate data alone: answering them requires micro-level structural parameters and a model of how they aggregate to macro outcomes. My work estimates structural and technological parameters from disaggregated European data and combines them with explicit aggregation frameworks to quantify the macroeconomic outcomes; the two projects below apply this approach to euro-area labour demand under energy-price shocks and to cross-country firm-level productivity.

Below, I describe current projects in each strand.

1. Weak Identification in Structural Econometrics

Weak Identification Robust Methods for Production Function Estimation. Control-function methods (Olley and Pakes, 1996; Levinsohn and Petrin, 2003; Ackerberg et al., 2015) proxy for latent productivity using observable firm decisions. I show these estimators are subject to structural sources of weak identification, and develop an identification-robust toolkit, building on Angelini et al. (2024); Stock and Wright (2000); Kleibergen (2005), that integrates into the standard OP/LP/ACF workflow, flagging when conventional inference

is unreliable and delivering confidence sets valid regardless of identification strength. Estimated elasticities feed into downstream quantities, notably markups (see De Loecker and Warzynski, 2012), so weak identification passes directly into markup estimates. Propagating the robust bounds, I show that the markup literature's conclusions on the level and dispersion of market power hinge on the identification strength of the data. A companion project studies identification when the control function is noisy: measurement error in the proxy breaks the invertibility OP/LP/ACF rely on, and I characterise what remains identified and how the parameters can still be estimated.

Robust Monetary Policy under Weak Identification. I derive monetary policy that is robust to parameter and identification uncertainty. Standard analysis presumes the policymaker knows the model and its parameters; in practice, the parameters of DSGE models are hard to identify from aggregate data (Canova and Sala, 2009; Mavroeidis et al., 2014). When identification is weak or the parameters set-identified, plug-in policies that implement the policy optimal at the point estimate are misguided: small data perturbations produce large swings in the implied policy. Building on Andrews and Mikusheva (2022), I replace the policy optimal at the estimated parameter with the optimal *decision rule* — the map from data to policy that is optimal under weak identification. I apply the method to U.S. data and confirm that the concern is empirically relevant.

2. Heterogeneous Firms and Macroeconomic Dynamics

Heterogeneous Firms Model with Capital Accumulation and Endogenous Entry and Exit. Building on Ericson and Pakes (1995), I embed an industry-dynamics model, with heterogeneous firms, endogenous entry and exit, and strategic interaction, into a general-equilibrium macro environment. Firm profits depend on aggregate prices and demand, which in turn depend on the equilibrium distribution of firms; equilibrium is a fixed point in which market structure becomes an endogenous, slow-moving state that propagates aggregate shocks. The central application asks how financial frictions reshape market structure: tighter financing depresses entry and incumbent investment, raises exit, and shifts the firm distribution toward higher concentration and markups, with effects that outlast the shock. Because the model has a high-dimensional state, I solve it using structural reinforcement-learning techniques in the spirit of Yang et al. (2025): firms condition on a low-dimensional summary of market structure rather than the full distribution.

3. Microdata and Macroeconomic Aggregates

Energy Prices and Labour Demand. At the European Central Bank, I study how energy-price shocks transmit to labour demand in euro-area sectors. The total effect splits into a substitution channel, within-sector input re-optimisation at fixed output, and a scale channel, output contraction as higher energy costs pass through to prices. Following the identification strategy of León-Ledesma et al. (2010), I estimate the substitution channel from the cost-minimising first-order conditions of a nested-CES production function in capital, labour, and intermediate inputs: in log-linear form each condition separates the elasticity from factor-augmenting technical change, and panel cointegrating regression delivers super-consistent estimates in short samples. The scale channel is a general-equilibrium object, characterised through the production-network framework of Baqaee and Farhi (2019), in which low substitution elasticities amplify the aggregate output loss. Combining the micro elasticities with the network structure delivers the aggregate response and enables comparative statics to inform policy.

TFP in European Countries. With Marco Miorandi, I estimate total-factor-productivity

(TFP) distributions across European countries from firm-level microdata in the Microdata Infrastructure (MDI). A long tradition attributes the cross-country income gap to differences in aggregate TFP, but aggregate measures cannot reveal where in the firm distribution those differences originate, nor whether they reflect frontier productivity, dispersion, or misallocation. We characterise the full distribution of TFP across firms, regions, and sectors, capturing heterogeneity that aggregates obscure. We document productivity growth dynamics, quantify the role of factor misallocation in cross-country income differences, and identify systematic sources of variation in firm efficiency.

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