Comment on “From Mancession to Shecession: Women’s Employment in Regular and Pandemic Recessions.”

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Using a variety of micro-level datasets, Alon, Coskun, Doepke, Koll, and Tertilt (2021) document carefully women’s and men’s labor supply patterns during the pandemic recession. The pandemic recession differs from previous recessions in that, for almost all countries, women experienced a larger decline than men in their market hours. According to the correlations presented in the paper, two salient factors associated with this gap are the increased need for childcare and the concentration of women’s employment in industries and occupations hit hardest by the pandemic.

The paper contributes a large number of observations on time allocation by gender and other demographic groups that will certainly stimulate future research on labor markets. Two questions arise when reading the paper. Are the observations informative about the causes of the decline in market hours? Filtered through standard labor supply theory, is the larger impact of the pandemic on women’s labor supply puzzling or concerning?

I use a tractable model of consumption and time allocation to bridge the observations documented by Alon, Coskun, Doepke, Koll, and Tertilt (2021) and the lessons we draw from these observations. My first conclusion is that their observations are informative about the causes of the decline in market hours in the pandemic recession relative to previous recessions. My second conclusion is that the gender gap in decline in market hours is not particularly puzzling or concerning when filtered through the lens of the model. In reaching these conclusions, I acknowledge that I do not attempt a quantification of the model that matches every aspect of hours worked during the pandemic. Rather, my more modest goal is to use a quantitatively tractable framework
that speaks to the most salient observations reported in the paper.

Model

The model considers the consumption and time allocation decisions of heterogeneous households. It has four key elements necessary to interpret the observations in the paper. First, households have heterogeneous members. Second, household members combine expenditures purchased in the market with their time to produce commodities at home. Third, female and male time inputs enter asymmetrically in home production. Finally, the model features partial insurance, with households fully insured against some shocks in the market sector and unable to insure against some other including shocks that originate in the home sector.

Preferences and technologies. Households derive utility from a market-purchased commodity $c_0$ and different home-produced commodities $c_k$ for $k = 1, \ldots, K$. The market commodity is produced with only market expenditures $c_0 = x_0$. Home commodities are produced with market expenditures, female time spent on home production, and male time spent on home production, $c_k(x_k, h_k^f, h_k^m)$. Households maximize the expectation of discounted sum of utility flows, where flow utility is:

$$U_t = \log \left( \omega_0 x_0^{\phi-1} + \sum_k \left( \omega_k^f \left( x_k^{\sigma_k} + \left( \theta_k h_k^f \right)^{\sigma_k} \right)^{\phi-1} + \omega_k^m \left( h_k^m \right)^{\phi-1} \right) \right)^{\phi-1}. \tag{1}$$

Consumption weights, $\omega_0, \omega_k^f, \omega_k^m$, vary over time and across households. The variable $\theta_k$ is the efficiency of female time relative to expenditures in the production of good $k$ and also varies over time and across households.

Preferences are nested CES functions of inputs. Parameter $\phi > 0$ is the elasticity of substitution between male time $h_k^m$ and all other commodities and parameter $\sigma_k > 0$ is the elasticity of substitution between female time $h_k^f$ and expenditures $x_k$. To give a concrete example from the application below, commodity $c_k$ can be the production of childcare. Childcare takes as input expenditures on goods and services such as childcare providers, education programs and supplies, and other extracurricular activities. It also uses time spent with kids by household members. I
will assume a key asymmetry in home technology, $\sigma_k > 1 > \phi$, which implies that female time is a closer substitute than male time with expenditures amenable to home production. This “social norm” is imposed to the analysis rather than derived from more primitive frictions or historical experiences shaping the production technology frontier of households.\(^1\)

For every household member $g = \{f, m\}$, working in the market yields earnings:

$$y^g_t = z^g_t n^g_t = \exp (\alpha^g_t + \varepsilon^g_t) \left( T^g - \sum_k h^g_{kt} \right). \tag{2}$$

In this equation, $z^g_t = \exp (\alpha^g_t + \varepsilon^g_t)$ is the wage per unit of hour worked and $n^g_t = T^g - \sum_k h^g_{kt}$ is discretionary time devoted to working in the market. The difference between $\alpha^g$ and $\varepsilon^g$ will become apparent below when I restrict attention to allocations with no insurance against changes in $\alpha^g$ and full insurance against changes in $\varepsilon^g$. Changes in $\alpha^g$ are, thus, capturing more permanent changes in earnings that are difficult to insure such as differential long-run shifts in labor demand across skill or occupational groups. Changes in $\varepsilon^g$ are capturing changes in earnings that are easier to insure through asset markets, family transfers, and government transfers. Examples are short unemployment spells, furloughs, and pay reduction programs.

**Sources of heterogeneity.** Households are heterogeneous in their discretionary time, consumption weights, production efficiency at home, and wages. A household is summarized by a sequence $\iota = \{T^f, T^m, \omega^f_0, \omega^m_0, \omega^f_{kt}, \omega^m_{kt}, \theta_{kt}, \alpha^f_t, \alpha^m_t, \varepsilon^f_t, \varepsilon^m_t\}_t$. The analysis focuses on the market and home sectors. Differences in leisure across and within households are captured through differences in discretionary remaining time, $T^f$ and $T^m$, allocated between market and home production. I allow discretionary time to be heterogeneous across and within households but, for simplicity, I assume it is constant over time.

**Planning problems.** I now introduce a sequence of island-level planning problems. An island $\ell$ consists of household $\iota$’s with same $\{T^f, T^m, \omega^f_0, \omega^m_0, \omega^f_{kt}, \omega^m_{kt}, \theta_{kt}, \alpha^f_t, \alpha^m_t, \varepsilon^f_t, \varepsilon^m_t\}_t$. This means that all

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\(^1\)An example of such work is Alesina, Ichino, and Karabarbounis (2011) who develop a collective household model in which differences in bargaining power, perhaps due to cultural or historical reasons from a period of time when physical power mattered, generate gender gaps in career investments and labor supply elasticities. In more recent work, Alon, Doepke, Ohmstead-Rumsey, and Tertilt (2020) model social norms such that a fraction of households, the traditional households, suffer a utility penalty when males work more at home than females.
households in an island share the same sources of heterogeneity except for the \( \varepsilon_t = (\varepsilon^f_t, \varepsilon^m_t) \) components of wages. In every period \( t \), the island-\( \ell \) planning problem is:

\[
\max \left\{ x_{0t}(t), x_{kt}(t), h^f_{kt}(t), h^m_{kt}(t) ; t \right\} \int U(x_{0t}(t), x_{kt}(t), h^f_{kt}(t), h^m_{kt}(t) ; t) d\Phi_t(\varepsilon),
\]

subject to the island-level resource constraint:

\[
\int (x_{0t}(t) + \sum_k p_{kt} x_{kt}(t)) d\Phi_t(\varepsilon) = \sum_g \int z^g_t(\varepsilon) (T^g(\varepsilon) - \sum_k h^g_{kt}(\varepsilon)) d\Phi_t(\varepsilon),
\]

where \( \Phi_t(\varepsilon) \) is the distribution function of households within an island. In the objective function (3), \( U \) is the flow utility in equation (1). Home production is non-tradeable across households within an island, as evidenced by the fact that home technologies are already substituted into utility. The left hand side of the resource constraint (4) is total household expenditures in an island, where \( p_{kt} \) is the price of good \( k \) relative to the market good. The right hand side is total income earned by females and males in an island.

Solving these planning problems has two advantages. First, it allows to derive equilibrium allocations in closed form. Second, the model generates partial insurance against shocks in the market sector. The \( \varepsilon^f_t \) and \( \varepsilon^m_t \) components of wages are fully insurable because planners pool resources across members of the island with different realizations of \( \varepsilon^f_t \) and \( \varepsilon^m_t \). The \( \alpha^f_t \) and \( \alpha^m_t \) components of wages are uninsurable because members of a given island share the same \( \alpha^f_t \) and \( \alpha^m_t \) and they cannot trade securities with members of other islands. While not essential for the results I want to stress, there are decentralizations that generate the same equilibrium allocations as the allocations generated by the planning problems that I study.\(^2\)

**Markets.** Aggregate production is \( Y_t = \sum_g \int \exp(\alpha^g_t(\varepsilon) + \varepsilon^g_t(\varepsilon))(T^g(\varepsilon) - \sum_k h^g_{kt}(\varepsilon)) d\Phi_t(\varepsilon) \), where \( \Phi_t(\varepsilon) \) is the distribution function of households in the economy. Markets for labor and goods

\(^2\)These decentralizations require specific assumptions on the structure of asset markets and on the stochastic processes that govern the sources of heterogeneity. Heathcote, Storesletten, and Violante (2014) is the first model with such a decentralization that generates closed-form solutions for consumption and labor supply. Their decentralization has been extended by Boerma and Karabarbouris (2020) and Boerma and Karabarbouris (2021) in models with multiple home production sectors. The presentation here is closer to Boerma and Karabarbouris (2020) in that I adopt the Ghez and Becker (1975) version of the home production model instead of the Gronau (1986) version used in Boerma and Karabarbouris (2021). The model here extends these papers by adding two household members with heterogeneous substitutability, production efficiency at home, and discretionary time. The theorems that allow to decentralize the planning problems in these papers can be extended here under further assumptions on how \( \alpha^f \) and \( \alpha^m \) are related and an extension of the definition of the island.
are perfectly competitive and the wage per efficiency unit of labor is one. Production $Y_t$ is
transformed at a rate of one into market goods, $\int x_{0t}(t)d\Phi(t)$, and at a rate of $A_{kt}^{-1}$ into home
goods, $\int x_{kt}(t)d\Phi(i)$. Therefore, relative prices equal $p_{kt} = A_{kt}^{-1}$ and henceforth I treat $p_{kt}$ as a
primitive. Goods market clear when $Y_t = \int (x_{0t}(t) + \sum_k p_{kt} x_{kt}(t)) d\Phi(t)$.

**Equilibrium allocations.** An equilibrium consists of allocations $\{x_{0t}, x_{kt}, h_{kt}^f, h_{kt}^m\}$ that: (i) solve
the planning problem in equations (3) and (4); (ii) clear goods and labor markets. I denote by
$\lambda_t(i)$ the multiplier on the island-level resource constraint (4), which equals the marginal utility
of a unit of resources. By the planning problems, all households belonging to the same island
have the same $\lambda_t(i)$. Solving the planning problems, I obtain equilibrium allocations that map
primitives, that is sources of heterogeneity and parameters, into endogenous variables:

$$
\lambda_t(i) = \left( T^f_t(i) \exp(\alpha_t^f(i)) \int \exp(\varepsilon)^d\Phi(i) \varepsilon^f + T^m_t(i) \exp(\alpha_t^m(i)) \int \exp(\varepsilon)^d\Phi(i) \varepsilon^m \right)^{-1},
$$

(5)

$$
x_{0t}(t) = \frac{1}{\lambda_t(i) R_t(i)},
$$

(6)

$$
x_{kt}(t) = \frac{\left( \frac{\omega_{kt}^f(i)}{\omega_{0t}^f(i)} \right)^\phi (p_{kt})^1 - \phi \left( 1 + \left( \frac{\theta_{kt}(i)p_{kt}}{\zeta_t(i)} \right)^\sigma_k - 1 \right) \frac{\phi-\sigma_k}{\sigma_k-1}}{\lambda_t(i) p_{kt} \theta_{kt}(i) R_t(i)},
$$

(7)

$$
h_{kt}^f = \frac{\left( \frac{\omega_{kt}^m(i)}{\omega_{kt}^m(i)} \right)^\phi \left( p_{kt} \right)^1 - \phi \left( 1 + \left( \frac{\theta_{kt}(i)p_{kt}}{\zeta_t(i)} \right)^\sigma_k - 1 \right) \frac{\phi-\sigma_k}{\sigma_k-1}}{\lambda_t(i) \phi_t(i) R_t(i)},
$$

(8)

$$
h_{kt}^m = \frac{\left( \frac{\omega_{kt}^m(i)}{\omega_{kt}^m(i)} \right)^\phi \left( z_t^m(i) \right)^1 - \phi \left( 1 + \left( \frac{\theta_{kt}(i)p_{kt}}{\zeta_t(i)} \right)^\sigma_k - 1 \right) \frac{\phi-\sigma_k}{\sigma_k-1}}{\lambda_t(i) \phi_t(i) R_t(i)},
$$

(9)

with $R_t(i) \equiv 1 + \sum_k \left( \frac{\omega_{kt}^f(i)}{\omega_{kt}^m(i)} \right)^\phi \left( p_{kt} \right)^1 - \phi \left( 1 + \left( \frac{\theta_{kt}(i)p_{kt}}{\zeta_t(i)} \right)^\sigma_k - 1 \right) \frac{\phi-\sigma_k}{\sigma_k-1} + \left( \frac{\omega_{kt}^m(i)}{\omega_{kt}^m(i)} \right)^\phi \left( z_t^m(i) \right)^1 - \phi \left( 1 + \left( \frac{\theta_{kt}(i)p_{kt}}{\zeta_t(i)} \right)^\sigma_k - 1 \right) \frac{\phi-\sigma_k}{\sigma_k-1}$ in the denominators.

Marginal utility $\lambda$ depends only on the realizations of the $\alpha^f$ and $\alpha^m$ components of wages.
This does not imply that spending and time allocation remain constant in response to changes
in other sources of heterogeneity. To see this, I use the solutions into the island-level resource
constraint and rewrite $\lambda$ in terms of endogenous variables:

$$
\lambda_t(i) = \left( x_{0t}(i) + \sum_k p_{kt} x_{kt}(i) + \sum_g \sum_{i} h_{kt}^g(i) \right)^{-1}.
$$

(10)
With log preferences, marginal utility equals the inverse of the market value of total consumption which consists of expenditures on market goods, \( x_0(t) + \sum_k p_{kt}x_{kt}(t) \), and the imputed market value of home production, \( \sum_g z^g(t) \sum_k h^g_{kt}(t) \). In response to shocks other than \( \alpha_f \) or \( \alpha_m \), there is intratemporal substitution between \( x_0 \), \( x_k \), \( h^f_k \) and \( h^m_k \). Equation (5), however, restricts substitution patterns such that \( \lambda \) remains constant.\(^3\)

Using the equilibrium allocations, we can get some insights on the economic forces that determine the allocation of time and spending. Dividing the solution for \( h^f_k \) with the solution for \( x_k \) we obtain:

\[
\frac{h^f_{kt}(t)}{x_{kt}(t)} = \left( \frac{p_{kt}}{z^f_{kt}(t)} \right)^{\sigma_k} (\theta_{kt}(t))^{\sigma_k-1}. \tag{11}
\]

The first term shows that female time in home production relative to expenditures increase with the relative price of expenditures to time, \( p_{kt}/z^f_k \). The second term shows that, when female time and expenditures are substitutes, \( \sigma_k > 1 \), an increase in production efficiency of female time is associated with higher female time relative to expenditures.

For the allocation of time across household members we obtain:

\[
\frac{h^f_{kt}(t)}{h^m_{kt}(t)} = \left( \frac{\omega^f_{kt}(t)}{\omega^m_{kt}(t)} \right)^{\phi} \left( \frac{\phi(\theta_{kt}(t))^{\sigma_k-1}}{(z^f_{kt}(t))^{\sigma_k}} \right) \left[ \left( \frac{1}{\theta_{kt}(t)} \right)^{\sigma_k-1} + \left( \frac{\theta_{kt}(t)}{z^f_{kt}(t)} \right)^{\sigma_k-1} \right]^\frac{\phi-\sigma_k}{\sigma_k-1}. \tag{12}
\]

The key comparative static is how changes in the relative price of expenditures \( p_k \) affect the allocation of time across members of the household. An increase in \( p_k \) causes households to substitute away from the female commodity bundle toward male production which becomes relatively cheaper. This effect is parameterized by the elasticity of substitution across commodities \( \phi \). At the same time, an increase in \( p_k \) causes households to substitute away from expenditures which are more expensive toward female time. This effect is parameterized by the elasticity of substitution within commodities \( \sigma_k \). When \( \sigma_k > \phi \), the latter effect dominates and higher \( p_k \) is associated with higher ratio of time inputs \( h^f / h^m \).

\(^3\)The constancy of \( \lambda_t \) in response to uninsurable shocks that originate in the home sector may appear surprising. This result is special to the log specification of utility with respect to the consumption aggregator in equation (1). Log preferences generate a separability between \( (\omega_0, \omega^f_{kt}, \omega^m_{kt}, \theta_{kt}) \) and the marginal utility.
Application

I specialize the model to two sectors, the market sector \( c_0 = x_0 \) and the home sector that produces childcare using childcare expenditures and time spent with kids by females and males, \( c_k(x_k, h_k^f, h_k^m) \). I proceed in four steps. First, I input to the model parameters and pre-pandemic consumption and time allocation data. Second, I discuss the identification of sources of heterogeneity such that the model matches perfectly the pre-pandemic data. Third, I perturb the model with aggregate shocks in the \( \varepsilon \)'s, the \( \alpha \)'s, the \( \omega \)'s, and \( p_k \) and study labor supply responses. Finally, I compare the new allocations with the post-pandemic observations documented in the paper.

Inputs to the model. I use parameter values \( \sigma_k = 3 \) and \( \phi = 0.8 \), which imply that female time spent on childcare is more substitutable than male time with childcare expenditures. The upper panel of Table 1 shows data on consumption and time allocation for two hypothetical households before the pandemic. The households belong to different islands. In the household without kids, both spouses earn a wage of 1 per hour and both spouses work 40 hours in the market and 0 hours at home. The household without kids spends 80 on market goods and 0 on home goods. In the household with kids, both spouses earn a wage of 1 per hour and work 40 hours in the market. The difference with the first household is the female member spends 30 hours on childcare whereas the male member spends only 5 hours. The household with kids spends 72 on market goods and 8 on goods used in home production.

Identification of sources of heterogeneity. Next, I choose sources of heterogeneity across households such that the allocations generated by the model match perfectly with the pre-pandemic data. In the bottom panel of Table 1, the household without kids has a weight on market goods \( \omega_0 = 1 \) and female production efficiency \( \theta_k = 1 \). To account for differences in expenditures across households, the household with kids has a weight on market goods \( \omega_0 = 0.63 \), a weight on female commodities \( \omega_k^f = 0.35 \), and a weight on male commodities \( \omega_k^m = 0.02 \). The model generates gender gaps in time

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\[ \omega_k^f = 0.35, \quad \omega_k^m = 0.02 \]

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The Appendix shows how to invert equations (5) to (9) and identify the sources of heterogeneity. Consumption weights are normalized such that \( \omega_k^f(\iota) + \sum_k (\omega_k^f(\iota) + \omega_k^m(\iota)) = 1 \). The \( \alpha_k^m(\iota) \) or \( \alpha_k^f(\iota) \) sources of heterogeneity are not identified because they both account perfectly for a given market value of total consumption \( x_0(\iota) + \sum_k p_k x_k(\iota) + \sum_g z_g^f(\iota) \sum_k h_k^f(\iota) \). However, this lack of identification is inessential for the comparative statics.
Table 1: Data and Sources of Heterogeneity for Two Households

<table>
<thead>
<tr>
<th>Household data</th>
<th>$z^f$</th>
<th>$z^m$</th>
<th>$n^f$</th>
<th>$n^m$</th>
<th>$h^f_k$</th>
<th>$h^m_k$</th>
<th>$x_0$</th>
<th>$p_k x_k$</th>
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<td>no kids</td>
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<td>40</td>
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<td>0</td>
<td>80</td>
<td>0</td>
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<tr>
<td>with kids</td>
<td>1</td>
<td>1</td>
<td>40</td>
<td>40</td>
<td>30</td>
<td>5</td>
<td>72</td>
<td>8</td>
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</table>

<table>
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<tr>
<th>Sources of heterogeneity</th>
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<th>$\omega^f_k$</th>
<th>$\omega^m_k$</th>
<th>$\theta_k$</th>
<th>$\alpha^f$</th>
<th>$\alpha^m$</th>
<th>$\varepsilon^f$</th>
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<td>0</td>
</tr>
<tr>
<td>with kids</td>
<td>0.63</td>
<td>0.35</td>
<td>0.02</td>
<td>1.94</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>

allocations for the household with kids when its female production efficiency at home, $\theta_k = 1.93$, exceeds the efficiency of the household without kids. Equation (11) is useful in understanding this result. The social norm is that, with $\sigma_k > 1$, a higher $\theta_k$ leads households with kids to allocate more resources to female time than to expenditures relative to households without kids.\(^5\)

_Perturbation of the model with aggregate shocks._ I perform comparative statics by changing the insurable component of wages $\varepsilon^f$ and $\varepsilon^m$, the uninsurable component of wages $\alpha^f$ and $\alpha^m$, the consumption weights $\omega_0, \omega^f_k, \omega^m_k$, and the price of home produced goods $p_k$. The shocks are aggregate in the sense that they affect both households equally. Owing to the planning problems, the model does not have any state variables and I consider changes across periods without specifying whether these changes are persistent or transitory and unexpected or anticipated.

Figure 1 plots comparative statics of market hours with respect to wages. Left panels display the comparative statics for the household without kids and right panels for the household with kids. In each panel, the solid line is for the female member of the household and the dashed line is for the male member of the household. Market hours are always normalized to 1 in the initial pre-pandemic equilibrium. Each line traces the change in market hours as we change the insurable component of female wages $\varepsilon^f$, the insurable component of male wages $\varepsilon^m$, the

\(^5\)For the household without kids I assume $h^f_k = h^m_k = x_k$ and that all these variables are very close to zero but positive. This generates a production efficiency $\theta_k = 1$. 

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Figure 1: Effects of Wages on Market Hours
uninsurable component of female wages $\alpha^f$, and the uninsurable component of male wages $\alpha^m$.

Beginning with the four upper panels, we observe that female market hours decline in response to a decline in $\varepsilon^f$ only for the household with kids. While significantly smaller in magnitude, male market hours decline in response to a decline in $\varepsilon^m$ again only for the household with kids. Because changes in the $\varepsilon$’s are insurable and do not affect the marginal utility $\lambda$, the curves shown in the two upper panels are Frisch labor supply curves.

What explains the difference in $\lambda$-constant labor supply responses across and within households? Using the time constraint $n^g + h^g_k = T^g$, the elasticity of labor supply with respect to changes in the insurable component of wages equals:

$$\frac{\partial n^g}{\partial \varepsilon^g} \frac{\varepsilon^g}{n^g} = -\frac{h^g}{n^g} \times \left( \frac{\partial h^g}{\partial \varepsilon^g} \frac{\varepsilon^g}{h^g} \right).$$

The Frisch elasticity of labor supply depends on the share of time devoted to home production, as shown by the first term in the right hand side of equation (13). For the household without kids, this share is zero for both spouses and, thus, both spouses have a zero Frisch elasticity of labor supply. For the household with kids, females have a significantly larger share of home production time than males and, thus, experience significantly larger responses in their market hours. To get a sense of quantitative magnitudes, female with kids have a Frisch elasticity of roughly 1 for 10 percent decline in wages and a Frisch elasticity of roughly 1.5 for 20 percent decline in wages. For males with kids, the corresponding Frisch elasticities are 0.1 and 0.15. Frisch elasticities increase with the size of the wage shock because, in response to larger wage changes, the share of time devoted to home production increases.

In the four bottom panels, I plot changes in market hours in response to uninsurable changes in wages, $\alpha^f$ and $\alpha^m$. With log preferences and no home production, income and substitution effects from uninsurable changes in wages cancel out. This logic explains why market hours are unresponsive to $\alpha^f$ and $\alpha^m$ for the household without kids. In models with home production, intratemporal substitution may attenuate or strengthen the substitution effect. As shown in the panels, own elasticities of labor supply are positive for both members but substantially larger for females than for males. This difference comes from the assumed elasticity values $\sigma_k = 3$ and $\phi =$
0.8. Substitution effects are substantially stronger than income effects for females because their time is substitutable with expenditures. Substitution effects are roughly of the same magnitude as income effects for males because their time is complementary to expenditures.\footnote{Cross-elasticities of labor supply are negative and substantially larger for females, again, reflecting the higher substitutability of female time.}

The two upper panels of Figure 2 plot comparative statics with respect to the price of home goods \( p_k \). An increase in \( p_k \) lowers market hours for females with kids and does not affect males with kids or households without kids. The gender gap for households with kids reflects again the higher substitutability of female time with expenditures. The difference across the two households reflects differences in initial pre-pandemic expenditure shares. A change in relative prices does not affect significantly the allocation of expenditures and time for the household without kids because its initial expenditure share on home goods is zero.
The two lower panels of Figure 2 plot comparative statics with respect to the consumption weight on market goods $\omega_0$. For this comparative static, I allocate the remaining weight proportionally between $\omega_f^k$ and $\omega_m^k$. Thus, as shown in equation (12), changes in $\omega_0$ do not affect the ratio of time inputs $h_f^k/h_m^k$. Because time inputs are equalized for the household without kids, a decline in $\omega_0$ leads to an equal percent decline in market hours. For the household with kids, female market hours decline by more in percent terms than male market hours. The logic is that the time constraint is additive and, therefore, the same percent change in home production time necessitates a larger percent decline in market hours for the household member who performs the larger share of home production.

Comparison between U.S. data and theoretical allocations. In evaluating the implications of the model, I now use three key observations of Alon, Coskun, Doepke, Koll, and Tertilt (2021) for the United States. Total market hours decline by roughly $\Delta_t(\log n) = -0.36$. The gender gap in market hours for households without kids is $\Delta_t\Delta_g(\log n \mid \text{no kids}) = -0.06$. The gender gap in market hours for households with kids is $\Delta_t\Delta_g(\log n \mid \text{with kids}) = -0.18$. The last two statistics can be understood as differences-in-differences conditional on household status. The difference between the two, that is the “triple difference” equal to -0.12, shows that females in households with kids experienced a larger decline in their market hours than females in households without kids relative to the pre-pandemic state.

How do these statistics compare to the theoretical labor supply responses? Insurable shocks to wages $\varepsilon_f$ and $\varepsilon_m$ generate a gender gap in decline in market hours for households with kids. However, if Frisch elasticities of labor supply are low, these shocks cannot account for the significant common component of the decline across all demographic groups. Uninsurable shocks to wages $\alpha_f$ can account for the decline in market hours of females with kids, but drive market hours of spouses in the opposite direction. The increase in the price of home-produced goods $p_k$ generates a

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7Given elasticities, the statistics in the paper are informative about the shocks driving labor supply patterns. Alternatively, given observed shocks, the statistics are informative about elasticities. Without externally identified shocks, which is likely the case for the pandemic recession accompanied by school closures and lockdowns, one could use other time periods to infer elasticities and hope that elasticities did not change much during the pandemic. Here I explore this route in the sense that I use elasticities from knowledge of prior samples.
substantial decline in the market hours of females with kids but does not affect other demographic groups. In light of the observations of Alon, Coskun, Doepke, Koll, and Tertilt (2021), the most promising driver of the decline in market hours in the pandemic is the reallocation of the consumption bundle away from market goods toward home goods $\omega_0$. The decline in $\omega_0$ generates declines in market hours for all demographic groups. Further, it generates a substantial gender gap for households with kids but not for households without kids.\(^8\)

**Conclusion**

Alon, Coskun, Doepke, Koll, and Tertilt (2021) document patterns of women’s and men’s labor supply during the pandemic recession. I develop a model of consumption and time allocation to answer two questions. First, are the observations informative about the causes of the decline in market hours? I find that the observations are useful in discriminating between the drivers of labor supply in the pandemic recession relative to other recessions. Market hours during the pandemic recession are mainly driven by a reallocation of the consumption bundle away from market goods toward home goods such as childcare. This reallocation generates a decline in labor supply for all groups. Additionally, the reallocation also accounts for the gender gap in decline in labor supply for households with kids but not for households without kids, as social norms lead women with kids to enter the pandemic with a larger share of home duties than men. Different from the pandemic recession, previous recessions are better thought as labor demand shocks that fall disproportionally on men who work in more cyclical market sectors such as construction, manufacturing, and finance.

Second, is the larger impact of the pandemic on women’s labor supply puzzling or concerning? The gender gap in decline in labor supply is not particularly puzzling or concerning when filtered through the lens of the model. Labor supply theory predicts that women’s labor supply is more elastic than men’s when women perform a larger share of home duties. Thus, in response to

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\(^8\)The inference of shocks driving market hours in the pandemic would be sharper if it also incorporated data on expenditures. I speculate such data would attribute a more important role to $p_k$ as it is plausible that households substituted between market goods and home goods in categories outside of childcare (for example, food at home or home improvements). The application would need to be augmented to allow households without kids to also perform home production in these alternative activities.
common shocks such as the reallocation of economic activity toward the home sector, we expect women’s labor supply to decline by more. As argued before with the help of the solution for the marginal utility $\lambda$, this reallocation is such that $\lambda$ remains constant over the pandemic for all households. Additionally, there is full risk sharing within households because all household members share the same consumption bundle. Therefore, one may be tempted to conclude that the larger decline in market hours of women during the pandemic is as concerning as the larger decline in market hours of men during previous recessions.\(^9\)

References


\(^9\)Intratemporal substitution between market and home production provides implicit insurance against shocks that originate in the market sector. This means that total consumption, $\lambda^{-1}$ in the model, is smoother than expenditures, $x_0 + \sum_k p_k x_k$ in the model, in response to market shocks. Alon, Doepke, Olmstead-Rumsey, and Tertilt (2020) examine time-varying social norms in a model of consumption and time allocation with heterogeneous households. Changes in social norms toward modern family organizations with more equal division of home production weakens intratemporal substitution and strengthens the added worker effect. In the model, such a change can be conceptualized as a convergence of the elasticity $\sigma_k$ toward the elasticity $\phi$ together with $\theta_k = 1$.\]
Appendix

In this appendix I show how to identify sources of heterogeneity. The strategy is to invert equations (5), (6), (7), (8), and (9) and write the sources of heterogeneity as functions of expenditures $x_0, x_k$, time $h_k^f, h_k^m$, and wages $z^f, z^m$. Dropping time $t$ and household $i$ subscripts for convenience, I obtain:

$$
\theta_k = \left( \frac{x_k}{h_k^f} \right)^{1-\sigma_k} \left( \frac{p_k}{z^f} \right)^{\sigma_k-1},
$$

(A.1)

$$
\frac{\omega_k^f}{\omega_0} = p_k \left( \frac{x_k}{x_0} \right)^{1-\phi} \left( 1 + \left( \frac{\theta_k p_k}{z^f} \right)^{\sigma_k-1} \right)^{\frac{\sigma_k-\phi}{\sigma_k-1}},
$$

(A.2)

$$
\frac{\omega_k^m}{\omega_0} = z^m \left( \frac{h_k^m}{x_0} \right)^{1-\phi},
$$

(A.3)

$$
\frac{\omega_0}{1 + \sum_k \left( p_k \left( \frac{x_k}{x_0} \right)^{1-\phi} \left( 1 + \left( \frac{\theta_k p_k}{z^f} \right)^{\sigma_k-1} \right)^{\frac{\sigma_k-\phi}{\sigma_k-1}} + z^m \left( \frac{h_k^m}{x_0} \right)^{1-\phi} \right)}
$$

(A.4)

$$
\lambda(\alpha^f, \alpha^m; d\Phi(\varepsilon)) = \left( x_0 + \sum_k p_k x_k + \sum_g z^g \sum_k h_k^g \right)^{-1},
$$

(A.5)

$$
\varepsilon^f = \log z^f - \alpha^f,
$$

(A.6)

$$
\varepsilon^m = \log z^m - \alpha^m.
$$

(A.7)

Equation (A.5) shows that $\alpha^m$ and $\alpha^f$ are not identified because they both can account perfectly for a given market value of total consumption $x_0 + \sum_k p_k x_k + \sum_g z^g \sum_k h_k^g$. In the application, I have fixed $\alpha^f$ and used equation (A.5) to infer $\alpha^m$. This is without loss in generality for any of the comparative statics or conclusions.