

# Plano de Ensino

Dados de Identificação	
Disciplina:	Tópicos Especiais em Análise Econômica (Macro Quantitativa)
Período	2º / 2021
Professor:	Tomás R. Martinez tomas.martinez@unb.br <a href="https://tomasrm.github.io/">https://tomasrm.github.io/</a>
Horário e local:	Terça e Quinta às 16:00-18:00
Carga Horária	60 horas (4 créditos)

## 1 Objetivos e Descrição do Curso

O curso tem dois objetivos principais: (i) familiarizar o estudante com a pesquisa de fronteira na macroeconomia com agentes heterogêneos, e (ii) proporcionar as ferramentas necessárias para solucionar esses modelos computacionalmente.

O curso será dividido em dois grandes “módulos”. No primeiro, estudaremos heterogeneidade no nível da família. Utilizaremos modelos com mercados incompletos onde a distribuição de riqueza da economia é endógena, e choques econômicos individuais (renda, emprego, saúde) tem fortes implicações para o consumo das famílias/agentes. Políticas públicas como tributação, seguro desemprego, e previdência terão impactos de primeira ordem no bem-estar das famílias.

No segundo, estudaremos heterogeneidade no nível da firma. Utilizaremos modelos de *firm/industry dynamics* e de empreendedorismo (*occupational choice*) para estudar as decisões de emprego, investimento, inovação, entrada de mercado, etc, e suas implicações macroeconômicas.

Finalmente, discutiremos como levar esses modelos aos dados (em particular, no uso de métodos de inferência causal em macro), e em caso que haja demanda, métodos computacionais de solução em tempo contínuo e modelos HANK (*Heterogeneous Agent New Keynesian*). O conteúdo do curso é adaptável, e podemos dedicar mais ou menos tempo a um assunto dependendo do interesse dos estudantes matriculados.

## 2 Metodologia e Avaliação

A dinâmica do curso será a seguinte: o professor apresentará os modelos e os métodos computacionais para solucioná-los. Os estudantes entregarão listas de exercícios (4 ou 5) onde irão resolver os modelos básicos no computador (em uma linguagem de programação da sua escolha), farão uma apresentação de um artigo a escolha, e ao final do curso entregarão um projeto de pesquisa.<sup>1</sup>

1. Lista de Exercícios (em grupo) (40%)
2. Apresentação (individual) (20%)

<sup>1</sup>Exemplos de possíveis artigos para apresentação na parte de “outras aplicações” do conteúdo programático. O estudante também pode sugerir um artigo que pode ou não ser aceito pelo professor.

### 3. Proposta de Pesquisa (individual ou em dupla) (40%)

O requisito mínimo para seguir o curso é ter feito um curso inicial de Macroeconomia ao nível da pós-graduação e ter noções de programação dinâmica. Como o curso requer apresentações de estudantes e do professor, a presença durante a aula será exigida e seguirá as normas da universidade.

## 3 Material

O curso será baseado em artigos (as leituras obrigatórias estão marcadas com \*). Alguns livros podem ser úteis para determinados tópicos em métodos computacionais.

- **Ljungqvist, Lars and Thomas J. Sargent. 2004. *Recursive Macroeconomic Theory*:** Referência básica para programação dinâmica. Tem um capítulo dedicado para o modelo de Huggett-Aiyagari.
- **Sargent, Thomas and John Stachurski. 2021. *QuantEcon*:** Introdução open source para aprender a programar em Python e em Julia. <https://quantecon.org/>
- **Heer, Burkhard and Alfred Maussner. 2008. *Dynamic General Equilibrium Modeling*:** Ótima referência para métodos aplicados a modelos de agentes heterogêneos.
- **Fehr, Hans and Fabian Kindermann. 2018. *Introduction to Computational Economics using Fortran*:** Para os que querem se aventurar em Fortran. Útil mesmo se você programa em outra linguagem, já que os algoritmos são claros e bem explicados.

Outros livros podem ser úteis em outras aplicações: Judd (1998) é a enciclopédia básica de economia computacional. Canova (2007) é ótimo para DSGE e séries temporais. Miranda and Fackler (2002) é uma boa referência com Matlab.

## 4 Conteúdo Programático

### 1. Heterogeneidade na Família

- (a) Desigualdade de renda e de riqueza: O modelo de Bewley-Huggett-Aiyagari-Imrohoroglu. [Aiyagari \(1994\)\\*](#), [Guvenen \(2011\)\\*](#), [Heathcote et al. \(2009\)](#).
- (b) Desigualdade de Consumo, Renda e Riqueza durante o ciclo de vida. [Storesletten et al. \(2004\)\\*](#), [Huggett et al. \(2011\)](#), [Kaplan and Violante \(2010\)](#).
- (c) Além do *Stationary Equilibrium*: Dinâmicas de transição e choques agregados. [Krusell and Smith \(1998\)\\*](#), [Boppart et al. \(2018\)\\*](#), [Krueger et al. \(2016\)](#), [Algan et al. \(2014\)](#).
- (d) Métodos Computacionais: Endogenous Grid Method; Discretização do processo estocástico (Tauchen & Rowenhorst); Non-stochastic simulation of the Stationary Distribution; Algoritmo de Krusell & Smith; Método de Reiter.
- (e) **Outras Aplicações:** Consumption and Income Inequality ([Krueger and Perri, 2006](#)); Long Run Trends in Hours and Income Inequality ([Heathcote et al., 2010](#)); Social Security ([Conesa and Krueger \(1999\)](#), [Fuster et al. \(2007\)](#)); Labor and Capital Taxation ([Conesa et al. \(2009\)](#), [Guvenen et al. \(2014\)](#)); Wealth Inequality ([De Nardi and Fella \(2017\)](#), [Quadrini \(2000\)](#)) Fiscal Policy and the Wealthy hand-to-Mouth ([Kaplan and Violante, 2014](#)); Human Capital and Education ([Lochner and Monge-naranjo \(2011\)](#), [Abbott et al. \(2019\)](#)); Family Economics ([Greenwood et al.](#)

(2016), Barczyk and Kredler (2018), Voena (2015)); Progressive Taxation (Heathcote et al. (2020), Boar and Virgilu Midrigan (2020)); Risk and Income Dynamics (De Nardi et al., 2020); Consumer Default (Chatterjee et al. (2007), Livshits et al. (2007)); Welfare/ Cash Transfer Policy (Low et al. (2010), Wellschmied (2021)); Volatility Shocks and Consumption over the Business Cycles (Bayer et al. (2019), McKay (2017)); Labor Market Frictions (Krusell et al. (2010), Bils et al. (2011), Nakajima (2012));

## 2. Heterogeneidade na Firma.

- (a) Heterogeneidade na produtividade e *firm dynamics*. Hopenhayn (2014)\*, Hopenhayn and Rogerson (1993)\*, Hopenhayn (1992).
- (b) Comércio Internacional. (Melitz, 2003).
- (c) *Misallocation*. Restuccia and Rogerson (2017)\*, Restuccia and Rogerson (2008)\*, Hsieh and Klenow (2009).
- (d) Empreendedorismo, fricções financeiras e desenvolvimento. Buera et al. (2011)\*, Midrigan and Xu (2014).
- (e) Choques, Custo de Ajuste e Flutuações Agregadas. Clementi and Palazzo (2016)\*, Khan and Thomas (2008), Bachmann and Bayer (2013).
- (f) Métodos Computacionais: Projection Methods; Discrete Choice; Terry (2017), Winberry (2018).
- (g) **Outras Aplicações:** Innovation and Quality Ladders (Klette and Kortum (2004), Akcigit and Kerr (2018)); Uncertainty Shocks (Bloom et al. (2018), Bloom (2009)); Monopoly and Monopsonic Power (Berger et al. (2019), Edmond et al. (2015), De Loecker et al. (2020)); Trade Liberalization (Cosar et al. (2016), Kambourov (2009)); Development and Firm Size (Poschke (2018), Bento and Restuccia (2017), Hsieh and Klenow (2014)); Informality (Ulyssea (2018), D’Erasmus and Moscoso Boedo (2012)); Start-ups and Firm Growth (Sterk et al. (2021), Sedláček and Sterk (2017)); Entrepreneurship and Inequality (Allub and Erosa, 2019); Size-dependent Policies (Guner et al. (2008), Garicano et al. (2016)); Microfinance (Buera et al., 2021); Large Firms and Granularity (Carvalho and Grassi (2019), di Giovanni and Levchenko (2012)); Firm and Employment Dynamics (Decker et al. (2014), Bachmann et al. (2020)); Consumer Capital (Gourio and Rudanko, 2014); Manager Heterogeneity (Guner et al. (2018), Akcigit et al. (2021)); Wealth Taxation (Guvenen et al., 2019); Banking Industry Dynamics (Corbae and D’Erasmus, 2021).

## 3. Dados em modelos macroeconômicos: *calibration*, *estimation*, e outros tópicos.

- (a) Conhecimento “escondido”: uma discussão (honest) sobre *calibration*, *estimation*, e *indirect inference* em modelos macro. Nakamura and Steinsson (2018)\*, Canova (2007, ch. 7).
- (b) Evidência causal regional e *missing intercept problem*. Chodorow-Reich (2020), Wolf (2019), Guren et al. (2021).

## 4. Resolvendo Modelos em Tempo Contínuo.

- (a) Programação Dinâmica e Incerteza em Tempo Contínuo. Stokey (2020, The Economics of Inaction).
- (b) *Finite difference method*. Achdou et al. (2021)\*, Ahn et al. (2017).

## 5. HANK: Heterogeneous Agent New Keynesian.

- (a) Modelos Analíticos. [Acharya and Dogra \(2020\)](#), [Bilbiie \(2021\)](#).
- (b) Modelos Quantitativos. [Kaplan et al. \(2018\)\\*](#), [Kaplan and Violante \(2018\)\\*](#), [Auclert \(2019\)](#), [McKay et al. \(2016\)](#).
- (c) Métodos Computacionais: [Auclert et al. \(2021\)](#), [Bayer and Luetticke \(2020\)](#).
- (d) **Outras Aplicações:** Fiscal Policy ([Hagedorn et al. \(2019\)](#), [Auclert et al. \(2018\)](#)); Heterogeneous Portfolios ([Luetticke, 2021](#)); Open Economies ([Auclert et al., 2021](#)); Automatic Stabilizers ([McKay and Reis, 2016](#)); Search Frictions ([Ravn and Sterk, 2021](#)).

## Referências

- Abbott, B., G. Gallipoli, C. Meghir, and G. L. Violante (2019). Education policy and intergenerational transfers in equilibrium. *Journal of Political Economy* 127(6), 2569–2624.
- Acharya, S. and K. Dogra (2020). Understanding HANK: Insights From a PRANK. *Econometrica* 88(3), 1113–1158.
- Achdou, Y., J. Han, J.-M. Lasry, P.-L. Lions, and B. Moll (2021). Income and Wealth Distribution in Macroeconomics: A Continuous-Time Approach. *The Review of Economic Studies*.
- Ahn, S., G. Kaplan, B. Moll, T. Winberry, and C. Wolf (2017). When Inequality Matters for Macro and Macro Matters for Inequality. In *NBER Macroeconomics Annual*, pp. 1–75.
- Aiyagari, R. (1994). Uninsured idiosyncratic risk and aggregate savings. *Quarterly Journal of Economics* 109(3), 659–684.
- Akcigit, U., H. Alp, and M. Peters (2021). Lack of selection and limits to delegation: firm dynamics in developing countries. *American Economic Review* 111(1), 231–275.
- Akcigit, U. and W. R. Kerr (2018). Growth through heterogeneous innovations. *Journal of Political Economy* 126(4).
- Algan, Y., O. Allais, W. J. Den Haan, and P. Rendahl (2014). *Solving and Simulating Models with Heterogeneous Agents and Aggregate Uncertainty*, Volume 3. Elsevier B.V.
- Allub, L. and A. Erosa (2019). Financial frictions, occupational choice and economic inequality. *Journal of Monetary Economics* 107, 63–76.
- Auclert, A. (2019). Monetary policy and the redistribution channel. *American Economic Review* 109(6), 2333–2367.
- Auclert, A., M. Rognlie, M. Souchier, and L. Straub (2021). Exchange Rates and Monetary Policy With Heterogeneous Agents: Sizing Up the Real Income Channel.
- Auclert, A., M. Rognlie, and L. Straub (2018). THE INTERTEMPORAL KEYNESIAN CROSS.
- Bachmann, R. and C. Bayer (2013). ‘Wait-and-See’ business cycles? *Journal of Monetary Economics* 60(6), 704–719.
- Bachmann, R., C. Bayer, C. Merkl, S. Seth, H. Stüber, and F. Wellschmied (2020). Worker churn in the cross section and over time: New evidence from Germany. *Journal of Monetary Economics* 117(282740), 781–797.
- Barczyk, D. and M. Kredler (2018). Evaluating long-term-care policy options, taking the family seriously. *Review of Economic Studies* 85(2), 766–809.
- Bayer, C. and R. Luetticke (2020). Solving discrete time heterogeneous agent models with aggregate risk and many idiosyncratic states by perturbation. *Quantitative Economics* 11(4), 1253–1288.
- Bayer, C., R. Luetticke, L. Pham-Dao, and V. Tjaden (2019). Precautionary Savings, Illiquid Assets, and the Aggregate Consequences of Shocks to Household Income Risk. *Econometrica* 87(1), 255–290.

- Bento, P. and D. Restuccia (2017). Misallocation, establishment size, and productivity. *American Economic Journal: Macroeconomics* 9(3), 267–303.
- Berger, D. W., K. F. Herkenhoff, and S. Mongey (2019). Labor Market Power. *NBER Working Paper*, No. 25719.
- Bilbiie, F. O. (2021). Monetary Policy and Heterogeneity: An Analytical Framework.
- Bils, M., Y. Chang, and S.-b. Kim (2011). Worker Heterogeneity and Endogenous Separations in a Matching Model of Unemployment Fluctuations. *American Economic Journal: Macroeconomics* 3(January), 128–154.
- Bloom, N. (2009). The Impact of Uncertainty Shocks. *Econometrica* 77(3), 623–685.
- Bloom, N., M. Floetotto, N. Jaimovich, I. Saporta-eksten, and S. J. Terry (2018). Really Uncertain Business Cycles. *Econometrica* 86(3), 1031–1065.
- Boar, C. and Virgilu Midrigan (2020). Efficient Redistribution. (July), 54.
- Boppart, T., P. Krusell, and K. Mitman (2018). Exploiting MIT shocks in heterogeneous-agent economies: the impulse response as a numerical derivative. *Journal of Economic Dynamics and Control* 89, 68–92.
- Buera, F. J., J. P. Kaboski, and Y. Shin (2011). Finance and development: A tale of two sectors. *American Economic Review* 101(5), 1964–2002.
- Buera, F. J., J. P. Kaboski, and Y. Shin (2021). The Macroeconomics of Microfinance. *The Review of Economic Studies* 88(1), 126–161.
- Carvalho, V. M. and B. Grassi (2019). Large firm dynamics and the business cycle. *American Economic Review* 109(4), 1375–1425.
- Chatterjee, S., D. Corbae, M. Nakajima, and J. V. Rios-Rull (2007). A Quantitative Theory of Unsecured Consumer Credit with Risk of Default. *Econometrica* 75(6), 1525–1589.
- Chodorow-Reich, G. (2020). Regional data in macroeconomics: Some advice for practitioners. *Journal of Economic Dynamics and Control* 115, 1–14.
- Clementi, G. L. and B. Palazzo (2016). Entry, Exit, Firm Dynamics, and Aggregate Fluctuations. *American Economic Journal: Applied Economics* 8(3), 1–41.
- Conesa, J. C., S. Kitao, and D. Krueger (2009). Taxing capital? not a bad idea after all! *American Economic Review* 99(1), 25–48.
- Conesa, J. C. and D. Krueger (1999). Social Security Reform with Heterogeneous Agents. *Review of Economic Dynamics* 2, 757–795.
- Corbae, D. and P. D’Erasmus (2021). Capital Requirements in a Quantitative Model of Banking Industry Dynamics.
- Cosar, A. K., N. Guner, and J. Tybout (2016). Firms Dynamics, Job Turnover, and Wages Distribution in an Open Economy. *American Economic Review* 106(3), 625–663.
- De Loecker, J., J. Eeckhout, and G. Under (2020). The Rise of Market Power and the Macroeconomics Implications. *Quarterly Journal of Economics* 135(2), 561–644.

- De Nardi, M. and G. Fella (2017). Saving and wealth inequality. *Review of Economic Dynamics* 26, 280–300.
- De Nardi, M., G. Fella, and G. Paz-Pardo (2020). Nonlinear Household Earnings Dynamics, Self-Insurance, and Welfare. *Journal of the European Economic Association* 18(2), 890–926.
- Decker, R., J. Haltiwanger, R. Jarmin, and J. Miranda (2014). The Role of Entrepreneurship in US Job Creation and Economic Dynamism. *Journal of Economic Perspectives* 28(3), 3–24.
- D’Erasmus, P. N. and H. J. Moscoso Boedo (2012). Financial structure, informality and development. *Journal of Monetary Economics* 59(3), 286–302.
- di Giovanni, J. and A. A. Levchenko (2012). Country size, international trade, and aggregate fluctuations in granular economies. *Journal of Political Economy* 120(6), 1083–1132.
- Edmond, C., V. Midrigan, and D. Y. Xu (2015). Competition, Markups, and the Gains from International Trade. *American Economic Review* 105(10), 3183–3221.
- Fuster, L., A. Imrohoroglu, and S. Imrohoroglu (2007). Elimination of social security in a dynastic framework. *Review of Economic Studies* 74, 113–145.
- Garicano, L., C. Lelarge, and J. Van Reenen (2016). Firm size distortions and the productivity distribution: Evidence from France. *American Economic Review* 106(11), 3439–3479.
- Gourio, F. and L. Rudanko (2014). Customer capital. *Review of Economic Studies* 81(3), 1102–1136.
- Greenwood, J., N. Guner, G. Kocharkov, and C. Santos (2016). Technology and the changing family: A unified model of marriage, divorce, educational attainment, and married female labor-force participation. *American Economic Journal: Macroeconomics* 8(1), 1–41.
- Guner, N., A. Parkhomenko, and G. Ventura (2018). Managers and productivity differences. *Review of Economic Dynamics* 29, 256–282.
- Guner, N., G. Ventura, and Y. Xu (2008). Macroeconomic implications of size-dependent policies. *Review of Economic Dynamics* 11, 721–744.
- Guren, A., A. McKay, E. Nakamura, and J. Steinsson (2021). *What do we learn from cross-regional empirical estimates in macroeconomics?*, Volume 35.
- Guvenen, F. (2011). Macroeconomics with Heterogeneity: A Practical Guide. *Economic Quarterly* 97(3), 255–326.
- Guvenen, F., G. Kambourov, B. Kuruscu, S. Ocampo-diaz, and D. Chen (2019). Use it or Lose it: Efficiency Gains from Wealth Taxation.
- Guvenen, F., B. Kuruscu, and S. Ozkan (2014). Taxation of Human Capital and Wage Inequality: A Cross-Country Analysis. *Review of Economic Studies* (81), 818–850.
- Hagedorn, M., I. Manovskii, and K. Mitman (2019). The Fiscal Multiplier.
- Heathcote, J., K. Storesletten, and G. L. Violante (2009). Quantitative Macroeconomics with Heterogeneous Households. *Annual Review of Economics* 1(1), 319–354.
- Heathcote, J., K. Storesletten, and G. L. Violante (2010). The Macroeconomic Implications of Rising Wage Inequality in the United States. *Journal of Political Economy* 118(4), 681–722.

- Heathcote, J., K. Storesletten, and G. L. Violante (2020). Optimal progressivity with age-dependent taxation. *Journal of Public Economics* 189, 104074.
- Hopenhayn, H. (1992). Entry, Exit, and firm Dynamics in Long Run Equilibrium. *Econometrica* 60(5), 1127–1150.
- Hopenhayn, H. and R. Rogerson (1993). Job Turnover and Policy Evaluation: A General Equilibrium Analysis. *Journal of Political Economy* 101(5), 915–938.
- Hopenhayn, H. A. (2014). *Firms, misallocation, and aggregate productivity: A review*, Volume 6.
- Hsieh, C.-T. and P. J. Klenow (2009). Misallocation and Manufacturing TFP in China and India. *Quarterly Journal of Economics* CXXIV(4), 1403–1448.
- Hsieh, C.-T. and P. J. Klenow (2014). The Life Cycle of Plants in India and Mexico. *Quarterly Journal of Economics* 129(3), 1035–1084.
- Huggett, M., G. Ventura, and A. Yaron (2011). Sources of lifetime inequality. *American Economic Review* 101(December), 2923–2954.
- Kambourov, G. (2009). Labour market regulations and the sectoral reallocation of workers: The case of trade reforms. *Review of Economic Studies* 76(4), 1321–1358.
- Kaplan, G., B. Moll, and G. L. Violante (2018). Monetary Policy According to HANK. *American Economic Review* 108(3), 697–743.
- Kaplan, G. and G. L. Violante (2010). How Much Consumption Insurance Beyond Self-Insurance? *American Economic Journal: Macroeconomics* 2, 53–87.
- Kaplan, G. and G. L. Violante (2014). A Model of the Consumption Response to Fiscal Stimulus Payments. *Econometrica* 82(4), 1199–1239.
- Kaplan, G. and G. L. Violante (2018). Microeconomic heterogeneity and macroeconomic shocks. *Journal of Economic Perspectives* 32(3), 167–194.
- Khan, A. and J. K. Thomas (2008). Idiosyncratic Shocks and the Role of Nonconvexities in Plant and Aggregate Investment Dynamics. *Econometrica* 76(2), 395–436.
- Klette, T. J. and S. Kortum (2004). Innovating firms and aggregate innovation. *Journal of Political Economy* 112(5), 986–1018.
- Krueger, D., K. Mitman, and F. Perri (2016). Macroeconomics and Household Heterogeneity. In *Handbook of Macroeconomics* (1 ed.), Volume 2, pp. 843–921. Elsevier B.V.
- Krueger, D. and F. Perri (2006). Does Income Inequality Lead to Consumption Inequality? Evidence and Theory. *Review of Economic Studies* 73, 163–193.
- Krusell, P., T. Mukoyama, and A. Sahin (2010). Labour-market matching with precautionary savings and aggregate fluctuations. *Review of Economic Studies* 77(4), 1477–1507.
- Krusell, P. and A. A. Smith (1998). Income and wealth heterogeneity in the macroeconomy. *Journal of Political Economy* 106(5), 867–896.
- Livshits, B. I., J. Macgee, and M. Tertilt (2007). Consumer Bankruptcy: A Fresh Start. *American Economic Review* 97(1), 402–418.



- Lochner, B. L. J. and A. Monge-naranjo (2011). The Nature of Credit Constraints and Human Capital. *American Economic Review* 101(6), 2487–2529.
- Low, H., C. Meghir, and L. Pistaferri (2010). Wage Risk and Employment Risk over the Life Cycle. *American Economic Review* 100(4), 1432–1467.
- Luetticke, R. (2021). Transmission of Monetary Policy with Heterogeneity in Household Portfolios. *American Economic Journal: Macroeconomics* 13(2), 1–25.
- McKay, A. (2017). Time-varying idiosyncratic risk and aggregate consumption dynamics. *Journal of Monetary Economics* 88, 1–14.
- McKay, A., E. Nakamura, and J. Steinsson (2016). The power of forward guidance revisited. *American Economic Review* 106(10), 3133–3158.
- McKay, A. and R. Reis (2016). The Role of Automatic Stabilizers in the U.S. Business Cycle. *Econometrica* 84(1), 141–194.
- Melitz, M. J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica* 71(6), 1695–1725.
- Midrigan, V. and D. Y. Xu (2014). Finance and Misallocation : Evidence from Plant-Level Data. *American Economic Review* 104(2), 422–458.
- Nakajima, M. (2012). Business Cycles in the Equilibrium Model of Labor Market Search and Self-Insurance. *International Economic Review* 53(2), 399–432.
- Nakamura, E. and J. Steinsson (2018). Identification in macroeconomics. *Journal of Economic Perspectives* 32(3), 59–86.
- Poschke, M. (2018). The firm size distribution across countries and skill-biased change in entrepreneurial technology. *American Economic Journal: Macroeconomics* 10(3), 1–41.
- Quadrini, V. (2000). Entrepreneurship, Saving, and Social Mobility. *Review of Economic Dynamics* 3(1), 1–40.
- Ravn, M. O. and V. Sterk (2021). Macroeconomic Fluctuations with HANK and SAM: An Analytical Approach. *Journal of the European Economic Association* 19(2), 1162–1202.
- Restuccia, D. and R. Rogerson (2008). Policy distortions and aggregate productivity with heterogeneous establishments. *Review of Economic Dynamics* 11, 707–720.
- Restuccia, D. and R. Rogerson (2017). The Causes and Costs of Misallocation. *Journal of Economic Perspectives* 31(3), 151–174.
- Sedláček, P. and V. Sterk (2017). The growth potential of startups over the business cycle. *American Economic Review* 107(10), 3182–3210.
- Sterk, V., P. Sedláček, and B. Pugsley (2021). The Nature of Firm Growth. *American Economic Review* 111(2), 547–579.
- Storesletten, K., C. I. Telmer, and A. Yaron (2004). Consumption and risk sharing over the life cycle. *Journal of Monetary Economics* 51(3), 609–633.
- Terry, S. J. (2017). Alternative Methods for Solving Heterogeneous Firm Models. *Journal of Money, Credit and Banking* 49(6).

- Ulyssea, G. (2018). Firms, Informality, and Development: Theory and Evidence from Brazil. *American Economic Review* 108(8), 2015–2047.
- Voena, A. (2015). Yours, Mine, and Ours: Do Divorce Laws Affect the Intertemporal Behavior of Married Couples? *American Economic Review* 105(8), 2295–2332.
- Wellschmied, F. (2021). The welfare effects of asset mean-testing income support. *Quantitative Economics* 12(1), 217–249.
- Winberry, T. (2018). A method for solving and estimating heterogeneous agent. *Quantitative Economics* 9, 1123–1151.
- Wolf, C. K. (2019). The Missing Intercept: A Demand Equivalence Approach. pp. 1–109.