

Research Statement

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My research spans the following key themes:

1. Macroeconomic and asset pricing implications of labor market frictions.
2. Minority labor markets, including issues of migration and LFP.
3. Optimal pandemic management policy.
4. Invariance in structural models for policy design and evaluation using Lie symmetries.
5. Public policy.

In what follows I present these issues briefly.

This statement does not cover the full scope of my research; for further details see the full list of papers on the web site at <https://www.yashiv.sites.tau.ac.il/>

1 Macroeconomic and Asset Pricing Implications of Labor Market Frictions

This major theme in my research can be divided into a number of specific topics.

1.1 Hiring Frictions and Business Cycles

The aim of this line of work is to determine how labor market frictions, in particular hiring frictions, affect business cycles. The background is a general view that these are too small to matter much.

In joint work with Renato Faccini (Faccini and Yashiv (2022)) we study hiring as a costly activity reflecting firms' investment in their workers. Micro-data shows that hiring costs involve production disruption. Thus,

cyclical fluctuations in the value of output, induced by price frictions, have consequences for the optimal allocation of hiring activities. We outline a mechanism based on cyclical fluctuations in the value of output, placing emphasis on hiring frictions interacting with price frictions. This mechanism generates strong propagation and amplification of all key macroeconomic variables in response to technology shocks and mutes the traditional transmission of monetary policy shocks. While hiring costs are small, they interact with price frictions to generate substantial effects. A local projection analysis of aggregate U.S. data shows that the empirical results, including the cyclical nature of markups, are consistent with the model's impulse response functions. It explains some persisting puzzles in the literature, such as the initial expansionary effects of a monetary contraction.¹

Two papers in this line are in progress:

In Millard and Yashiv (2021), we model the interactions of financial frictions and hiring frictions, using a DSGE model calibrated to the U.S. economy, with households, banks, firms, and wage bargaining. The model features labour and investment frictions, in the form of convex costs, and financial frictions, in the form of credit constraints and the risk of banks diverting funds. In addition, there are price frictions and habits in consumption. We examine technology, monetary policy, and credit shocks. We look at the response to these shocks of real aggregate variables, financial market variables, and labor market variables. We find that the interactions of real frictions and financial frictions have important implications for the study of the effects of financial shocks on the macroeconomy.

In Cnaan and Yashiv (2023) we propose a concept of "business cycle Q," where we define a marginal Q for capital, an analog concept for labor, and a general Q, which is a function of both. The Q for labor is based on the existence of hiring frictions. The Q for capital is broken down into physical, knowledge, and brand capital. U.S. firms data from Compustat is used to quantify these values, which govern firms' hiring and investment decisions. The predictive content for economic activity embodied in them is the result of firms' forward-looking optimal behavior. We aim to use a prediction method (such as a LP-IV methodology) to study how useful these values are as predictors, parsimoniously encompassing the firm's information and expectations sets.

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¹This research received a 2016 ISF grant.

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1.2 Labor Frictions and the Firm Market Value

In this line of work I ask: what role does labor play in the market value of firms? According to the standard neoclassical model, labor is not a part of this value, because it is costlessly adjusted and hence receives its share in output. In this frictionless environment, the firm's market value equals its stock of physical capital.

In Yashiv (2005) and in Merz and Yashiv (2007) we combine hiring frictions with adjustment costs of physical capital (the well known Tobin's Q-model). The standard Q-model still assigns no explicit role for labor, as determination of the firm's value requires only correction for the value of the capital adjustment technology. Labor explicitly enters the picture whenever there are frictions in the labor market. With frictional labor markets, labor is a quasi-fixed factor from which a firm extracts rents. These rents compensate it for the costs associated with adjusting the work force. The firm's value captures these rents. We investigate links between the financial market and the labor market. We qualitatively illustrate how firms' market value is linked to the flows of gross hiring and gross investment and to the stocks of employment and physical capital. We quantify the link between financial markets and labor markets by structurally estimating the model using aggregate time-series data for the US corporate sector. The results demonstrate a good fit of the first two moments of stock price data.

The estimation work in Yashiv (2000) gives further empirical support to this approach. In Yashiv (2016) I explore how the joint behavior of hiring and investment is governed by the expected present values of capital and of jobs. It uses a model of the type used in Merz and Yashiv (2007) and relies on structural estimation of private sector U.S. data. It studies the future determinants of capital and job values and the implications for U.S. labor market developments. Key findings include: (i) complementarity between the hiring and investment processes; (ii) important cross effects of the value of capital on the mean and the volatility of the hiring rate, and vice versa; (iii) future returns are shown to play a dominant role in determining capital and job values; and (iv) U.S. labor market developments, including the outward shift of the Beveridge curve in the Great Recession and its aftermath 2007–2013, can be accounted for by changes in job and capital values. A relatively surprising finding is that job values went up, not down, in the Great Recession.

Taking a very different track, in Moen and Yashiv (2018) we propose

a novel view of the modern firm. Workers search for other workers to engage in co-production. This set-up replaces the notion of workers searching for firms, which are owners of capital. Rather than being a function of its capital stock, the value of the firm arises from its role in matching workers. Production depends on how well workers match. We use a dynamic model of stochastically evolving relations between workers, not one of matching fixed qualities or skills. The model features a dynamic mechanism for such match formation, which fits salient data facts. It studies the evolution of firm value over time as it replaces workers, trying to attain a threshold value. It does so in a dynamic setting with discounting and costly worker replacement. There are differential contributions of workers, which are reflected in wages, through a process of bargaining. A worker's contribution to firm value changes over time in a non-trivial way as co-workers are replaced by new workers. Optimal worker replacement policy is based on a two dimensional stopping rule in the face of shocks to worker interactions. Illustrative simulations of the model reveal a rich pattern of worker turnover dynamics and their connections to the resulting firm values distribution.

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1.3 Analysis of Policy Implications

Two papers directly examine policy implications within the search and matching framework.

In Yashiv (2004) I explore the consequences of macroeconomic policy for labor market outcomes in the presence of frictions. The paper shows how policy may be useful in over-riding frictions, as well as how it might generate adverse outcomes. A partial-equilibrium, empirically grounded model is used to simulate policy effects. The key results are that policy has effects on the stochastic behavior of key variables – measures that reduce unemployment also reduce its persistence and increase the volatility of vacancies. Hiring subsidies and unemployment benefits have substantial effects on labor market outcomes, while employment subsidies or wage tax reductions are not very effective policy instruments.

In Blumkin, Danziger, and Yashiv (2017) we provide a novel justification for a declining time profile of unemployment benefits that does not rely on moral hazard or consumption-smoothing considerations. We consider a simple search environment with homogeneous workers and low- and high-productivity firms. By introducing a declining time profile of benefits, the government can affect the equilibrium wage profile in a manner that enhances the sorting of workers across low- and high-productivity firms. We demonstrate that optimal government policy depends on the dispersion and skewness of the firms' productivity distribution.

References

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1.4 Empirical Work

In empirical work I have used structural estimation on U.S. and Israeli data to place the different components of the DMP model on solid empirical footing. It attempts to resolve key puzzles and lacunae in the empirical literature.

Yashiv (2000a) tests the model's empirical validity and employs structural estimation to generate a characterization of the optimal behavior of firms and workers. The model is applied to Israeli data that are uniquely suited for this kind of empirical investigation. The structural estimates are used to quantify the frictions embodied in the model, including the costs of search, the congestion and trading externality effects, and the matching process. A calibration-simulation analysis then studies the effect of several key variables on equilibrium unemployment.

Yashiv (2000b) explores the determinants of hiring at the macroeconomic level. It treats the hiring decision as an investment decision, similar to the one taken for physical capital or for financial assets. At its core is a present value relation which defines the worker's "asset value" for the firm and determines optimal hiring. The paper validates this relation using volatility tests and infers the unobserved asset values by estimating it. The paper demonstrates the links between models employed and issues examined in finance and the labor market.

Yashiv (2006) asks – does the search and matching model fit aggregate U.S. labor market data? The paper aims to answer two questions: (i) Does the model fit the data, and, if so, on what dimensions? (ii) Does the data "fit" the model, i.e. what are the data which are relevant to be explained by the model? The analysis shows that the model fits certain specifications of the data on many dimensions, though not on all. This includes capturing the high persistence and high volatility of most of the key variables, the negative co-variation of unemployment and vacancies, and the behavior of the worker job finding rate. A key role in this fit is played by the convexity of hiring costs and the stochastic properties of the separation rate. The latter is a major component of the rate discounting the future value of the job-worker match. The paper offers a workable, empirically grounded version of the model for the analysis of aggregate U.S. labor market dynamics.

Yashiv (2007a) departs from the premise that the picture of U.S. labor market dynamics is opaque. The paper aims at its clarification by (i) listing data facts that can be agreed upon; these indicate that there is considerable cyclical and volatility of both accessions to and separations from employment and hence both are important for the understanding of the business cycle; (ii) presenting the business cycle facts of key series; (iii) pointing to specific gaps in the data picture, showing that the definite characterization of labor market dynamics depends upon the closing of these data gaps.

Yashiv (2007b) provides a critical, selective survey of the empirical literature. Four fundamental questions are explored: How are unemployment, job vacancies, and employment determined as equilibrium phenomena? What determines worker flows and transition rates from one labor market state to another? How are wages determined? What role do labor market dynamics play in explaining business cycles and growth? The survey describes the basic model, reviews its theoretical extensions, and discusses its empirical applications in macroeconomics.

Yashiv (2008) is a New Palgrave dictionary entry. It describes the Beveridge curve which depicts a negative relationship between unemployed workers and job vacancies, a robust finding across countries. The paper relates it to the more modern theory of search and matching model, with workers and firms engaging in costly search leading to random matching. The Beveridge curve depicts the steady state of the model, whereby inflows

into unemployment are equal to the outflows from it, generated by matching.

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2 Minority Labor Markets

I have studied several aspects of minority labor markets, using data of labor markets of Arabs in Israel and in Palestine.

2.1 The Arab Labor Market in Israel

With Nitsa Kasir, I have published several academic papers on this topic (see Kasir and Yashiv (2011, 2013, 2021)). In the most recent, Kasir and Yashiv (2021), we review key data facts and present a model of barriers to integration facing Arabs in Israel, taking it to the data. The empirical analysis, based on a general equilibrium model of occupational choice with optimizing agents and barriers proposed by Hsieh, Hurst, Jones, and Klenow (2019), points to an increase over time in barriers to the acquisition of human capital in highly skilled occupations, and, concurrently, a reduction in labour market barriers in all occupations. The analysis offers insights relevant to other developed economies with large ethnic minorities.

In Kasir and Yashiv (2015), we explore the consequences of negative labour market outcomes of Israeli Arabs for the under-utilisation of the economy's productive capacity. We highlight the need for comprehensive government policy to help integration in the labour market. This CEPR

Policy Insight paper proposes a policy plan to facilitate a more successful integration.

In Kasir, Miaari, and Yashiv (2020) we start from the background that Israeli Arab women have low labor force participation rates, around 33%. The paper investigates how cultural factors, such as attitudes towards work of women, as well as economic factors affect this group's labour force participation. We use a novel data survey which collected detailed information about Arab women's cultural beliefs as well as economic and demographic data.

2.2 Migration from a Poor to a Rich Economy

In Yashiv (2021a) I deal with the phenomenon of workers moving from a poor to a rich economy, which is high on the political agenda. It poses the question : When a worker moves to a richer economy, what is gained by the move? The empirical challenge in giving an answer stems from the difficulty to disentangle income differences from many other determinants. Estimates are potentially biased due to substantial misspecification of the model, when omitting relevant determinants. The paper makes use of a unique data set on Palestinian workers, working locally and in Israel, that allows to isolate the pure effects of income differences with no other relevant factors. It explicitly addresses the question of what workers newly experience in the richer economy (higher productivity), what is taken from the poorer economy (human capital), and their choices in moving (self-selection). Importantly, it encompasses the constraints placed on workers in terms of the human capital skills demanded. The findings show that income differences affecting worker choice are made up of contradictory elements. Consistently with findings in the development accounting literature, productivity differences in favor of the richer economy, due to differences in TFP and in physical capital, are sizeable and operate to raise wages for movers. But lower job task values operate to lower wages for movers, who are offered manual tasks in the rich economy. The latter loss offsets the former gain. The paper emphasizes the idea that tasks are tied to locations. Workers choose a location-wage-task 'pack,' with movers getting low rewards to the skills bundled in their job tasks.

2.3 Current Work

I am currently working on two new papers:

The background for Danieli and Yashiv (2023) is as follows: a key methodology to approach the design of policies aimed at enhancing the labor supply of women is the undertaking of RCTs. However, it is hard for researchers to know ex-ante which RCTs have the most potential for a cost-effective intervention. In this paper we address this difficulty by using an

econometric methodology developed by Danieli et al. (2021), which is a data-driven way to design policy experiments. In particular, it allows for the ranking of variables in terms of their potential treatment value for policy. The methodology is complementary to experiments and does not identify causal relationships. Rather, it highlights variables that could have a large impact on labor force participation (LFP) if the association is causal. Thus it is a method to allow researchers to select and target their policy experiments, testing for causal relationships in variables that have the highest potential for a cost-effective intervention geared for enhancing LFP. The method is particularly useful in identifying variables which are affecting LFP through other observed variables.

We examine social norms related variables as well as standard economic and demographic variables. By way of motivation, suppose LFP is a function of the level of education, which in turn is determined by social norms. Prevalent prediction methods typically focus on the level of education, which would be sufficient for prediction. But a policy that aims to increase education levels, if ignoring social norms, is likely to fail due to a weak “first stage,” as education levels will not increase sufficiently without normative change. The current methodology would identify social norms as a variable that should be tested in RCTs.

We use a data set from a novel, specially-designed survey of Arab women in Israel, which has elicited information pertinent to social norms, as well as to the more standard variables. In particular, it includes variables which are typically not available and which interaction with economic variables has not been sufficiently quantified. We note that Arab women constitute over 10% of Israel’s total population and almost 21% of Israel’s female population, i.e., it is a big minority with macroeconomic significance. This group is characterized by rich variation in social norms on the traditional – modernity dimensions. It is highly disadvantaged, with low labor market participation and relatively low wages.

In Yashiv (2021b), I use the afore-cited general equilibrium model, proposed by Hsieh, Hurst, Jones, and Klenow (2019), to study the dynamics of barriers in the labour market. The model examines the differences in labour market outcomes between groups in the economy using an enhanced Roy model of occupational choice, embedded in a general equilibrium set-up. More specifically, the model caters for educational choices, labour force participation decisions, and occupational preferences. It focuses on the dynamics of barriers to human capital investment and on labour market discrimination. I take the model to the data on Israeli Arabs to characterize two types of barriers (human capital and labour market), their dynamics, and assess their relative importance. This includes an attempt to explain the dynamics revealed by the data and to explore the mechanisms underlying them. I also try to evaluate the loss to the economy in terms of GDP from the presence of barriers, which cause human capital misallocation.

2.4 ISF 2024 Proposal

I am submitting an ISF proposal (for 2024) entitled “Micro and Macro Perspectives on Female Labor Force Participation.” The background is that Labor force participation (LFP) of women is of first order importance for both economic growth and business cycle fluctuations. Thus policy to enhance it is of consequence. A major topic in the Macro and Labor literatures on such policy has been the LFP of women. However, there is a disconnect between the two strands. The Labor literature places its focus on studies of RCTs, each exploring a particular policy and its female LFP outcomes. The Macro literature takes changes in female LFP as given and studies their macroeconomic implications. Thus, particular policy plans related to LFP are not examined “all the way through,” i.e., the macroeconomic consequences of particular LFP-enhancing policy plans are not studied. Evidently, not all policy plans have significant macroeconomic consequences, if any. However, in some cases, for example in big minority communities, enhancing female LFP has effects on a macroeconomic scale. The object of this proposal is to examine the macroeconomic consequences of LFP-enhancing policy plans, after identifying effective plans in a microeconomic study. The proposal has three stages: first, in a Micro study, joint with Oren Danieli (as delineated above), we shall examine which variables amenable to policy may potentially affect female LFP, allowing for a role to be played by social norms, within a large set of candidate variables. Second, in a Macro context, I shall examine how changes in female LFP affect macroeconomic variables using a Pissarides model catering for gender differences in LFP. Third, using the estimates of the first and second stages, I will derive the macroeconomic effects of policy plans found in the first stage as potentially effective. In order to examine these issues one needs appropriate data, which will facilitate the Micro and Macro analyses. These data pertain to Arab women in Israel, who constitute over 10% of Israel’s total population and almost 21% of Israel’s female population. The expected significance lies in providing empirical basis for efficient LFP-enhancing policy plans and understanding their macroeconomic effects. Such contribution is important for both academic research and policy applications.

References

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3 Optimal Pandemic Management Policy

This work related at first to COVID19 and now to possible future pandemics. In the COVID 19 work it was undertaken by two economists co-authors, Tanya Baron and Ofer Cornfeld, who were joined by two system biologists from the Weizmann Institute of Science, Ron Milo and Yinon Bar-On. Currently, Ofer Cornfeld joins me in working on future pandemics with University of Maryland biologist Joshua Weitz and Georgia Tech electrical and computer engineer Yorai Wardi.

3.1 COVID 19

The basis for this line of work is a novel policy tool introduced in Karin et al (2020), a paper in which I am a co-author (as the only economist). The idea is that following an initial lockdown, the economy would move to a regime of k days of work and $14 - k$ days of lockdown, every 14 days. On work days, people are released from lockdown with strict hygiene and physical

distancing measures on the same k weekdays for everyone. On lockdown days, people are kept away from work places as well as from other public spaces. It is referred to as a cyclical policy strategy as it keeps alternating between lockdown and release periods.²

In Bar-On, Baron, Cornfeld, and Yashiv (2023) we introduce these novel policy tools for pandemic or epidemic management. The paper stresses the crucial multiple roles played by time in this context. We present both normative and positive analyses. The former applies to the management of the ongoing COVID19 pandemic, as well as to any future pandemic or epidemic. The latter analysis evaluates policy against real world benchmarks in the U.S. The novel tools are particularly relevant in light of the difficulties experienced by policymakers in finding a policy strategy that lessens the trade-offs involved. In theory, targeted population lockdowns could constitute “fine tuning ” of lockdown measures, which would serve to lessen any economic cost. In practice, however, it turned out to be challenging to identify sub populations to be allowed unrestricted economic activity, while imposing restrictions on other population groups. Political and moral issues, as well as practical implementation issues, have come into play. This was made even more difficult by the uncertainty with respect to the exact state and dynamics of the epidemic. The novel, time-based public health management policy avoids these difficulties, taking time, rather than population, as the medium of restrictions. Key findings are that the new tools significantly improve social welfare, substantially lessening the trade-offs involved; optimally-derived timings of interventions suppress the disease while maintaining reasonable economic activity; and outcomes are superior to the actual experience of New York State and Florida in the course of 2020.

In Bar-On et al (2021) and Baron, Cornfeld, and Yashiv (2021) we analyze prevalent misspecifications of disease dynamics in Economics research, at odds with the epidemiological evidence. We show that erroneous modelling has substantial consequences for policy. Two key properties of disease dynamics, its scale and speed, are at the center of misspecification. Er-

²The proposed cyclical policy has been brought to the attention of policymakers; see Yashiv (2020) and Alon, Milo and Yashiv (2020). It can be applied on many scales: firms, schools, towns, regions, or an entire country. In practice it has been implemented, or was under consideration, by:

- (i) Multinational firms, including MasterCard, Delvenia, SENER, and Biogen
- (ii) Schooling institutions – the Austrian school system, schools in and around Atlanta (GA), a local school district in Berkeley (CA), schools in Los Angeles (CA) and Minneapolis (MN).
- (iii) Academic institutions – departments at Yale University, Cornell University, University of Georgia, and the University of Wisconsin-Madison.
- (iv) Local government – Mexico City, NYC Department of Citywide Administrative services, and the City of Tubaro, Brazil.

roneously characterizing a relatively slow-moving disease engenders dramatically higher death tolls and excessive output loss relative to the correct benchmark. We delineate the latter, employing epidemiological evidence on the timescales of COVID19 transmission and clinical progression. The resulting sound model is simple, transparent, and novel in Economics.

In Baron, Cornfeld and Yashiv (2020) we apply the model used in the preceding two papers to Israel. We evaluate the lockdown policies actually implemented against reasonable alternatives, including the aforementioned cyclical policy.

3.2 Optimal Policy in Future Pandemics

In work in progress with the afore-cited U.S.-based authors, the key aim is to analyze the policy response in a future pandemic. It focuses on public health-economics trade-offs. The epi model includes the SEIRD model and a PDF on vaccine arrival time. The economic model features individual optimization entailing an endogenous response and a social planner. The latter minimizes a social welfare loss function, which compares social welfare to the pre-pandemic steady state. This function embodies the following:

- (i) A PDF for vaccine arrival time.
- (ii) Discounting of future values with interest rate r .
- (iii) The various fractions of the population classified by their illness status and work status, are evaluated with the utility loss relative to the pre-pandemic steady state.
- (iv) The value of statistical life applied to deaths from the pandemic.

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R and R at Nature: Scientific Reports.
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4 Invariance in Structural Models for Policy Design and Evaluation

In Perets and Yashiv (2022), we connect Theory and Econometrics in terms of invariance restrictions in economic optimization problems. We do so using Lie symmetries of the differential equations in economic models, which define optimal behavior. The symmetries provide solutions, including functional form restrictions, or rich information regarding the properties of the solutions, when no closed-form solutions exist. We implement this algebra to a key model of consumer-investor choice. We connect this analysis to the analysis of invariant structural models in Econometrics. We then outline a diverse set of models at the research frontier, which would be amenable to similar analysis, thereby providing a road map for a potentially important new literature.

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5 Public Policy

In the years 2001-2013 I was on the faculty of the Public Policy Department at Tel Aviv University (and its Chair in 2012-13). Hence I have 18 papers in this field. In what follows, I describe two key areas of contribution.

5.1 Structural Problems and Economic Policy in Israel

In a series of papers I address the deep structural problems facing the Israeli economy and delineate economic policy programs. The structural issues include poor outcomes for large minority groups, high inequality, low levels of physical infrastructure, and problematics in the housing market. The proposed policies include fiscal policy, relating to both government expenditures and taxation, and (targeted) education, labor market, housing, and infrastructure policies. Yashiv (2011, 2012, and 2016) are three out of twelve papers on these issues.

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5.2 Economic Policy Issues in Palestine

In continuation of the research delineated in Section 2 above, I have written seven policy papers on Palestinian labor market issues within Israel and in Palestine. These include policy proposals to promote employment and enhance outcomes in the labor market. (e.g., productivity). Policy proposals include taxation (such as the negative income tax), targeted investment in education and physical infrastructure, welfare to work programs, training programs, new credit market mechanisms, policy w.r.t. migrant workers, anti-discrimination legislation and enforcement, and more. Yashiv (2012) and Kasir and Yashiv (2015) are two examples.

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