SVERIGES RIKSBANK
WORKING PAPER SERIES

349

Manufacturing Decline and House Price Volatility

Isaiah Hull, Conny Olovsson, Karl Walentin and Andreas Westermark

September 2018

WORKING PAPERS ARE OBTAINABLE FROM

www.riksbank.se/en/research
Sveriges Riksbank • SE-103 37 Stockholm
Fax international: +46 8 21 05 31
Telephone international: +46 8 787 00 00

Manufacturing Decline and House Price Volatility[*]

Isaiah Hull
Sveriges Riksbank

Conny Olovsson
Sveriges Riksbank

Karl Walentin[†]
Sveriges Riksbank

Andreas Westermark
Sveriges Riksbank

Sveriges Riksbank Working Paper Series

No. 349

September 2018

Abstract

Using a unique dataset of all Swedish housing transactions over the 2009-2017 period, we find that an increase in manufacturing's share of employment is positively associated with house price growth volatility and negatively associated with risk-adjusted housing returns. Both effects appear to be related to manufacturing's impact on firm concentration, employment growth volatility, and economic uncertainty. Moreover, as we demonstrate in an application, our results have implications for portfolio choice. They also suggest that the manufacturing decline since 1970 could account for a 32% reduction in house price volatility in Sweden, and similar reductions in the U.S., U.K., and Japan.

Keywords: House Prices, Portfolio Choice, Manufacturing, Volatility

---

[*] We would like to thank Fabio Canova, Greg Howard, Thomas Jansson, Jack Liebersohn, Sydney Ludvigson, Xin Zhang, and various seminar and conference participants for their comments and suggestions. An earlier version of the paper was circulated under the title "The Granular Origins of Aggregate House Price Volatility." The opinions expressed in this article are the sole responsibility of the authors and should not be interpreted as reflecting the views of Sveriges Riksbank.

[†] Corresponding author: Karl Walentin. Email: karl.walentin@riksbank.se. Tel: + 46 8 787 04 91. Fax: +46 8 0821 05 31. Research Division, Sveriges Riksbank, SE-103 37, Stockholm, Sweden.

1 Introduction

Existing work has shown that manufacturing is a volatile sector that affects aggregate output volatility (Carvalho and Gabaix, 2013), and local and regional house price growth (Case and Mayer, 1996; Howard and Liebersohn, 2018). We examine how manufacturing affects house price growth volatility using a unique dataset of all property transactions in Sweden over the 2009-2017 period.[1] This question is relevant in many high income countries, where the manufacturing share of employment has declined by 10-20ppt since the 1970s.[2] Furthermore, as recent work has shown (Kuhn et al., 2018), households with below-median income have historically held few assets besides housing. Thus, shifts in house price volatility have substantial implications for portfolio choice and welfare.

The dataset we construct allows us to exploit geographic and time variation to identify the impacts of manufacturing share, firm concentration, and manufacturing news on house price growth volatility. We also measure the impact on housing Sharpe ratios directly. Furthermore, the comprehensive geographic coverage enables us to measure national, regional, local, and idiosyncratic house price growth volatility. We are not aware of any other research that has measured all geographic levels of volatility and has explored the relationship between those measurements and the manufacturing sector. The existing literature does, however, provide measurements of house price volatility at the property level. This was first done by Flavin and Yamashita (2002). More recent work also relates variation in this measure of volatility to local income.[3]

Our dependent variable in most regression exercises is house price growth volatility, measured at the property-level. We construct this variable by first computing returns

---

[1] See Zhou and Haurin (2010) for an overview of house properties that typically generate volatility. They use American Housing Survey data to show that volatility is typically higher for very high and very low quality homes, atypical homes, "land leveraged" homes, and minority-owned homes.

[2] See Charles et al. (2013) and Charles et al. (2018) for an overview of the impact of manufacturing's decline on employment, the labor market, and drug abuse.

[3] Hartman-Glaser and Mann (2017) find that ZIP code level income and income volatility are associated with house price volatility. Peng and Thibodeau (2017) and Peng and Thibodeau (2013) find that low income ZIP codes tend to have higher house price volatility. Furthermore, they show that households do not receive compensation for this higher volatility in the form of faster house price appreciation.

on repeat sales and then applying the Davidian and Carroll (1987) method to obtain the property level instantaneous volatility.[4] The first exercise estimates the impact of manufacturing share at the region level in 2008 on our measure of volatility for housing transactions between 2009 and 2017. We find that a 10 percentage point (ppt) increase in the manufacturing share implies a 0.79 to 1.42ppt increase in house price growth volatility. For the median property, this is equivalent to a 12% to 21% increase in house price growth volatility. These results are largely invariant to specification and remain significant whether we adjust standard errors for heteroskedasticity and autocorrelation or cluster them at the narrowest geographic unit. We also show that the results hold both in an instrumental variables (IV) setting and also when volatility is aggregated up to the regional level in a cross-sectional regression. Furthermore, the dynamic regressions are robust to the inclusion of geographic fixed effects, which capture the impact of Saiz-style (2010) measures of housing supply elasticity on house price volatility. This suggests that the effect measured in our dynamic regressions is likely to be related to demand-driven factors, such as expected future income and employment.

One explanation for the association between manufacturing share and house price growth volatility is that a higher manufacturing share may generate increased volatility in employment. Higher employment volatility could generate fluctuations in housing demand, which would increase house price volatility. This relationship has been documented in existing work for manufacturing share and output volatility (Carvalho and Gabaix, 2013). Additionally, the literature has demonstrated an association between house price growth and manufacturing share (Case and Mayer (1996) and Howard and Liebersohn (2018)). We find that regional variation in employment growth volatility is positively associated with house price growth volatility. In particular, when we include employment growth volatility in a regression of house price growth volatility on manufacturing share of employment, we find that the magnitude of the coefficient

---

[4] This measure has been used in finance (e.g. Schwert (1989)), macroeconomics (e.g. McConnell and Perez-Quiros (1990)), and real estate economics (e.g. Goodman and Thibodeau (1998)).

on manufacturing share is reduced by 39%. Furthermore, removing manufacturing share increases the magnitude of the coefficient on employment growth volatility by 80%. This suggests that manufacturing share may at least partially affect house price volatility through employment growth volatility.

Another possible explanation for this phenomenon is that manufacturing might tend to increase the concentration of income, employment, and output. In our sample, for instance, 9 of 15 of the largest employers in Sweden are manufacturers, even though manufacturing employs less than 15% of the workers. Thus, areas dominated by manufacturing might be more vulnerable to firm-specific shocks. We test this hypothesis by evaluating how firm concentration affects house price growth volatility. We do this by constructing local Herfindahl-Hirschman Indices (HHIs). A high HHI value implies high firm concentration, indicating that local employment and income are more exposed to firm-specific shocks. Our preferred regression specification includes region-time fixed effects, time-varying local controls, and property level controls. We find that a one standard deviation increase of the local HHI index is associated with with a 1.01 to 1.45ppt increase in house price growth volatility. For the median property, this is equivalent to a 15% to 21% increase in house price growth volatility. These findings are largely invariant to the choice of specification and are robust to choice of standard error adjustment.

We further test the hypothesis about manufacturing's impact on income, employment, and output concentration by estimating how sensitive house price growth volatility is to news about manufacturing. We do this by collecting a novel dataset of newspaper articles on the largest manufacturers in Sweden. Using these articles, we construct an index that measures the intensity with which they were referenced in the news in each month over the 2009-2017 period. We show that an increase in news about manufacturers is associated with an increase in the volatility of house price growth in the areas in which manufacturing establishments are located. In particular, a one standard deviation increase in the news coverage of manufacturers is associated with a 0.17 to 0.31ppt increase in house price growth volatility. This is equivalent to a volatility increase of 2.6 to 4.5% for the median household.

To reinforce our results on news, we expand the period we consider, but focus narrowly on the relationship between manufacturing news and house price news. Specifically, we evaluate whether the topics of manufacturing and house prices have comoved historically in newspapers. We do this by constructing a unique dataset of all articles in one of Sweden's largest newspapers over the 1850-2017 period. This includes both Sweden's Industrial Revolution, where manufacturing rose as a share of output, and the ensuing decline. We then identify all articles that reference manufacturing and identify all articles that reference house prices. We are also able to determine the location associated with each reference, which allows us to construct manufacturing and house price news series for 20 regions. We find that a one standard deviation increase in manufacturing news is associated with a 0.61 standard deviation increase in house price news at the region level. Note that this estimate includes time fixed effects, which remove growth and business cycle components at the national level, and region fixed effects. We also show that the effect of manufacturing news appears to operate partly through the creation of economic uncertainty.

Finally, we evaluate whether the house price growth volatility associated with manufacturing is compensated for by higher returns, and find that it is not. Both manufacturing itself and the channels through which it generates house price growth volatility are associated with lower Sharpe ratios. A 10ppt increase in manufacturing is associated with a 0.22 to 0.25ppt reduction in the housing returns Sharpe ratio, which suggests that the decline in manufacturing's share since the 1970s may have made housing a better investment. Similarly, a doubling of firm concentration is associated with a Sharpe ratio reduction of 0.16 to 0.21ppt.

Beyond our empirical results, we work through two applications that highlight the importance of our findings. The first evaluates the portfolio choice implications of a positive association between manufacturing share and house price growth volatility. Among other things, we show that the portfolio component of a homeowner's location choice can be distilled to a comparison between housing return volatilities and income covariances with housing returns across different cities. Furthermore, under reasonable assumptions, we show that manufacturing workers can typically improve their welfare by living and working in different cities, as long as non-portfolio considerations, such as commuting costs, do not dominate. To the contrary, it is often optimal for those in the service sector to live and work in the same place.

Our second application aggregates our estimates up to the national level and examines the implication of the decades-long decline in manufacturing's share of employment. We show that this could explain part of the reduction in house price growth volatility during the Great Moderation in high income countries, such as Sweden, the U.S., the U.K., and Japan.[5] In particular, the 16ppt manufacturing employment share reduction in Sweden since 1970 could account for a 2.2ppt (32%) decline in house price growth volatility. Similarly, the 17.5ppt decline in manufacturing share in the U.S. since 1970 would account for a 2.5ppt decline in house price growth volatility. It would also account for volatility reductions of 3.3ppt in the U.K. and 1.4ppt in Japan. Furthermore, it is possible that this could have improved the attractiveness of homeownership.

The paper is organized as follows. Section 2 describes the data. Section 3 describes our empirical strategy and results. Section 4 presents two applications of our empirical findings. And finally, Section 5 concludes.

2 Data

Our main exercises use a unique dataset that consists of all property transactions in Sweden over the 2009-2017 period. Each observation contains the sales date, final price, property type, street address, GPS coordinates, number of rooms, and area in square meters. It also contains each property's region, municipality, and parish, which we recover by reverse geocoding its GPS coordinates. Note that we use the term "region" to refer to the largest subnational administrative unit, "municipality" to refer to the

---

[5] Mack and Martinez-Garcia (2012) find that house price growth volatility experienced a secular decline that coincided with the Great Moderation.

second largest, and "parish" to refer to the smallest.[6]

We limit the sample to properties that were sold at least twice over the 2009-2017 period and compute annualized returns for each sales pair. Following Landvoigt et al. (2015), we drop abnormal returns ($> 50\%$) and sales pairs with a short holding period ($< 6mo.$). This leaves us with 44,895 properties with at least two sales. Additionally, we compute the time between sales and the number of transactions per parish-quarter.

In addition to property transaction data, we also collect the number of establishments located within commuting distance (25km) of the GPS coordinate centroid of each parish for the 15 largest employers in Sweden: Volvo, Ericsson, Electrolux, Svenska Cellulosa, Scania, Atlas Copco, Sandvik, SKF, Assa Abloy, Vattenfall, ICA, Securitas, Telia, Axel Johnson, and H&M. The centroid is computed as the average latitude and longitude of all properties located within the same parish. We also compute the distance in kilometers between each property and its parish and region centroids.[7]

In addition to the housing dataset, we also assemble all newspaper articles between the 2009-2017 period in the main Swedish business newspaper, Dagens Industri. We use these articles to identify all references to the largest manufacturers: Volvo, Ericsson, Electrolux, Svenska Cellulosa, Scania, Atlas Copco, Sandvik, SKF, and Assa Abloy. We then divide the number of references by the total number of articles, giving us the share of all news that is attributable to the largest manufacturing firms at a monthly frequency. We deseasonalize this news using the X-13 ARIMA-SEATS method and detrend it using Hodrick-Prescott filtering.

Our regressor of interest in most specifications is manufacturing's share of employment at the region level. We use both time-varying (annual) and static measures. For the static case, we always use the 2008 value, which predates our sample and limits potential endogeneity issues. For the dynamic case, we use the contemporaneous value of the manufacturing share for the years it is available (2009-2015). This variable is

---

[6] Län, kommun, and församling are Swedish geographic designations that roughly translate to "county," "municipality," and "parish." We avoid the direct translation to county to avoid confusion with U.S. counties. As a share of the country's size, Swedish counties are closer to U.S. states than to U.S. counties.

[7] Since each centroid is defined as the mean GPS coordinates for a region or parish, distance to the centroid may capture distance to the urban or residential center.

constructed by Statistics Sweden. In addition to manufacturing's share of employment, we also use manufacturing's share of income and output in different regressions.

Finally, we collect controls for population density, real per capita income, real per capita income growth, and employment growth for 20 of the 21 subnational regions.[8] These variables are produced by Statistics Sweden. Population density is measured annually and is defined as persons per square kilometer. Real per capita income is measured annually and is used to compute real per capita income growth. Nominal income is deflated to real per capita income using the consumer price index. Employment growth is computed as the percentage change in the number of individuals employed in a given region since the previous quarter. For all level variables, we use either the 2008 value or the time-varying values as controls, depending on the regression specification.

The aforementioned descriptive statistics at the property and region level are shown in Table 1. Figure 1 contains two region level maps of Sweden. Subfigure (a) shows the geographic distribution of house price growth volatility. Subfigure (b) shows manufacturing's share of employment. A darker shade indicates higher volatility in (a) and a higher manufacturing share in (b).

3 Empirical Results

We first regress property-level returns, r_{jt}, from repeat sales[9] on location-time fixed effects, γ_{kt}, and a vector of property level controls, X_{jt}. Property-level controls include area in square meters, distance to parish centroid, dummies for property type, dummies for number of rooms, number of months between transaction dates, and number of transactions that occurred in the same quarter and parish.

---

[8] We omit one region for which the number of housing transactions is insufficient for inclusion in our empirical exercises.

[9] Unlike Giacoletti (2017), we do not have access to remodeling expenses and do not differentiate between idiosyncratic volatility generated by non-stochastic, unobserved expenditures and other sources; however, this is unlikely to affect our results, since we are primarily interested in volatility at the parish, region, and national levels.

$$r_{jt} = X_{jt}\beta + \gamma_{kt} + \epsilon_{jt}. \tag{1}$$

In equation (1), t refers to the time period, j to the property, and k to the geographic location. We use a quarterly time period in all specifications. For the location, we use parish, which is the narrowest available geographic unit. We pool fixed effects for small parishes with fewer than 100 sales; however, the results are qualitatively similar if we drop them or instead use municipality or region, rather than parish.

We next extract the regression residuals:

$$\hat{\epsilon}_{jt} = r_{jt} - X_{jt}\hat{\beta} - \hat{\gamma_{kt}}. \tag{2}$$

We use an unbiased, instantaneous estimator of the standard deviation of ϵ_{jt} as our measure of volatility, which was introduced by Davidian and Carroll (1987) and has been widely used in finance (e.g. Schwert (1989)), macroeconomics (e.g. McConnell and Perez-Quiros (1990)), and urban economics (e.g. Goodman and Thibodeau (1998)):

$$\hat{\sigma}_{jt} = \sqrt{\frac{\pi}{2}}|\hat{\epsilon}_{jt}|. \tag{3}$$

Note that equation (2) removes the national, regional, and local components of the house price growth trend, but does not detrend the equivalent components of volatility. Since our dataset contains national, regional, local, and idiosyncratic variation, $\hat{\sigma}_{jt}$ will capture changes in all volatility components. This includes both the time-varying and cross-sectional components.

3.1 Manufacturing Sector Share

We first test the hypothesis that dependence on manufacturing increases house price growth volatility. We do this by exploiting region and region-time variation in manufacturing, which Carvalho and Gabaix (2013) identify as a volatile sector:

$$\hat{\sigma}_{jt} = M_{it}\zeta + X_{jt}\theta + Z_{it}\eta + \xi_t + \mu_k + \nu_{jt}. \tag{4}$$

In equation (4), M_{it} is manufacturing's share of employment, income, or output in region i at time t; X_{jt} is a vector of property level controls; Z_{it} is vector of region level controls; ξ_t is a time fixed effect; and μ_k is a parish fixed effect.

Table 2 contains our baseline results. Note that we adopt a commonly-used measure of volatility that is constructed by performing the equation (1) regression with parish-year-quarter fixed effects. For parishes with fewer than 100 repeat sales, we pool fixed effects. Column 1 tests our core hypothesis using manufacturing's share of employment at the region level in 2008. No controls are included. Column 2 adds yearly fixed effects and columns 3-9 include year-quarter fixed effects. Columns 4-9 include property level characteristics as controls: area in square meters, dummies for the number of rooms, dummies for the property type, and distance from the region's center in kilometers, the number of months between transaction dates, and the number of transactions that occurred in the same quarter and parish.

Other than $distance\_to\_region\_center_j$, the distance between a property and its region's GPS centroid, and $months\_between\_transactions_{jt}$, the number of months between the pair of transactions in a repeat sale, we omit all property level controls from the tables to save space and improve readability.[10] Column 5 includes static, region level controls for the log of population density and the log of real per capita income. And finally, columns 6-9 include time-varying controls for the log of real income per capita (annual), the log of population density (annual), real per capita income growth (annual), and employment growth (quarterly). Column 7 clusters standard errors at the parish level. All other columns use heteroskedasticity and autocorrelation robust standard errors.[11] Note that time-varying controls are not available for all years at the

---

[10] Note that $months\_between\_transactions_{jt}$ is negative and significant at 1% in all specifications, which coincides with findings for the U.S. in Giacoletti (2017).

[11] As a convention, we provide heteroskedasticity and autocorrelation robust standard errors for all results. We also include separate cluster robust standard errors for each table's main result. Neither choice yields consistently smaller standard errors.

region level. Including them forces us to reduce our sample size from 43,009 to 14,972. Note also that we cannot use parish fixed effects in this specification because we only have variation in the regressor of interest at the region level.

Our preferred specifications are given in columns 5 and 6. Note that the coefficients on manufacturing employment share are positive and significant at the 1% level and indicate that a unit increase in manufacturing's employment share would increase house price growth volatility by between 7.9 and 14.2ppt, depending on specification. Since manufacturing share ranges from 0 to 1, it may be more instructive to compare the region with the lowest manufacturing share of employment in 2008, Stockholm (0.145), to the region with the highest, Kalmar (0.366). This would translate into a 1.75 to 3.14ppt increase in house price growth volatility. For the median property, this is equivalent to a 26% to 46% increase in house price growth volatility. Finally, our results for manufacturing's share of income and output at the region level in 2008 are both significant at the 1% level and quantitatively similar to our baseline results. They also hold and explain a high share of variation in aggregate and local volatility in a separate cross-sectional regression.[12]

We next extend our initial result by using a time-varying measure of manufacturing's share of employment in columns 1-8 of Table 3. This enables us to include parish fixed effects to soak up cross-sectional variation that could comove with manufacturing's share. We also include time-varying region level controls, year-quarter fixed effects, and property level controls in our preferred specifications, which are shown in columns 5 and 8. Note that column 2 uses an IV specification, where manufacturing's employment share is instrumented by a one period lag of itself.[13] All other columns use OLS. Additionally, all columns use heteroskedasticity and autocorrelation robust standard errors, except column 8, which clusters standard errors at the parish level. Again, we find that the impact of manufacturing's share of employment on house price

---

[12] We perform a separate cross-sectional regression of the region mean of property volatility on the average manufacturing shares of income, output, and employment. The regression on output yields the largest coefficient (18.93) and adjusted R-squared (0.388).

[13] The purpose of the IV exercise is provide further evidence that reverse causality and omitted variable bias are unlikely to be driving our results.

growth volatility remains positive and is statistically significant in all specifications. The magnitude of the effect is similar to what we identified in Table 2. Namely, a 10ppt increase in manufacturing share is associated with a 0.78 to 1.42ppt increase in house price growth volatility.

3.2 Employment Growth Volatility

We next test the hypothesis that manufacturing employment share drives house price growth volatility through employment growth volatility. In columns 9-10 of Table 3, we include employment growth volatility as a regressor. We compute this control as the standard deviation of region level employment growth over the 2009-2017 period. Comparing columns 5 and 9, we can see that manufacturing's employment share remains significant, but its magnitude declines from 20.3 to 12.7. Similarly, removing manufacturing's employment share in column 10 increases the magnitude of employment growth volatility from 1.34 to 2.43. This suggests that the impact that manufacturing's share of employment has on house price growth volatility may be related to the impact it has on employment growth volatility.[14]

We also consider whether manufacturing explains a substantial share of the cross-sectional variation in region-level volatility. We do this in a set of cross-sectional regressions, shown in Table 4, where we regress the region level mean of property volatility on the region level employment growth volatility and manufacturing share. Columns 1-3 provide the estimates for the manufacturing shares of employment, income, and output on regional house price volatility. In each case, we average manufacturing share observations over the time dimension. The magnitudes of the estimates are similar to the uncontrolled results in Table 3. Column 4 shows results for employment growth volatility in isolation. Columns 5-7 include both employment growth volatility manufacturing employment, income, and output share, respectively. Column 6 yields an

---

[14] Note that the estimates for manufacturing income share and manufacturing output share are larger and more statistically significant than manufacturing employment share in cross-sectional regressions that include employment growth volatility. This suggests that the relationship between house price growth volatility and manufacturing does not come entirely through employment volatility.

adjusted R-squared of 0.44, which suggests that manufacturing share and employment growth volatility explain a high share of the aggregate and regional volatility.

3.3 Firm Concentration

Another candidate explanation for manufacturing's impact on housing volatility is that it tends to increase the concentration of employment, output, and income. This leaves local housing markets exposed to firm-specific shocks. Indeed, at the regional level, manufacturing share and firm concentration have a 0.536 correlation; however, firm concentration is available at the local level, where it may be more relevant for house price volatility, which we exploit in our next exercise, shown in Table 5. Here, we measure the impact of firm concentration on house price growth volatility. The regressor of interest in all specifications is the Herfindahl-Hirschman Index (HHI) at the parish level,[15] which we compute as follows:

$$hhi_k = s_0^2 + ... + s_F^2. \tag{5}$$

Note that s_l is firm l's share of establishments in parish k.[16] We compute this using data on the number of establishments within commuting distance (25km) of each parish's GPS centroid for each of the 15 largest employers in Sweden: Volvo, Ericsson, Electrolux, Svenska Cellulosa, Scania, Atlas Copco, Sandvik, SKF, Assa Abloy, Vattenfall, ICA, Securitas, Telia, Axel Johnson, and H&M. Using the narrowest geographic unit, parish, allows us to include region-year-quarter fixed effects in columns 7-9, which absorb all permanent and region level variation in volatility. We use two different regression specifications:

$$\hat{\sigma}_{jt} = log(hhi_k)\zeta + X_{jt}\theta + Z_{kt}\eta + \xi_t + \mu_i + v_{jt}. \tag{6}$$

---

[15] At the region level, HHI and manufacturing's employment share are positively correlated (0.536); however, only HHI can be constructed at the parish level.

[16] Since we cannot compute market share at the parish level, we instead use a measure of establishment share for the largest firms in Sweden. Note that we use parish, rather than region, since parish is a narrower geographic unit and is available for establishment location data; however, the results are not sensitive to the choice of geographic unit or the commuting distance assumption.

The first specification, given in equation (6), includes parish level controls, Z_{kt}; time fixed effects, ξ_t; and region fixed effects, μ_i. The second specification, given in (7), replaces region and year-quarter fixed effects with region-year-quarter fixed effects, κ_{it}:

$$\hat{\sigma}_{jt} = log(hhi_k)\zeta + X_{jt}\theta + Z_{kt}\eta + \kappa_{it} + \nu_{jt}. \tag{7}$$

In column 1 of Table 5, we perform the regression with no controls. We next add year fixed effects in column 2 and year-quarter fixed effects in columns 3-6. In columns 3-8, we limit the sample to cover only years 2015-2017. This is to limit potential endogeneity issues, since our measure of firm concentration is only available for 2017. Importantly, however, our specifications with the most extensive set of controls and region-year-quarter fixed effects, shown in columns 6-9, suggest that this does not appear to bias the coefficient estimates upward in the full sample. Column 8 clusters standard errors at the parish level. All other columns use heteroskedasticity and autocorrelation robust standard errors. For all estimates, we find a positive, quantitatively similar effect that is significant at the 1% level. Our preferred specifications in columns 7 and 9 suggest that a doubling of firm concentration is associated with a 1.45 to 1.81ppt increase in house price growth volatility. For the median property, this is equivalent to an 21% to 26% increase in house price growth volatility.

3.4 The Sharpe Ratio

Thus far, we have shown that manufacturing is associated with increased house price volatility. It remains unclear, however, whether homeowners are compensated for this increased volatility with higher house price growth. We might expect this to be the case in equity markets; however, it may not be true in the housing market, where location choices are not primarily determined by expected return and volatility. Peng and Thibodeau (2017), for instance, have shown that other sources of house price volatility, such as zip-code level median income in the U.S., are not compensated for by increased house price appreciation.

Measuring the Sharpe ratio is one way to identify the extent to which homeowners are compensated for higher volatility:

$$S_{jt} = \frac{E[r_{jt} - r^*]}{\sigma_{jt}}. \tag{8}$$

Here, S_{jt} is the Sharpe ratio for property j at time t, r_{jt} is the return to housing, r^* is the return to the safe asset, and σ_{jt} is the standard deviation of the housing return. The Sharpe ratio was originally developed to measure mutual fund performance (Sharpe, 1966), and can be interpreted here as the expected excess return to housing per unit of volatility.

We approximate the housing return with the house price growth rate at the property level,[17] and use the annualized return to three month Swedish government bonds as the risk free rate. Finally, we again adopt the property-level measure of instantaneous volatility introduced in equation (3) for σ_{jt}.

Our specification for the Sharpe ratio regressions is given below.

$$S_{jt} = M_{it}\zeta + X_{jt}\theta + Z_{it}\eta + \xi_t + \mu_k + \nu_{jt}. \tag{9}$$

Note that S_{jt} is the realized Sharpe ratio for property j at time t; M_{it} is manufacturing's share of employment, income, or output in region i at time t; X_{jt} is a vector of property level controls; Z_{it} is vector of region level controls; ξ_t is a time fixed effect; and μ_k is a parish fixed effect. All reported Sharpe ratios are annualized. The median Sharpe ratio in our sample is 1.26, which exceeds historical equity performance, and is likely related to the period we cover, where house price growth was high and the risk free rate was low and sometimes negative. Sharpe ratios estimated for Sweden and other countries over longer time horizons have typically been below unity (e.g. Favilukis et al. (2017); Jórda et al. (2017); Flavin and Yamashita (2002)); however, Nordic countries have

---

[17] Note that we do not have access to remodeling costs, so we follow the literature by using house price growth to approximate the house price return.

generally had high housing Sharpe ratios since the 1950s (Jórda et al., 2017). See Lo (2003) for a comparison of Sharpe ratio estimates for different categories of assets.

Our findings are summarized in Table 6. Note that the specifications in columns 1-10 are identical to those used in the volatility regressions, which were shown in Table 3, except that our dependent variable is now the housing returns Sharpe ratio. In all cases, the sign on the region-level manufacturing share of employment is negative, suggesting that an increase in the manufacturing share is associated with a decrease in the Sharpe ratio. This implies that the increase in house price volatility associated with manufacturing is not fully compensated for by increased house price appreciation.

Note that this finding is less robust than our original results for house price growth volatility. In particular, including time-varying region controls requires us to drop the 37% of the sample for which such controls are not available. When we do this, the results remain significant when standard errors are clustered at the parish level, but not when we use Newey-West standard errors. Overall, 7 of 9 specifications yield estimates that are significant at a 1% level. Our preferred specifications, given in columns 5 and 8, are both significant at the 1% level and suggest that a 10ppt increase in the manufacturing share is associated with a 0.05 to 0.25ppt decrease in the Sharpe ratio. Again, moving from the region with the lowest share of manufacturing employment in 2008, Stockholm (0.145), to the region with the highest, Kalmar (0.366), would translate into a 0.11 to 0.55ppt decrease in the Sharpe ratio. For the median home, this effect amounts to a 9% to 44% reduction in the Sharpe ratio.

Furthermore, columns 9 and 10 indicate that part of the effect of manufacturing on the Sharpe ratio comes through employment growth volatility. In particular, in column 9, we add employment growth volatility to the regression specification given in column 5, which reduces the coefficient on manufacturing employment share from -2.52 to -2.2. Additionally, upon removing manufacturing share in column 10, the impact of employment growth volatility becomes significant and increases in magnitude from -0.05 to -0.24. Thus, a one standard deviation increase in employment growth volatility is associated with a 0.11 decrease in the Sharpe ratio. In terms of house price volatility, this effect is similar to moving from the region with the lowest manufacturing share to the region with the highest.

Finally, we consider the impact of firm concentration on the Sharpe ratio. If volatility in manufacturing emerges from the effect it has on concentrating employment, income, and output, then we might expect measures of firm concentration to be associated with the volatility and Sharpe ratio of housing returns. We have already shown the former. We will show the latter in the exercise below, where we re-use the specification given in equation (7), but change the dependent variable to the Sharpe ratio, S_{jt}, as shown in equation (10):

$$S_{jt} = log(hhi_k)\zeta + X_{jt}\theta + Z_{kt}\eta + \kappa_{it} + \nu_{jt}. \tag{10}$$

The results for this exercise are given in Table 7. Here, we again find strong evidence that homeowners are not compensated for the increased volatility associated with firm concentration. In particular, 8 out of 9 specifications are significant at the 1% level and 1 is significant at the 5% level. Our preferred specifications in columns 7 and 9 suggest that a doubling of firm concentration is associated with a 0.125 to 0.156ppt increase in the Sharpe ratio. For the median property, this is equivalent to an 10% to 12% decrease in the Sharpe ratio.

3.5 Manufacturing News

We claim that manufacturing's impact on housing return volatility is at least partly explained by the effect it has on concentrating employment, income, and output into a small number of firms. If this is true, we might expect news about manufacturers to increase house price volatility in areas with a high manufacturing share. Importantly, we do not differentiate between good and bad news, but instead assume that the release of news will tend to affect the perceived likelihood of a factory's contraction or expansion, which would have implications for local housing demand. In the following subsections, we measure the impact of news about manufacturing on house price volatility and house price news. We also measure whether news about manufacturing is associated with text-based measures of economic uncertainty. This could provide an additional channel through which manufacturing affects house price growth volatility.

3.5.1 House Price Growth Volatility (2009-2017)

We first test our hypothesis about manufacturing news and house price growth volatility. We do this by exploiting news and location information about the largest manufacturers in Sweden. Specifically, we identify the number of manufacturing establishments located within a 25km radius of the parish centroid.[18]

In addition to this, we collect news about manufacturing firms by scraping a Swedish newspaper archive for all articles between 2009 and 2017 in the largest business newspaper, Dagens Industri. We count both the total number of articles written and the number of articles that specifically reference manufacturing firms. Both counts were computed at a monthly frequency, which is higher than the annual frequency at which manufacturing share is available. We then produce a time series of the ratio of manufacturing firm news to total news, which we then deseasonalize using the X-13 ARIMA-SEATS method and Hodrick-Prescott filter.[19] The time series plots are shown in Figure 2. Note that the regression exercises described in this section use a single series for all firms, rather than the individual series.

As with the firm concentration regressions, our variable of interest, manufacturer news, has variation at the parish level; however, it also has time variation, since it consists of the interaction of a binary variable that indicates whether a manufacturing establishment is present[20] with news about manufacturers, which is time-varying. We again use the specification from the firm concentration regressions and examine results for both housing return volatilities and Sharpe ratios.

---

[18] Specifically, we take the subset of the largest 15 firms by employment that are operating in the manufacturing sector: Assa Abloy, SKF, Sandvik, Atlas Copco, Svenska Cellulosa, Ericsson, Volvo, Electrolux, and Scania.

[19] We set the value of λ on the HP filter to 129,600.

[20] We again require an establishment to be located within 25km of the parish centroid to be identified as present.

Our findings for this exercise are given in Table 8. Columns 1-3 show the results for housing return volatility and columns 4-6 show the results for the Sharpe ratio. All specifications include property-level controls, time-varying parish controls, and region-year-quarter fixed effects. Columns 1-2 and 4-5 restrict the sample to the years 2015, 2016, and 2017 to mitigate potential endogeneity issues related to the firm location data, which is only available for 2017. Finally, columns 2 and 5 cluster standard errors at the parish level. All other specifications use Newey-West standard errors.

Overall, we find that manufacturing news has a positive and statistically significant effect on house price growth volatility in parishes with manufacturers, and a negative, but statistically insignificant impact on the Sharpe ratio. The impact on house price growth volatility in our preferred specifications ranges from 0.0873 to 0.1546. Thus, a one standard deviation increase in news about manufacturing is associated with a 0.17 to 0.31ppt increase in house price growth volatility in parishes with at least one manufacturing establishment.

3.5.2 House Price News and Economic Uncertainty (1850-2017)

The archive we scraped in the previous subsection contains several newspapers with substantial historical coverage. One such newspaper, Aftonbladet, contains articles that span the period between the early 1800s and the present.[21] To strengthen our results above, we exploit this long archive to construct news time series for manufacturing and property prices that span the period between 1850 and 2017. This captures both the rise and fall in manufacturing as a share of total output. Furthermore, we are able to identify the geographic location of each news event by performing queries for specific regions, which allows us to construct series for house prices and manufacturing that are specific to each of the 20 regions we consider. Figures 3 and 4 plot the time series in percentage changes for each region.

The high variation in time and geography allows us to evaluate the impact of

---

[21] Note that we used Dagens Industri in the previous subsection, since it is the largest Swedish business newspaper; however, for this exercise, we used Aftonbladet, since it has archival coverage going back to the early 1800s.

manufacturing news on property price news in a setting where we control for both long trends and the shorter business cycle trends using yearly fixed effects. It also permits us to include region fixed effects. Our preferred specification, given in equation (11), includes time fixed effects, ξ_t, and region fixed effects, μ_i:

$$H_{it}^N = M_{it}^N + EU_{it}^N \zeta + \xi_t + \mu_i + \nu_{it}. \tag{11}$$

In equation (11), H_{it}^N is news about house prices, M_{it}^N is news about manufacturing, and EU_{it}^N is a text-based measure of economic uncertainty.[22] The results are reported in Table 9. Note that all variables are standardized. Column 1 estimates the impact of manufacturing news on house price news with no controls. Column 2 shows the results of an IV, where contemporaneous manufacturing news is instrumented with a one-year lag of itself. Column 3 adds year fixed effects. Column 4 includes region fixed effects. And column 5 includes both. Column 6 is identical to column 5, but uses standard errors clustered at the region level, rather than Newey-West standard errors. In column 7, we remove manufacturing news, but add our text-based measure of economic uncertainty. We then include both manufacturing news and economic uncertainty in column 8. The remaining columns repeat the same exercises, but use percentage changes for both the dependent variable and regressor of interest.

Our preferred estimate in column 5 suggests that a one standard deviation increase in manufacturing news is associated with a 0.61 standard deviation increase in house price news. This persists with both region and time fixed effects, as well as in an instrumental variables regression. Furthermore, all specifications, including those in both levels and percentage changes, are significant at the 1% level. In column 7, we find that a one standard deviation increase in economic uncertainty is associated with a .46 standard increase in house price news. This is significant at the 1% level, even in the presence of region and time fixed effects. Economic uncertainty becomes statistically

---

[22] For an overview of economic uncertainty measurement, see Bloom (2009), Baker et al. (2013), Baker et al. (2016). We use a simpler version of Armelius et al. (2017). Additionally, we cover only economic uncertainty and use a single newspaper; however, we construct an index for each region and cover the period between 1850 and 2017.

insignificant when we include manufacturing news in column 8, which suggests that part of the effect of manufacturing news on house price news comes through the impact it has on economic uncertainty. See Figure 5 for plots of regional economic uncertainty.

Importantly, this exercise does not tell us about about the relationship between manufacturing, economic uncertainty, and property price volatility directly; however, it does suggest that there is a strong relationship between manufacturing and house prices, which is independent of the national-level business cycle, and is detectable in newspaper coverage over the period spanning the rise and decline of manufacturing as a share of output. It also indicates that this partially comes through the generation of economic uncertainty.

4 Applications

We now consider two applications of our findings on the impact of manufacturing on house price growth volatility and, relatedly, the Sharpe ratio. The first application considers the portfolio choice implications of the housing location decision in a setting where housing returns comove with labor income. In particular, we couple our estimated results with a theoretical model to evaluate the portfolio gains of living and working in separate locations. The second application considers the aggregate implications of our volatility findings. Here, we show that effects estimated at the regional level translate into volatility in national level house price indices. Thus, the relationship between manufacturing and house price volatility should also persist at the aggregate level. We use our estimates to show what this implies about the long run decline in manufacturing share on house price growth volatility in four countries.

4.1 Portfolio Choice

The literature has shown that households hedge labor income risk by adjusting risky asset holdings (Betermier et al., 2012); and respond to comovement between unemployment and house price risk by reducing investment in owner-occupied housing (Jansson, 2017). In our first application, we consider a related portfolio choice problem, where a worker has obtained a job and must now choose housing; however, rather than selecting a quantity of housing or deciding whether to switch to the rental market, the homeowner will instead choose a location in which to purchase a home. Note that we will explicitly consider only the portfolio choice dimension of the problem, abstracting away from dimensions such as local amenities and commuting costs.

We will use a standard model in the Markowitz-Sharpe style[23] in which a household attempts to maximize the Sharpe ratio of its portfolio; however, there will be two deviations from the standard model: 1) the portfolio will contain exogenously determined labor income; and 2) the choice over remaining assets will be discrete. That is, an agent must either choose to live in a city where manufacturing is dominant or where services are dominant.

In the model, a household supplies one unit of labor to a job in sector g, where $g \in \{m, s\}$, and earns labor income, l_g, with volatility σ_{l_g}, where m and s denote manufacturing and services. The household also chooses whether to live in a city that is dominated by either the manufacturing sector ($w = 1$) or the service sector ($w = 0$). Houses in areas dominated by sector g generate a return of r_g and have a return volatility of σ_g. For the sake of simplicity, we will treat all returns as excess returns (i.e. less the risk free rate). This yields the following portfolio optimization problem, where ρ is a fixed portfolio share weight of income and w is a discrete portfolio weight on housing location choice:

$$\max_{w \in \{0,1\}} \frac{\rho l_g + (1-\rho)(w r_m + (1-w) r_s)}{\sqrt{\rho \sigma_{l_g}^2 + (1-\rho)(w\sigma_m^2 + (1-w)\sigma_s^2) + \rho(1-\rho)(w\sigma_{l_g,m} + (1-w)\sigma_{l_g,s})}}. \tag{12}$$

Note that there is no covariance term, $\sigma_{m,s}$, because it is not possible to hold housing located in the city dominated by manufacturing and services simultaneously. If the worker chooses to live in the city with a dominant manufacturing sector, we have

---

[23] See Markowitz (1952), Sharpe (1966), and Sharpe (1994) for an overview of portfolio optimization.

$w = 1$, and equation (12) becomes:

$$\frac{\rho l_g + (1-\rho) r_m}{\sqrt{\rho \sigma_{l_g}^2 + (1-\rho)\sigma_m^2 + (1-\rho)\sigma_{l_g,m}}}. \tag{13}$$

Alternatively, if the worker chooses to live in the city with a dominant service sector, we have $w = 0$, and equation (12) becomes:

$$\frac{\rho l_g + (1-\rho) r_s}{\sqrt{\rho \sigma_{l_g}^2 + (1-\rho)\sigma_s^2 + \rho(1-\rho)\sigma_{l_g,s}}}. \tag{14}$$

Let's now consider the case of a worker in the service sector (i.e. g=s) who wishes to choose a housing location optimally. She will choose to both work and live in a service sector dominated city if the following condition holds:

$$\frac{\rho l_s + (1-\rho) r_s}{\sqrt{\rho \sigma_{l_s}^2 + (1-\rho)\sigma_s^2 + \rho(1-\rho)\sigma_{l_s,s}}} > \frac{\rho l_s + (1-\rho) r_m}{\sqrt{\rho \sigma_{l_s}^2 + (1-\rho)\sigma_m^2 + \rho(1-\rho)\sigma_{l_s,m}}}. \tag{15}$$

We will also assume that manufacturing does not generate a premium on house price returns, which is roughly consistent with our findings.[24] Under these conditions, the household will live in the city dominated by the service sector if the following condition holds:

$$\sigma_m^2 + \rho\sigma_{l_s,m} > \sigma_s^2 + \rho\sigma_{l_s,s}. \tag{16}$$

Empirically, we have demonstrated that $\sigma_m^2 > \sigma_s^2$. Additionally, it is reasonable to assume that labor income in the service sector comoves more strongly with house prices in the service sector-dominated city than house prices in the manufacturing-dominated city. Thus, $\sigma_{l_s,s} > \sigma_{l_s,m}$, which suggests that we may rewrite equation (16) as follows:

$$\underbrace{(\sigma_m^2 - \sigma_s^2)}_{>0} + \underbrace{\rho(\sigma_{l_s,m} - \sigma_{l_s,s})}_{<0} > 0. \tag{17}$$

According to equation (17), if a worker's portfolio share of labor income, ρ, is low, then the relative volatilities of housing returns will matter more for her location choice

---

[24] We have demonstrated that the Sharpe ratio tends to be negatively associated with manufacturing. That is, households are not fully compensated for the increase in volatility generated by manufacturing with higher house price appreciation. Note that this is somewhat weaker than the claim we make here, since we assume that there is no premium.

than the relative covariances between labor income and housing returns. Note that this is most likely to be true for high income workers. Here, such a worker in the service sector would choose to live in a city dominated by the service sector. Alternatively, if the comovement between labor income and housing returns is weak, then relative return volatilities will again dominate, which will result in the service sector worker living in the city with a dominant service sector.

If we instead consider the case of a manufacturing worker who is deciding where to locate, we get the following condition for living in the manufacturing-dominated city:

$$\underbrace{(\sigma_s^2 - \sigma_m^2)}_{<0} + \underbrace{\rho(\sigma_{l_m,s} - \sigma_{l_m,m})}_{<0} > 0. \tag{18}$$

Since this condition is never satisfied, it will never be optimal for a manufacturing worker to live in the manufacturing city, unless non-portfolio choice concerns–such as commuting costs, local amenities, or the cost of living–dominate.

Overall, we show that manufacturing workers may capture substantial portfolio gains by living and working in different locations; however, this is is often not the case for service sector workers. Our findings in the empirical section (e.g. Table 2) also suggests that living closer to the center of a region is another way in which households can reduce volatility and increase their housing return Sharpe ratio, regardless of whether manufacturing or services is dominant in that region.

4.2 Aggregate Effects

Much of our empirical work focused on cleanly identifying the impact of manufacturing on house price volatility. We will now examine the implications of those findings for aggregate house price volatility. Note that most of our effects were measured at the level of the largest subnational administrative unit, which we referred to as "region" throughout the paper. There are 21 such regions in Sweden, three of which account for 53% of the country's housing transactions. Consequently, movements in apparently regional factors, such as manufacturing share or employment volatility, may translate into aggregate movements in house price volatility. This is particularly likely to be true for manufacturing, which has experienced a secular decline across all regions since 1970.

We first note that national house price indices are typically computed at the regional level and then aggregated using transaction shares. This implies that a house price index can be decomposed into its regional parts as follows:

$$P_t = \alpha_1 p_{1t} + ... + \alpha_n p_{nt} \tag{19}$$

In equation (19), P_t is the aggregate house price in period t, p_{it} is the house price in region i, and α_i is the transaction share of region i. Note that n is the number of regions and $\sum_i^n \alpha_i = 1$. This implies that the variance of the aggregate index can be decomposed as follows:

$$\sigma_{P_t}^2 = \sum_{i=1}^{n} \alpha_i^2 \sigma_{p_{it}}^2 + \sum_{1<i\leq j} \alpha_i \alpha_j \sigma_{p_{it},p_{jt}}. \tag{20}$$

For simplicity, assume that house price variances are identical across region in period 0 (e.g. $\sigma_{p_{10}} = ... = \sigma_{p_{n0}}$) and all covariance terms are zero.[25] Now, consider an increase in the house price variance in region j in period 1. We may write the implied percentage change in the national house price index as follows:

$$\frac{\Delta \sigma_{P_1}}{\sigma_{P_0}} = \frac{\alpha_j^2}{\sum_{i=1}^{n} \alpha_i^2} \frac{\Delta \sigma_{p_{j1}}^2}{\sigma_{P_{j0}}^2}. \tag{21}$$

This suggests that a 10% increase in the variance of region j would translate into a $0.10 * \alpha_j^2 / \sum_{i=1}^{n} \alpha_i^2$ percent increase in aggregate house price variance. For example, a 10% house price variance increase in the Stockholm region, which has a transaction share of 0.27, would yield a 6.1% increase ($0.10 * 0.27^2 / 0.122$) in national house price variance. This suggests that reductions in the manufacturing share at the regional level

---

[25] In practice, the covariance terms are positive, which would increase the size of the effects we capture in this exercise. Additionally, the shock exposure we study – which partly drives covariance in house prices across region – also positively covaries.

can translate into substantial reductions in national-level house price volatility.

Above, we have 1) measured the impact of manufacturing at the regional-level using microdata; and 2) demonstrated that fluctuations at that level can plausibly translate into national level aggregate fluctuations. We now use our earlier empirical findings to simulate the national level implications for house price volatility in Sweden, the U.S., the U.K., and Japan. We will focus exclusively on the partial effects that would have been generated by the manufacturing share reductions in each country.

Figure 6 plots the results of this simulation exercise.[26] In each case, we use the estimated relationship between manufacturing employment share[27] and house price volatility estimated in this paper. We interact this measure with the manufacturing employment share for the country being simulated. Each series can be interpreted as the cumulative percentage point change in house price volatility since 1970. All countries experienced a decline in manufacturing share, implying volatility declines of between 1.4 and 3.3ppt. The decline for Sweden (2.2ppt) is approximately 32% of its 2009-2017 volatility level. While we have the manufacturing share for other countries, we do not have microdata to estimate the size of the effect separately.

5 Conclusion

Using a unique dataset of all Swedish housing transactions over the 2009-2017 period, we show that the following factors are positively associated with house price growth volatility: 1) the employment, income, and output shares of manufacturing; 2) employment growth volatility; and 3) firm concentration; and 4) news about local manufacturers. We also use a separate unique dataset of all newspaper articles from a major Swedish news outlet that spans the 1850-2017 period to demonstrate that

---

[26] Importantly, we capture only the partial decline attributable to the reduction in manufacturing share. In certain periods, this decline was dominated by other sources of volatility. Most notably, house price volatility increased sharply in the U.S., U.K., and Sweden around the Great Recession. It also increased in Sweden during the early 1990s.

[27] For each country, we use the U.S. Bureau of Labor Statistics' "Percent of Employment in Manufacturing" series.

manufacturing news is strongly associated with house price news, and partly operates through the creation of economic uncertainty. In addition to this, we show that these volatility increases are not compensated for in the form of higher house price growth. Rather, manufacturing is associated with lower housing return Sharpe ratios.

Our results have implications for both optimal portfolio choice and the impact of national-level manufacturing share declines. On the portfolio choice side, we combine our empirical results with a theoretical model to demonstrate that living and working in an industrial city is often welfare-reducing, unless non-portfolio considerations, such as commuting costs, dominate. To the contrary, living and working in a service sector-dominated city is often optimal under reasonable assumptions.

Finally, we examine the implications of our results for the national-level manufacturing share declines that have occurred in high income countries since the 1970s. Our results suggest that the manufacturing share decline could explain part of the reduction in house price growth volatility during the Great Moderation. In particular, the 16ppt reduction in Sweden's manufacturing since 1970 could account for a 2.2ppt (32%) decline in house price growth volatility. Similarly, the 17.5ppt decline in manufacturing share in the U.S. since 1970 would account for a 2.5ppt decline in house price growth volatility. It would also account for volatility reductions of 1.4ppt in the U.K. and 3.3ppt in Japan.

References

Armelius, H., I. Hull, and H. Stenbacka Köhler, "The Timing of Uncertainty Shocks in a Small Open Economy," *Economics Letters*, 2017, *155*, 31–34.

Baker, S.R., N. Bloom, and S.J. Davis, "Uncertainty and the Economy," *Policy Review 175*, 2013.

_ , _ , and _ , "Measuring Economic Policy Uncertainty," *The Quarterly Journal of Economics*, 2016.

Betermier, S., T. Jansson, C.A. Parlour, and J. Walden, "Hedging Labor Income Risk," *Journal of Financial Economics*, 2012, *105* (3), 622–639.

Bloom, N., "The Impact of Uncertainty Shocks," *Econometrica*, 2009, *77* (3).

Carvalho, V. and X. Gabaix, "The Great Diversification and its Undoing," *American Economic Review*, 2013, *103* (5), 1697–1727.

Case, K. and C. Mayer, "Housing Price Dynamics within a Metropolitan Area," *Regional Science and Urban Economics*, 1996, *26* (3-4), 387–407.

Charles, K.K., E. Hurst, and M. Schwartz, "Housing Booms, Manufacturing Decline, and Labor Market Outcomes," *NBER Working Papers 18949*, 2013.

_ , _ , and _ , "The Transformation of Manufacturing and the Decline in U.S. Employment," *NBER Working Papers 24468*, 2018.

Davidian, M. and R. Carroll, "Variance Function Estimation," *Journal of the American Statistical Association*, 1987, *400* (82).

Favilukis, J., S.C. Ludvigson, and S. Van Nieuwerburgh, "The Macroeconomic Effects of Housing Wealth, Housing Finance, and Limited Risk Sharing in General Equilibrium," *Journal of Political Economy*, 2017, *125* (1), 140–223.

Flavin, M. and T. Yamashita, "Owner-Occupied Housing and the Composition of Household Portfolio," *American Economic Review*, 2002, *92* (1), 346–362.

Giacoletti, M., "Idiosyncratic Risk in Housing Markets," *Mimeo*, 2017.

Goodman, A.C. and T.G. Thibodeau, "Housing Market Segmentation," *Journal of Housing Economics*, 1998, *7*, 121–143.

Hartman-Glaser, B. and W. Mann, "Collateral Constraints, Wealth Effects, and Volatility: Evidence from Real Estate Markets," *SSRN Working Paper*, 2017.

Howard, G. and J. Liebersohn, "The Geography Channel of House Price Appreciation: Did the Decline in Manufacturing Partially Cause the Housing Boom?," *Working Paper*, 2018, *6*, 201–222.

Jansson, T., "Housing and Labor Income Risk," *Journal of Urban Economics*, 2017.

Jórda, Ò, K. Knoll, D. Kuvshinov, M. Shularick, and A.M. Taylor, "The Rate of Return on Everything, 1870-2015," *NBER Working Papers 24112*, 2017.

Kuhn, M., M. Shularick, and U. Steins, "Income and Wealth Inequality in America, 1949-2016," *CEPR, Discussion Paper 12218*, 2018.

Landvoigt, T., M. Piazzesi, and M. Schneider, "The Housing Market(s) of San Diego," *American Economic Review*, 2015, *105* (4), 1371–1407.

Lo, A., "The Statistics of Sharpe Ratios," *Financial Analysts Journal*, 2003.

Mack, A. and E. Martinez-Garcia, "Increased Real House Price Volatility Signals Break from Great Moderation," *Economic Letter*, 2012, *7* (1), 1–4.

Markowitz, H., "Portfolio Selection," *The Journal of Finance*, 1952, *7*, 77–91.

McConnell, M.M. and G. Perez-Quiros, "Output Fluctuations in the United States: What Has Changed Since the Early 1980's?," *The American Economic Review*, 1990, *90* (5), 1464–1476.

Peng, L. and T. Thibodeau, "Risk Segmentation of American Homes: Evidence from Denver," *Real Estate Economics*, 2013, *41* (3), 569–599.

_ **and** _ , "Idiosyncratic Risk of House Prices: Evidence from 26 Million Home Sales," *Real Estate Economics*, 2017, *45* (2), 340–375.

Schwert, W.G., "Why Does Stock Market Volatility Change Over Time?," *The Journal of Finance*, 1989, *XLIV* (5), 1115–1153.

Sharpe, W.F., "Mutual Fund Performance," *The Journal of Business*, 1966, *39* (1).

_ , "The Journal of Portfolio Management," *The Sharpe Ratio*, 1994, *21*, 49–58.

Zhou, Y. and D.R. Haurin, "On the Determinants of House Value Volatility," *Journal of Real Estate Research*, 2010, *32* (4), 378–395.

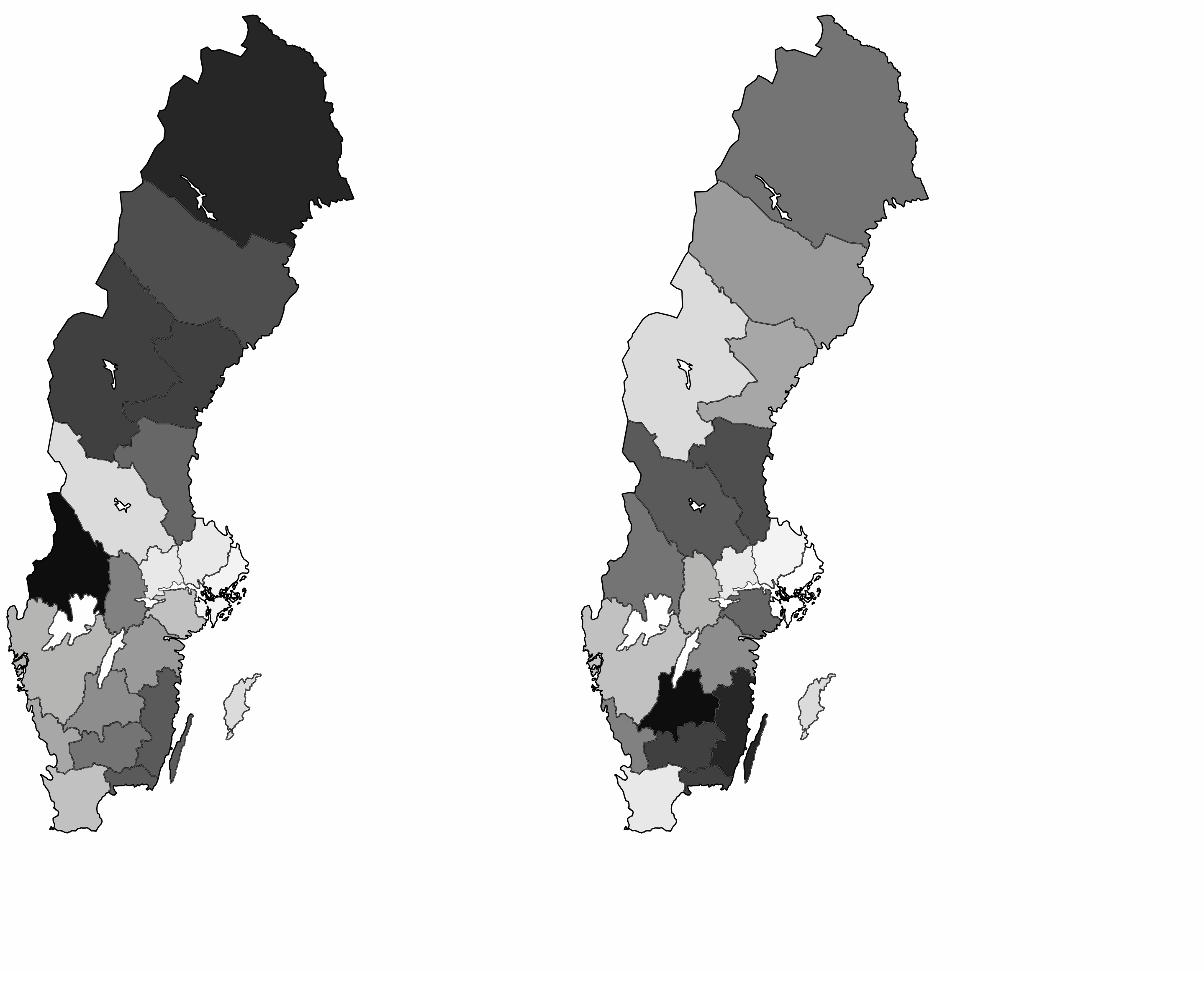
6 Tables and Figures

Table 1: Descriptive statistics: property and region level

Variable	Mean	SD	25%	50%	75%	N
Property level statistics						
Area	102.39	46.52	68.00	100.00	128.00	44895
Latitude	59.01	2.16	57.72	59.26	59.56	44895
Longitude	15.82	2.51	13.42	16.21	17.96	44895
Distance to region center (km)	35.22	27.49	14.09	30.23	48.05	44895
Annualized return	9.23	12.39	2.51	8.01	14.92	44895
Return volatility	10.11	10.72	3.12	6.82	12.86	44895
Time between sales (month)	32.19	19.14	17.00	28.00	44.00	44895
Sharpe ratio	1.72	2.00	0.27	1.26	2.36	44895
Region and parish level statistics						
Real per capita income growth	2.70	0.27	2.50	2.67	2.88	20
Population density (persons / sqkm)	45.16	66.25	14.20	26.70	49.38	20
Employment growth	0.64	0.23	0.56	0.64	0.78	20
Manufacturing income share	0.28	0.06	0.26	0.29	0.32	20
Manufacturing output share	0.29	0.05	0.27	0.30	0.32	20
Manufacturing employment share	0.27	0.05	0.25	0.27	0.31	20
Employment growth volatility	1.86	0.45	1.67	1.84	2.18	20
Herfindahl-Hirschman Index (HHI)	3600.70	2346.64	1330.85	2583.87	5709.03	90
Transactions	218.28	302.11	67	115	225	6015
Manufacturer news	-0.02	1.99	-1.23	-0.37	0.59	6015

Notes: The descriptive statistics are divided into property level and region level groups. Property level statistics include area in square meters, latitude, longitude, distance to region center, annualized return, return volatility, and the Sharpe ratio. We use an instantaneous, unbiased estimate of volatility at the property level, which is described in the Empirical Results section. Region and parish level statistics include real per capita income growth (annual), population density (annual), employment growth (quarterly), manufacturing income share (annual), manufacturing employment share (annual), and employment growth volatility. Each region level variable is averaged over its time dimension before descriptive statistics are computed. We include the HHI index in the list of region level variables; however, we also compute it at the parish level and include this measure in Table 5 regressions. Finally, we include the number of transactions (monthly) and manufacturer news (monthly) at the parish level.

Figure 1: Manufacturing share and house price growth volatility by region



(a) House Price Growth Volatility

(b) Manufacturing Share

Notes: A darker shade indicates a higher level of house price growth volatility in subfigure (a) and a higher manufacturing employment share in subfigure (b). House price growth volatility is computed at the property level and is averaged across properties over the 2009-2017 period. Manufacturing share is computed by Statistics Sweden and is averaged over the 2009-2015 period.

Table 2: Impact of 2008 manufacturing share on house price growth volatility

	(1) (OLS)	(2) (OLS)	(3) (OLS)	(4) (OLS)	(5) (OLS)	(6) (OLS)	(7) (OLS)	(8) (OLS)	(9) (OLS)
manufacturing_employment_share$_{t=2008}$	15.7934***	15.2591***	15.3348***	15.9253***	14.2401***	7.8895***	7.8895**		
	(0.7311)	(0.7352)	(0.7355)	(0.9032)	(1.5706)	(2.6872)	(3.3040)		
manufacturing_income_share$_{t=2008}$								6.5165*	
								(3.4857)	
manufacturing_output_share$_{t=2008}$									10.0563**
									(5.0096)
log(population_density$_{t=2008}$)					-0.2062***				
					(0.0712)				
log(per_capita_income$_{t=2008}$)					0.6580				
					(1.2543)				
log(population_density$_{it}$)						-0.1908	-0.1908	-0.2035	0.0514
						(0.1213)	(0.1365)	(0.1394)	(0.1801)
log(per_capita_income$_{it}$)						-2.4992	-2.4992	-2.9014	-3.6810
						(2.1666)	(2.6227)	(2.9534)	(2.5916)
per_capita_income_growth$_{it}$						-0.2324	-0.2324	-0.2191	-0.2403
						(0.1893)	(0.2150)	(0.2170)	(0.2181)
employment_growth$_{it}$						0.0481	0.0481	0.0495	0.0500
						(0.0696)	(0.0660)	(0.0665)	(0.0667)
distance_to_region_center$_{j}$				0.0084***	0.0068***	0.0134***	0.0134***	0.0130***	0.0134***
				(0.0023)	(0.0023)	(0.0041)	(0.0030)	(0.0029)	(0.0029)
months_between_transactions$_{jt}$				-0.1254***	-0.1255***	-0.1715***	-0.1715***	-0.1714***	-0.1715***
				(0.0032)	(0.0032)	(0.0076)	(0.0153)	(0.0154)	(0.0153)
transactions$_{kt}$				-0.0008***	-0.0008***	-0.0013***	-0.0013***	-0.0013***	-0.0013***
				(0.0001)	(0.0001)	(0.0003)	(0.0005)	(0.0005)	(0.0005)
Year FE	NO	YES	NO	NO	NO	NO	NO	NO	NO
Year-Quarter FE	NO	NO	YES	YES	YES	YES	YES	YES	YES
Property Controls	NO	NO	NO	YES	YES	YES	YES	YES	YES
Static Region Controls	NO	NO	NO	NO	YES	NO	NO	NO	NO
Time-Varying Region Controls	NO	NO	NO	NO	NO	YES	YES	YES	YES
Standard Errors	NW	NW	NW	NW	NW	NW	CL	NW	NW
Adj. R-squared	0.0108	0.0146	0.0159	0.0671	0.0673	0.0819	0.0819	0.0818	0.0819
N	43009	43009	43009	43009	43009	14972	14972	14972	14972

Notes: The dependent variable is the unbiased estimate of instantaneous house price return volatility at the property level, σ_{jt}. We regress σ_{jt} on three measures of manufacturing dependence at the region level in 2008: 1) manufacturing's share of employment; 2) manufacturing's share of income; and 3) manufacturing's share of output. Property controls include area in square meters, dummies for the number of rooms, dummies for the property type, distance from the region's center in kilometers, and the number of months between transaction dates. Static region controls include the log of real per capita income and the log of population density. Time-varying region controls include employment growth (quarterly), the log of per capita income (annual), per capita income growth (annual), and the log of population density (annual), and the number of transactions that occurred in the same parish (quarterly). Note that the time-varying controls are not available at the region level for all periods, which lowers the number of observations in 6-9. We cannot include region fixed effects because the regressor of interest is static. Standard errors are either Newey-West (NW) or clustered at the parish level (CL). Note that k indexes parish. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 3: Impact of time-varying manufacturing share and employment volatility on house price growth volatility

	(1) (OLS)	(2) (IV)	(3) (OLS)	(4) (OLS)	(5) (OLS)	(6) (OLS)	(7) (OLS)	(8) (OLS)	(9) (OLS)	(10) (OLS)
manufacturing_employment_share$_{it}$	17.2227***	17.5062***	16.4857***	16.6450***	20.3619***	7.7324**	6.5824*	6.5824***	12.7137***	
	(1.1492)	(1.1557)	(1.1687)	(1.1681)	(1.4076)	(3.0249)	(3.4432)	(0.3424)	(3.7331)	
employment_growth_volatility$_{i}$									1.3409*	2.4325**
									(0.8006)	(1.1294)
log(population_density$_{it}$)							-0.1289	-0.0396	-0.0396*	
							(0.1265)	(0.1459)	(0.0228)	
log(per_capita_income$_{it}$)							-3.5866*	-4.3894	-4.3894***	
							(2.0390)	(2.7667)	(0.5254)	
employment_growth$_{it}$							0.0509	0.0537	0.0537	
							(0.0696)	(0.0698)	(0.0669)	
per_capita_income_growth$_{it}$							-0.2183	-0.2219	-0.2219	
							(0.1891)	(0.1943)	(0.1719)	
distance_to_region_center$_{j}$					0.0037	0.0134***	0.0149***	0.0149***	0.0030	0.0056
					(0.0032)	(0.0041)	(0.0047)	(0.0013)	(0.0125)	(0.0110)
months_between_transactions$_{jt}$					-0.1271***	-0.1720***	-0.1721***	-0.1721***	-0.1715***	-0.1706***
					(0.0052)	(0.0076)	(0.0076)	(0.0154)	(0.0152)	(0.0149)
transactions$_{kt}$					-0.0008***	-0.0013***	-0.0003	-0.0003	-0.0007	-0.0008
					(0.0002)	(0.0003)	(0.0005)	(0.0003)	(0.0007)	(0.0007)
Year FE	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO
Year-Quarter FE	NO	NO	NO	YES	YES	YES	YES	YES	YES	NO
Property Controls	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES
Time-Varying Region Controls	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO
Parish FE	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO
Standard Errors	NW	NW	NW	NW	NW	NW	NW	CL	NW	NW
Adj. R-squared	0.0090	0.0090	0.0102	0.0121	0.0601	0.0818	0.0906	0.0906	0.0615	0.0596
N	24315	24315	24315	24315	24315	14972	14972	14972	24315	24315

Notes: The dependent variable is the unbiased estimate of instantaneous house price return volatility at the property level, σ_{jt}. We regress σ_{jt} on manufacturing's employment share at the region level. Property level controls include area in square meters, dummies for the number of rooms, dummies for the property type, distance from the region's center in kilometers, and the number of months between transaction dates. Time-varying region controls include employment growth (quarterly), the log per capita income (annual), per capita income growth (annual), the log of population density (annual), and the number of transactions that occurred in the same parish (quarterly). Note that the time-varying controls are not available at the region level for all periods, which lowers the number of observations in 6-8. Columns 7-8 include parish fixed effects. Columns 9 and 10 include employment growth volatility at the region level, computed as the standard deviation of employment growth over the 2009-2017 period. Standard errors are either Newey-West (NW) or clustered at the parish level (CL). Note that k indexes parish. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 4: Regional impact of employment volatility and manufacturing share on house price growth volatility

	(1) (OLS)	(2) (OLS)	(3) (OLS)	(4) (OLS)	(5) (OLS)	(6) (OLS)	(7) (OLS)
manufacturing_employment_share$_i$	14.7645**				11.4484*		
	(6.1759)				(6.0791)		
manufacturing_income_share$_i$		15.8125***				13.7797***	
		(4.8682)				(4.5487)	
manufacturing_output_share$_i$			18.9305***				15.7594**
			(5.2412)				(5.7282)
employment_growth_volatility$_i$				1.5659**	1.2004*	1.2076**	0.8048
				(0.6667)	(0.6535)	(0.5654)	(0.6342)
Adj. R-squared	0.1988	0.3345	0.3880	0.1921	0.2922	0.4444	0.4081
N	20	20	20	20	20	20	20

Notes: The dependent variable, σ_i, is the unbiased estimate of instantaneous house price return volatility at the property level, σ_{jt}, averaged over properties and time (2009-2015) within each region. We regress σ_i on the standard deviations of employment growth over the 2009-2015 period, as well as manufacturing employment, income, and output. In each case, we average the measure of manufacturing share over the time dimension. All specifications use OLS. Standard errors are shown in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 5: Impact of firm concentration on house price growth volatility

	(1) (OLS)	(2) (OLS)	(3) (OLS)	(4) (OLS)	(5) (OLS)	(6) (OLS)	(7) (OLS)	(8) (OLS)	(9) (OLS)
log(hhi$_k$)	1.3584***	1.2933***	1.4405***	1.5590***	1.0141***	1.8903***	1.8113***	1.8113***	1.4516***
	(0.0592)	(0.0594)	(0.0703)	(0.1128)	(0.1679)	(0.2193)	(0.2180)	(0.4086)	(0.1744)
log(parish_size$_{kt}$)						0.5387***	0.4941***	0.4941	0.5142***
						(0.1950)	(0.1876)	(0.5093)	(0.1507)
mean_distance_to_region_center$_{kt}$				-0.0002	-0.0009	0.0007	0.0006	0.0006	0.0009
				(0.0005)	(0.0007)	(0.0011)	(0.0011)	(0.0010)	(0.0008)
mean_distance_to_parish_center$_{kt}$				0.0016	0.0085***	0.0119***	0.0125***	0.0125***	0.0144***
				(0.0028)	(0.0030)	(0.0032)	(0.0032)	(0.0010)	(0.0027)
distance_to_region_center$_j$						-0.0148***	-0.0134***	-0.0134	-0.0123***
						(0.0042)	(0.0041)	(0.0104)	(0.0033)
distance_to_parish_center$_j$						-0.0285***	-0.0267***	-0.0267**	-0.0234***
						(0.0073)	(0.0073)	(0.0113)	(0.0059)
months_between_transactions$_{jt}$				-0.1126***	-0.1155***	-0.1155***	-0.1187***	-0.1187***	-0.1300***
				(0.0036)	(0.0035)	(0.0034)	(0.0034)	(0.0092)	(0.0030)
transactions$_{kt}$				-0.0004**	-0.0004**	-0.0002	-0.0003	-0.0003	-0.0005***
				(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)
Year FE	NO	YES	NO	NO	NO	NO	NO	NO	NO
Year-Quarter FE	NO	NO	YES	YES	YES	YES	NO	NO	NO
Property Controls	NO	NO	NO	YES	YES	YES	YES	YES	YES
Time-Varying Parish Controls	NO	NO	NO	NO	NO	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	NO	NO	NO
Region x Year-Quarter FE	NO	NO	NO	NO	NO	NO	YES	YES	YES
Year $\geq$ 2015	NO	NO	YES	YES	YES	YES	YES	YES	NO
Standard Errors	NW	NW	NW	NW	NW	NW	NW	CL	NW
Adj. R-squared	0.0096	0.0128	0.0142	0.0616	0.0833	0.0851	0.1040	0.1040	0.0958
N	44897	44897	28103	28103	28103	28103	28103	28103	44897

Notes: The dependent variable is the unbiased estimate of instantaneous house price return volatility at the property level, σ_{jt}. We compute the centroid of a parish as the mean longitude and latitude of properties located within it in our dataset. We then regress σ_{jt} on the parish level HHI index. The HHI index is computed using the number of establishments present in a given parish for each of the largest 15 employers in Sweden: Volvo, Ericsson, Electrolux, Svenska Cellulosa, Scania, Atlas Copco, Sandvik, SKF, Assa Abloy, Vattenfall, ICA, Securitas, Telia, Axel Johnson, and H&M. Property level controls include area in square meters, dummies for the number of rooms, dummies for the property type, and the number of months between transaction dates. For columns 3-8, we limit the sample to 2015-2017 to avoid possible issues with endogeneity, since the firm location data is only available for 2017. Columns 5 and 6 include region fixed effects. Columns 7-9 include region-year-quarter fixed effects. Columns 6-9 include additional parish level controls: the average property size, the average distance to the parish's centroid in kilometers, the average distance to the region's centroid in kilometers, the log of the number of properties located in the parish, and the number of transactions that occurred in the same parish (quarterly). Standard errors are either Newey-West (NW) or are clustered at the parish level (CL). Note that k indexes parish. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 6: Impact of time-varying manufacturing share and employment volatility on Sharpe ratio for housing returns

	(1) (OLS)	(2) (IV)	(3) (OLS)	(4) (OLS)	(5) (OLS)	(6) (OLS)	(7) (OLS)	(8) (OLS)	(9) (OLS)	(10) (OLS)
manufacturing_employment_share$_{it}$	-4.3624***	-4.4127***	-3.7916***	-3.8459***	-2.5203***	-0.0100	-0.5053	-0.5053***	-2.2030***	
	(0.2126)	(0.2010)	(0.2080)	(0.2073)	(0.2263)	(0.4207)	(0.4839)	(0.0613)	(0.5275)	
employment_growth_volatility$_{i}$									-0.0559	-0.2442*
									(0.0716)	(0.1311)
log(population_density$_{it}$)						-0.0907***	-0.0505**	-0.0505***		
						(0.0185)	(0.0210)	(0.0035)		
log(per_capita_income$_{it}$)						2.2681***	1.3673***	1.3673***		
						(0.3088)	(0.4165)	(0.0962)		
employment_growth$_{it}$						-0.0039	-0.0063	-0.0063		
						(0.0105)	(0.0105)	(0.0095)		
per_capita_income_growth$_{it}$						-0.0453	-0.0264	-0.0264		
						(0.0290)	(0.0296)	(0.0301)		
distance_to_region_center$_{j}$					-0.0011**	-0.0013**	-0.0015**	-0.0015***	-0.0010	-0.0015
					(0.0005)	(0.0006)	(0.0006)	(0.0001)	(0.0012)	(0.0010)
months_between_transactions$_{jt}$					0.0064***	0.0066***	0.0067***	0.0067***	0.0064***	0.0061***
					(0.0008)	(0.0011)	(0.0011)	(0.0009)	(0.0013)	(0.0014)
transactions$_{kt}$					0.0001***	0.0001*	-0.0000	-0.0000	0.0001	0.0002*
					(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Year FE	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO
Year-Quarter FE	NO	NO	NO	YES	YES	YES	YES	YES	YES	NO
Property Controls	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES
Time-Varying Region Controls	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO
Parish FE	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO
Standard Errors	NW	NW	NW	NW	NW	NW	NW	CL	NW	NW
Adj. R-squared	0.0202	0.0202	0.0559	0.0590	0.0772	0.0432	0.0499	0.0499	0.0773	0.0752
N	22845	22845	22845	22845	22845	14296	14296	14296	22845	22845

Notes: The dependent variable is the realized Sharpe ratio at the property level, S_{jt}. We regress S_{jt} on manufacturing's employment share at the region level. Property level controls include area in square meters, dummies for the number of rooms, dummies for the property type, distance from the region's center in kilometers, and the number of months between transaction dates. Time-varying region controls include employment growth (quarterly), the log per capita income (annual), per capita income growth (annual), the log of population density (annual), and the number of transactions that occurred in the same parish (quarterly). Note that the time-varying controls are not available at the region level for all periods, which lowers the number of observations in 6-8. Columns 7-8 include parish fixed effects. Columns 9 and 10 include employment growth volatility at the region level, computed as the standard deviation of employment growth over the 2009-2017 period. Standard errors are either Newey-West (NW) or clustered at the parish level (CL). Note that k indexes parish. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 7: Impact of firm concentration on Sharpe ratio for housing returns

	(1) (OLS)	(2) (OLS)	(3) (OLS)	(4) (OLS)	(5) (OLS)	(6) (OLS)	(7) (OLS)	(8) (OLS)	(9) (OLS)
log(hhi$_k$)	-0.3674***	-0.3259***	-0.3449***	-0.2102***	-0.0554*	-0.1476***	-0.1251***	-0.1251**	-0.1561***
	(0.0136)	(0.0133)	(0.0174)	(0.0234)	(0.0318)	(0.0432)	(0.0433)	(0.0613)	(0.0340)
log(parish_size$_{kt}$)						0.0193	0.0419	0.0419	0.0519
						(0.0419)	(0.0418)	(0.0724)	(0.0316)
mean_distance_to_region_center$_{kt}$						0.0001	-0.0005	-0.0005	-0.0009
						(0.0009)	(0.0009)	(0.0016)	(0.0007)
mean_distance_to_parish_center$_{kt}$						0.0051***	0.0049***	0.0049***	0.0048***
						(0.0015)	(0.0015)	(0.0016)	(0.0012)
distance_to_region_center$_j$				0.0001	0.0001	-0.0001	-0.0001	-0.0001	-0.0002
				(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
distance_to_parish_center$_j$				-0.0010**	-0.0023***	-0.0029***	-0.0030***	-0.0030***	-0.0037***
				(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0002)	(0.0004)
months_between_transactions$_{jt}$				0.0061***	0.0069***	0.0069***	0.0074***	0.0074***	0.0117***
				(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0013)	(0.0006)
transactions$_{kt}$				0.0001**	0.0001*	0.0000	0.0000	0.0000	0.0000
				(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0000)
Year FE	NO	YES	NO	NO	NO	NO	NO	NO	NO
Year-Quarter FE	NO	NO	YES	YES	YES	YES	NO	NO	NO
Property Controls	NO	NO	NO	YES	YES	YES	YES	YES	YES
Time-Varying Parish Controls	NO	NO	NO	NO	NO	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	NO	NO	NO
Region x Year-Quarter FE	NO	NO	NO	NO	NO	NO	YES	YES	YES
Year $\geq$ 2015	NO	NO	YES	YES	YES	YES	YES	YES	NO
Standard Errors	NW	NW	NW	NW	NW	NW	NW	CL	NW
Adj. R-squared	0.1158	0.1158	0.1029	0.1158	0.1158	0.1029			
N	41540	41540	22845	22845	22845	22845	22845	22845	41540

Notes: The dependent variable is the instantaneous, realized Sharpe ratio, S_{jt}. We compute the centroid of a parish as the mean longitude and latitude of properties located within it in our dataset. We then regress S_{jt} on the parish level HHI index. The HHI index is computed using the number of establishments present in a given parish for each of the largest 15 employers in Sweden: Volvo, Ericsson, Electrolux, Svenska Cellulosa, Scania, Atlas Copco, Sandvik, SKF, Assa Abloy, Vattenfall, ICA, Securitas, Telia, Axel Johnson, and H&M. Property level controls include area in square meters, dummies for the number of rooms, dummies for the property type, and the number of months between transaction dates. For columns 3-8, we limit the sample to 2015-2017 to avoid possible issues with endogeneity, since the firm location data is only available for 2017. Columns 5 and 6 include region fixed effects. Columns 7-9 include region-year-quarter fixed effects. Columns 6-9 include additional parish level controls: the average property size, the average distance to the parish's centroid in kilometers, the average distance to the region's centroid in kilometers, the log of the number of properties located in the parish, and the number of transactions that occurred in the same parish (quarterly). Standard errors are either Newey-West (NW) or are clustered at the parish level (CL). Note that k indexes parish. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 8: Impact of manufacturer share and manufacturer news on volatility (VOL) and the Sharpe ratio (SR)

	(1) (OLS) (VOL)	(2) (OLS) (VOL)	(3) (OLS) (VOL)	(4) (OLS) (SR)	(5) (OLS) (SR)	(6) (OLS) (SR)
manufacturer_news$_{kt}$	0.1546**	0.1546***	0.0873**	-0.0123	-0.0123	-0.0036
	(0.0632)	(0.0450)	(0.0396)	(0.0124)	(0.0104)	(0.0067)
manufacturer_share$_{k} > 0$	1.7810**	1.7810***	2.1654***	-0.1189	-0.1189	0.0943
	(0.8235)	(0.4520)	(0.6422)	(0.1649)	(0.0995)	(0.1271)
log(parish_size$_{kt}$)	0.2282	0.2282	0.2204	0.0637	0.0637	0.0966***
	(0.1928)	(0.5178)	(0.1571)	(0.0405)	(0.0799)	(0.0315)
mean_distance_to_region_center$_{kt}$	-0.0041	-0.0041	-0.0032	-0.0019**	-0.0019	-0.0022***
	(0.0040)	(0.0100)	(0.0032)	(0.0008)	(0.0017)	(0.0006)
mean_distance_to_parish_center$_{kt}$	-0.0106	-0.0106	-0.0133**	0.0038**	0.0038	0.0035***
	(0.0075)	(0.0132)	(0.0061)	(0.0015)	(0.0026)	(0.0012)
distance_to_region_center$_{j}$	0.0126***	0.0126***	0.0142***	-0.0048***	-0.0048***	-0.0038***
	(0.0033)	(0.0013)	(0.0028)	(0.0006)	(0.0003)	(0.0004)
distance_to_parish_center$_{j}$	0.0006	0.0006	0.0008	-0.0002	-0.0002	-0.0002*
	(0.0011)	(0.0014)	(0.0009)	(0.0002)	(0.0002)	(0.0001)
months_between_transactions$_{jt}$	-0.1209***	-0.1209***	-0.1326***	0.0129***	0.0129***	0.0114***
	(0.0035)	(0.0100)	(0.0032)	(0.0007)	(0.0028)	(0.0006)
transactions$_{kt}$	-0.0003	-0.0003	-0.0005***	0.0001	0.0001	0.0001
	(0.0002)	(0.0003)	(0.0002)	(0.0000)	(0.0001)	(0.0000)
Property Controls	YES	YES	YES	YES	YES	YES
Time-Varying Parish Controls	YES	YES	YES	YES	YES	YES
Region x Year-Quarter FE	YES	YES	YES	YES	YES	YES
Year $\geq$ 2015	YES	YES	NO	YES	YES	NO
Standard Errors	NW	CL	NW	NW	CL	NW
Adj. R-squared	0.1158	0.1158	0.1029	0.0767	0.0767	0.1076
N	25503	25503	40435	25503	25503	40435

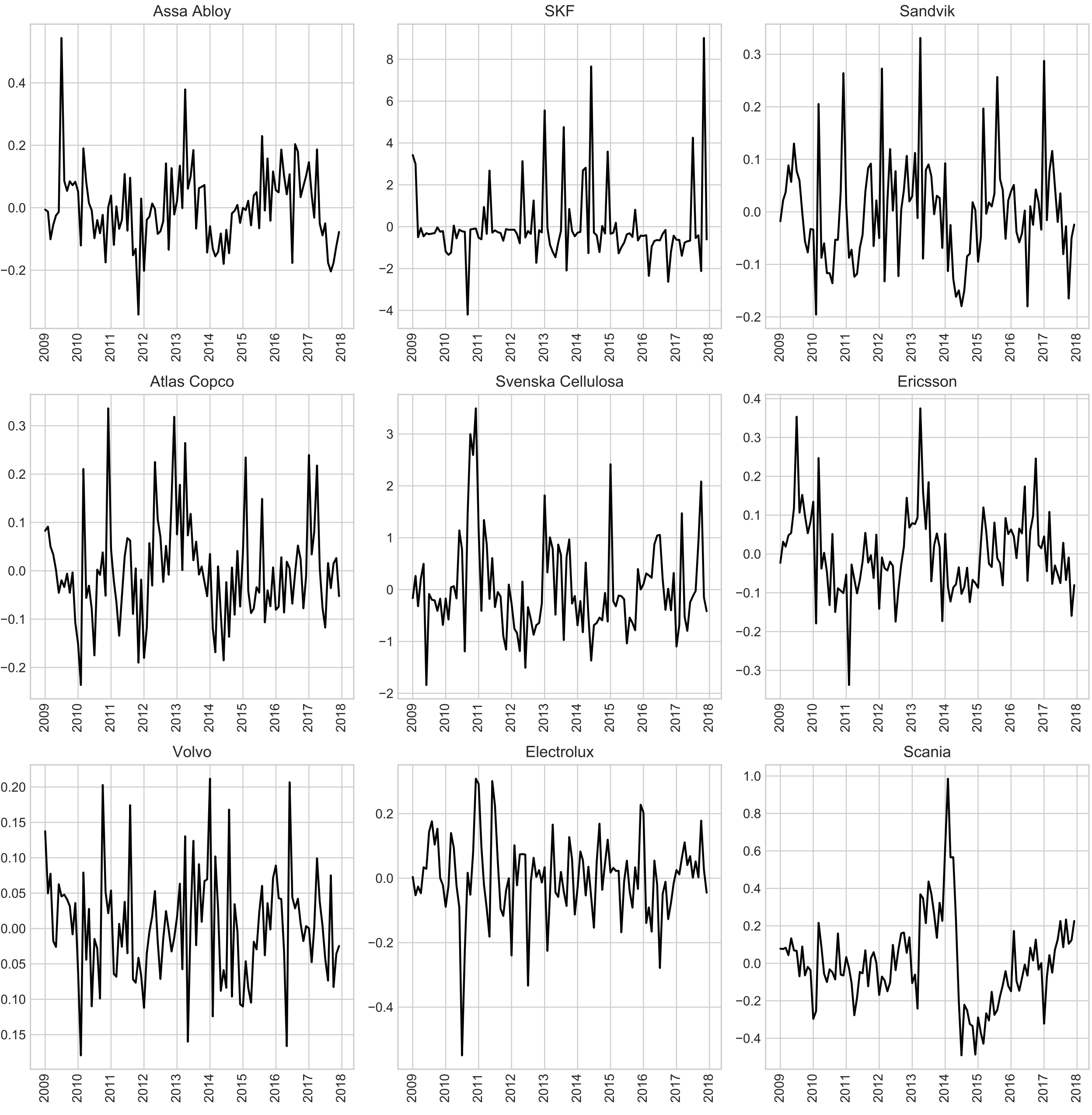
Notes: The dependent variable in columns 1-3 is volatility and the Sharpe ratio in columns 4-6. We compute the centroid of a parish as the mean longitude and latitude of properties located within it in our dataset. We regress the dependent variable on news about manufacturing firms located within the parish, as well as the share of manufacturing establishments in the parish. The share of manufacturing establishments is computed from data for each of the largest 15 employers in Sweden: Volvo, Ericsson, Electrolux, Svenska Cellulosa, Scania, Atlas Copco, Sandvik, SKF, Assa Abloy, Vattenfall, ICA, Securitas, Telia, Axel Johnson, and H&M. Manufacturing news is computed as the share of all newspaper articles that contain a reference to a manufacturing firm located within that parish. Property level controls include area in square meters, dummies for the number of rooms, dummies for the property type, and the number of months between transaction dates. For columns 3 and 6, we use the full sample. For the remaining columns, we restrict the sample to the years 2015-2017 to avoid possible issues with endogeneity, since the firm location data is only available for 2017. All columns include region-year-quarter fixed effects and the following parish level controls: the average property size, the average distance to the parish's centroid in kilometers, the average distance to the region's centroid in kilometers, the log of the number of properties located in the parish, and the number of transactions that occurred in the same parish (quarterly). Standard errors are either Newey-West (NW) or are clustered at the parish level (CL). Note that k indexes parish. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 9: Impact of manufacturing news and economic uncertainty on house price news over 1850-2017 period

	(1) (OLS)	(2) (IV)	(3) (OLS)	(4) (OLS)	(5) (OLS)	(6) (OLS)	(7) (OLS)	(8) (OLS)	(9) (OLS)	(10) (OLS)	(11) (OLS)	(12) (OLS)	(13) (OLS)	(14) (OLS)	(15) (OLS)
manufacturing_news$_{it}$	0.6319***	0.6353***	0.6225***	0.6306***	0.6118***	0.6118***		0.6039***							
	(0.0243)	(0.0175)	(0.0274)	(0.0281)	(0.0340)	(0.0282)		(0.0663)							
$\%\Delta\_manufacturing\_news_{it}$									0.3127***	0.3152***	0.3142***	0.3161***	0.3161***		0.3240***
									(0.0095)	(0.0089)	(0.0094)	(0.0088)	(0.0085)		(0.0665)
economic_uncertainty$_{it}$							0.4614***	0.0116							
							(0.0220)	(0.0557)							
$\%\Delta\_economic\_uncertainty_{it}$														0.1384***	-0.0038
														(0.0016)	(0.0287)
Year FE	NO	NO	YES	NO	YES	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES
Region FE	NO	NO	NO	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES
Standard Errors	NW	NW	NW	NW	NW	CL	NW	NW	NW	NW	CL	NW	NW		
Adj. R-squared	0.3997	0.3996	0.6349	0.4232	0.6747	0.6747	0.5767	0.6746	0.1919	0.3663	0.1918	0.3679	0.3679	0.3475	0.3676
N 2953	2953	2953	2953	2953	2953	2953	2953	2499	2499	2499	2499	2499	2499	2499	

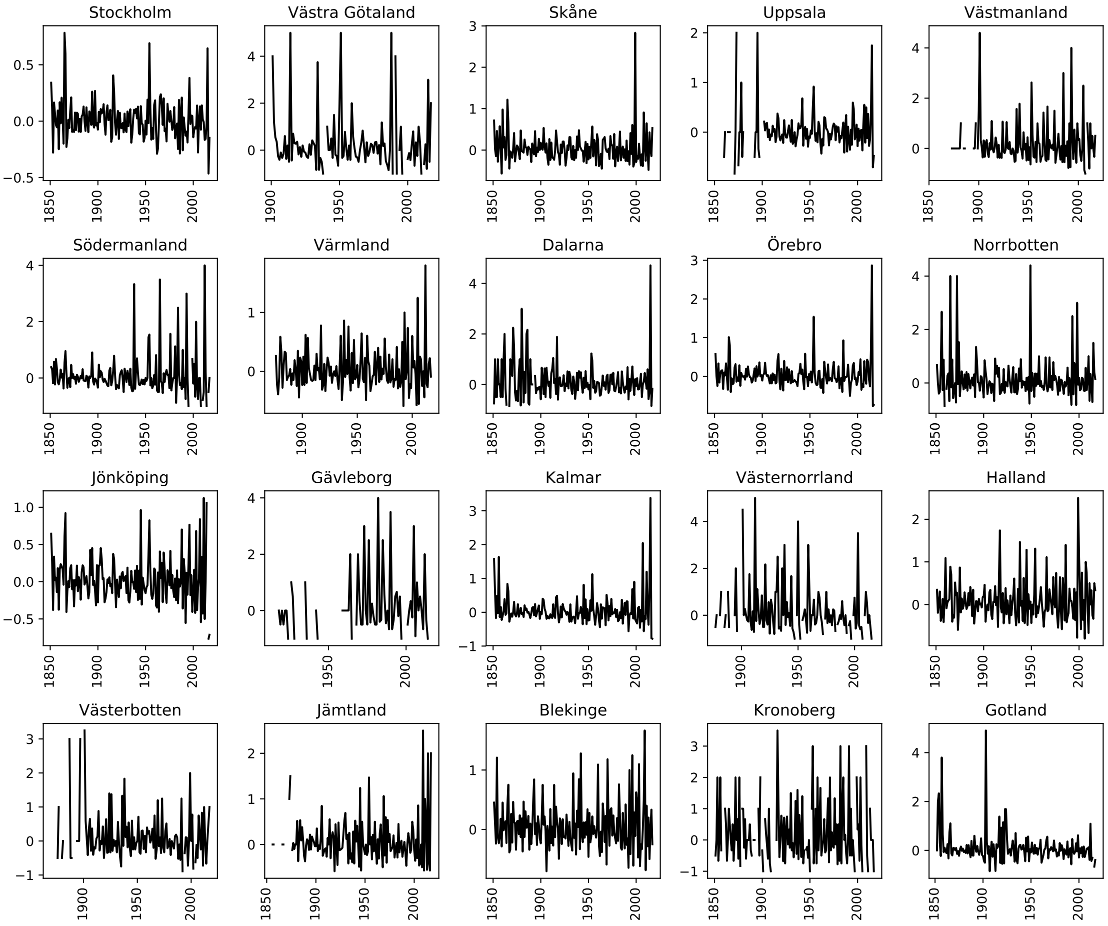
Notes: The dependent variable in columns 1-8 is the frequency with which property prices were referenced in the news. In columns 9-14, the dependent variable is the percentage change in the same variable. Our variable of interest is either the frequency with which manufacturing was referenced in the news (columns 1-8), economic uncertainty (columns 7-8), or the change in the same variables (9-14). The data on manufacturing news and house price news is assembled by scraping a Swedish newspaper archive for 1) all articles between 1850-2017; and 2) all articles that specifically reference manufacturing or house prices. We exclusively use the newspaper Aftonbladet, which has archival coverage that starts in the early 1800s. Standard errors are either Newey-West (NW) or are clustered at the parish level (CL). Note that i indexes region. * $p < .1$, ** $p < .05$, *** $p < .01$.

Figure 2: News by manufacturing firm



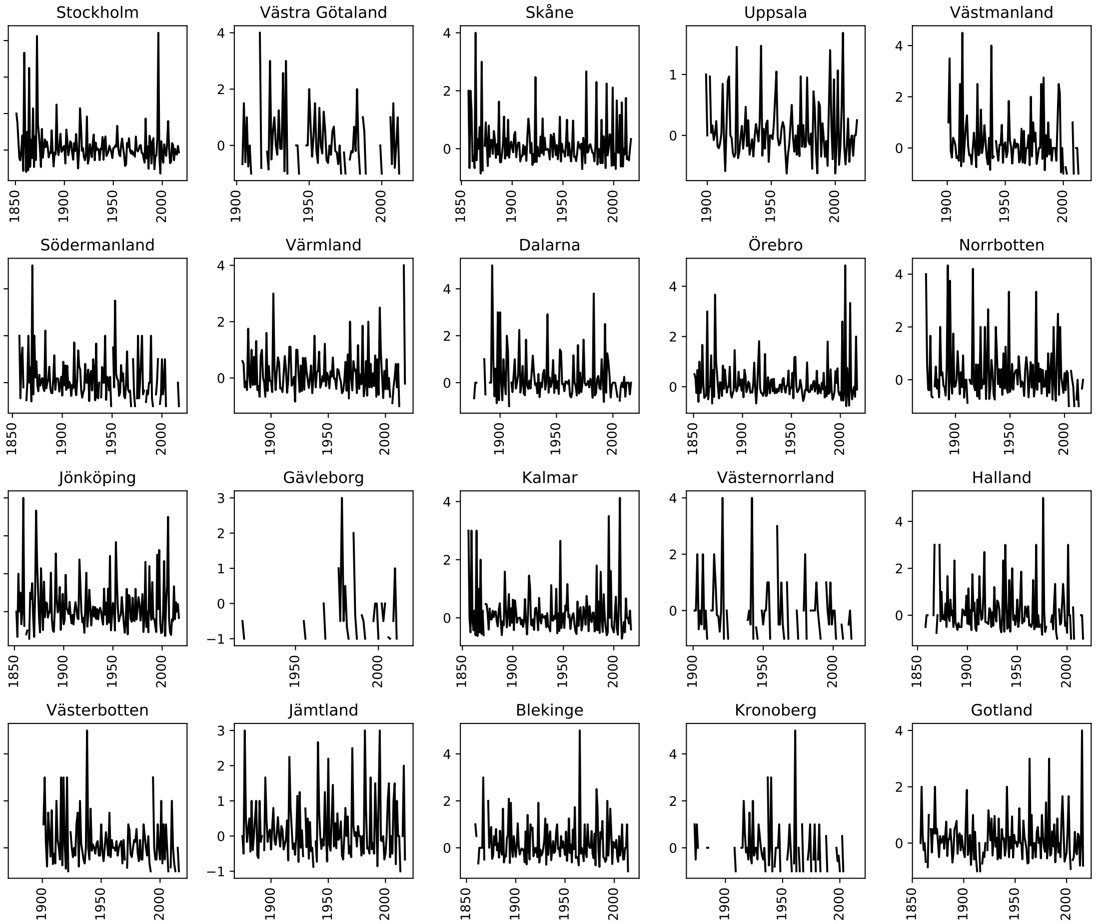
Notes: The plots above show deseasonalized and filtered news share series for the largest manufacturing firms in Sweden by employment. We scaped all newspaper articles from an archive over the 2009-2017 period for Dagens Industri, the largest Swedish business newspaper. We then counted all references to each firm and normalized the counts by the total number of articles. Finally, we deseasonalized the firm time series using the X-13 ARIMA SEATS method and then applied a Hodrick-Prescott filter with $\lambda = 129,600$.

Figure 3: Manufacturing news by region (1850-2017)



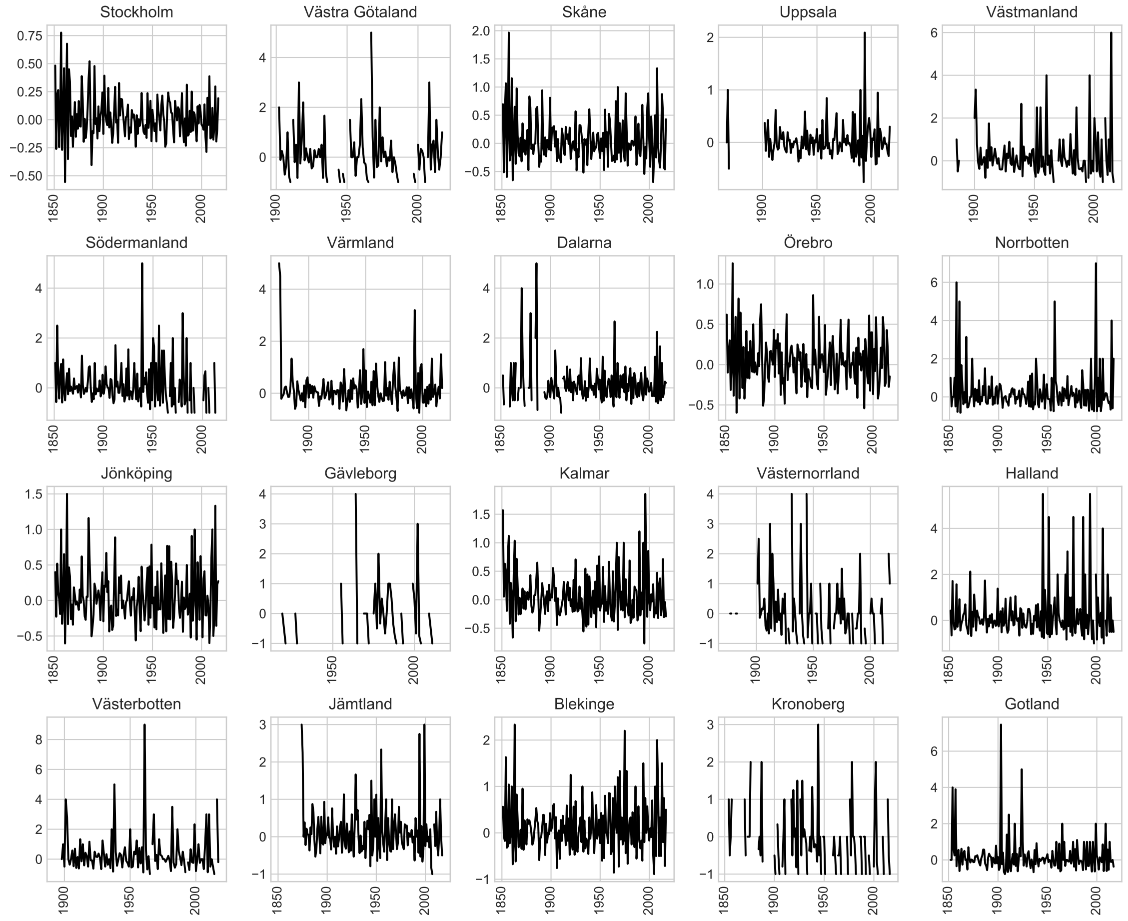
Notes: The plots above show the percentage change in newpaper coverage of manufacturing in different regions of Sweden. All articles were scraped from an archive and cover the 1850-2017 period. We focus on the newspaper Aftonbladet, which has archival coverage that begins in the early 1800s. Missing observations indicate that there was not enough data available to for the period construct a reliable measure of manufacturing news.

Figure 4: House price news by region (1850-2017)



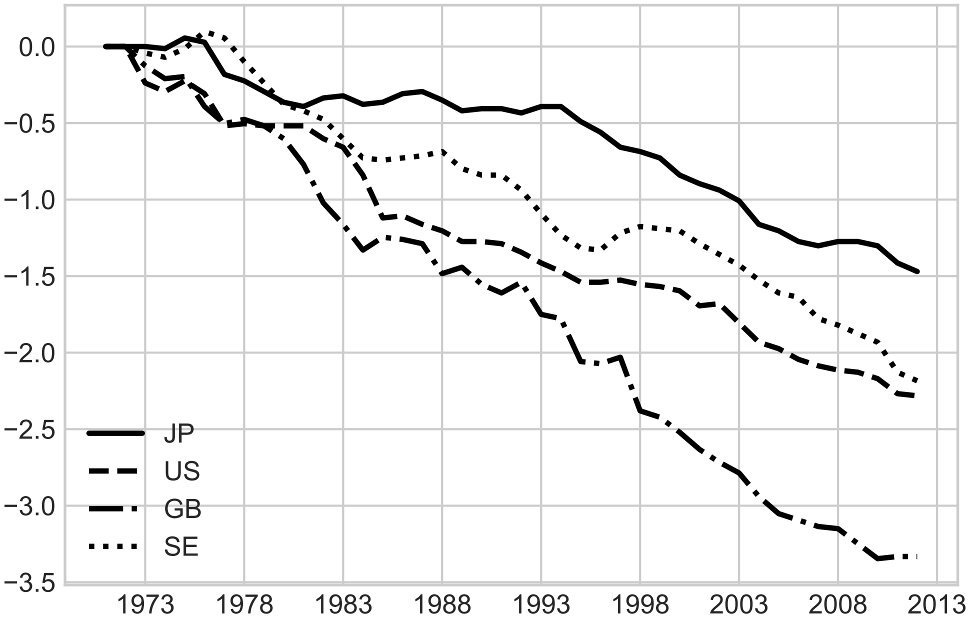
Notes: The plots above show the percentage change in newpaper coverage of house prices in different regions of Sweden. All articles were scraped from an archive and cover the 1850-2017 period. We focus on the newspaper Aftonbladet, which has archival coverage that begins in the early 1800s. Missing observations indicate that there was not enough data available to for the period construct a reliable measure of house price news.

Figure 5: Economic uncertainty by region (1850-2017)



Notes: The plots above show the percentage change in newpaper coverage of economic uncertainty in different regions of Sweden. All articles were scraped from an archive and cover the 1850-2017 period. We focus on the newspaper Aftonbladet, which has archival coverage that begins in the early 1800s. Missing observations indicate that there was not enough data available to for the period construct a reliable measure of economic uncertainty.

Figure 6: Impact of manufacturing share decline on house price volatility (ppts)



Notes: This plot shows the simulated partial declines in house price volatility for Japan, the United States, the United Kingdom, and Sweden since 1970. Each series is constructed using the manufacturing employment share for each country, computed by the U.S. Bureau of Labor Statistics, as well as the estimated relationship between employment share change and house price volatility for Sweden. Note that this captures only the partial contribution of manufacturing share to house price volatility and should not be interpreted as a total volatility series. Notably, there are increases in house price volatility around the Great Recession that are unrelated to exposure to regional microeconomic shocks and, thus, are not included in the simulation. There was also a substantial increase in house price volatility in Sweden in the 1990s that was unrelated to movements in manufacturing's share.

Earlier Working Papers:

For a complete list of Working Papers published by Sveriges Riksbank, see www.riksbank.se

Estimation of an Adaptive Stock Market Model with Heterogeneous Agents *by Henrik Amilon*	2005:177
Some Further Evidence on Interest-Rate Smoothing: The Role of Measurement Errors in the Output Gap *by Mikael Apel and Per Jansson*	2005:178
Bayesian Estimation of an Open Economy DSGE Model with Incomplete Pass-Through by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani	2005:179
Are Constant Interest Rate Forecasts Modest Interventions? Evidence from an Estimated Open Economy DSGE Model of the Euro Area *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2005:180
Inference in Vector Autoregressive Models with an Informative Prior on the Steady State *by Mattias Villani*	2005:181
Bank Mergers, Competition and Liquidity *by Elena Carletti, Philipp Hartmann and Giancarlo Spagnolo*	2005:182
Testing Near-Rationality using Detailed Survey Data *by Michael F. Bryan and Stefan Palmqvist*	2005:183
Exploring Interactions between Real Activity and the Financial Stance *by Tor Jacobson, Jesper Lindé and Kasper Roszbach*	2005:184
Two-Sided Network Effects, Bank Interchange Fees, and the Allocation of Fixed Costs *by Mats A. Bergman*	2005:185
Trade Deficits in the Baltic States: How Long Will the Party Last? *by Rudolfs Bems and Kristian Jönsson*	2005:186
Real Exchange Rate and Consumption Fluctuations follwing Trade Liberalization *by Kristian Jönsson*	2005:187
Modern Forecasting Models in Action: Improving Macroeconomic Analyses at Central Banks *by Malin Adolfson, Michael K. Andersson, Jesper Lindé, Mattias Villani and Anders Vredin*	2005:188
Bayesian Inference of General Linear Restrictions on the Cointegration Space *by Mattias Villani*	2005:189
Forecasting Performance of an Open Economy Dynamic Stochastic General Equilibrium Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2005:190
Forecast Combination and Model Averaging using Predictive Measures *by Jana Eklund and Sune Karlsson*	2005:191
Swedish Intervention and the Krona Float, 1993-2002 *by Owen F. Humpage and Javiera Ragnartz*	2006:192
A Simultaneous Model of the Swedish Krona, the US Dollar and the Euro *by Hans Lindblad and Peter Sellin*	2006:193
Testing Theories of Job Creation: Does Supply Create Its Own Demand? *by Mikael Carlsson, Stefan Eriksson and Nils Gottfries*	2006:194
Down or Out: Assessing The Welfare Costs of Household Investment Mistakes *by Laurent E. Calvet, John Y. Campbell and Paolo Sodini*	2006:195
Efficient Bayesian Inference for Multiple Change-Point and Mixture Innovation Models *by Paolo Giordani and Robert Kohn*	2006:196
Derivation and Estimation of a New Keynesian Phillips Curve in a Small Open Economy *by Karolina Holmberg*	2006:197
Technology Shocks and the Labour-Input Response: Evidence from Firm-Level Data *by Mikael Carlsson and Jon Smedsaas*	2006:198
Monetary Policy and Staggered Wage Bargaining when Prices are Sticky *by Mikael Carlsson and Andreas Westermark*	2006:199
The Swedish External Position and the Krona *by Philip R. Lane*	2006:200

Price Setting Transactions and the Role of Denominating Currency in FX Markets *by Richard Friberg and Fredrik Wilander*	2007:201
The geography of asset holdings: Evidence from Sweden *by Nicolas Coeurdacier and Philippe Martin*	2007:202
Evaluating An Estimated New Keynesian Small Open Economy Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani*	2007:203
The Use of Cash and the Size of the Shadow Economy in Sweden *by Gabriela Guibourg and Björn Segendorf*	2007:204
Bank supervision Russian style: Evidence of conflicts between micro- and macro-prudential concerns *by Sophie Claeys and Koen Schoors*	2007:205
Optimal Monetary Policy under Downward Nominal Wage Rigidity *by Mikael Carlsson and Andreas Westermark*	2007:206
Financial Structure, Managerial Compensation and Monitoring *by Vittoria Cerasi and Sonja Daltung*	2007:207
Financial Frictions, Investment and Tobin's q *by Guido Lorenzoni and Karl Walentin*	2007:208
Sticky Information vs Sticky Prices: A Horse Race in a DSGE Framework *by Mathias Trabandt*	2007:209
Acquisition versus greenfield: The impact of the mode of foreign bank entry on information and bank lending rates *by Sophie Claeys and Christa Hainz*	2007:210
Nonparametric Regression Density Estimation Using Smoothly Varying Normal Mixtures *by Mattias Villani, Robert Kohn and Paolo Giordani*	2007:211
The Costs of Paying – Private and Social Costs of Cash and Card *by Mats Bergman, Gabriella Guibourg and Björn Segendorf*	2007:212
Using a New Open Economy Macroeconomics model to make real nominal exchange rate forecasts *by Peter Sellin*	2007:213
Introducing Financial Frictions and Unemployment into a Small Open Economy Model *by Lawrence J. Christiano, Mathias Trabandt and Karl Walentin*	2007:214
Earnings Inequality and the Equity Premium *by Karl Walentin*	2007:215
Bayesian forecast combination for VAR models *by Michael K. Andersson and Sune Karlsson*	2007:216
Do Central Banks React to House Prices? *by Daria Finocchiaro and Virginia Queijo von Heideken*	2007:217
The Riksbank's Forecasting Performance *by Michael K. Andersson, Gustav Karlsson and Josef Svensson*	2007:218
Macroeconomic Impact on Expected Default Freqency *by Per Åsberg and Hovick Shahnazarian*	2008:219
Monetary Policy Regimes and the Volatility of Long-Term Interest Rates *by Virginia Queijo von Heideken*	2008:220
Governing the Governors: A Clinical Study of Central Banks *by Lars Frisell, Kasper Roszbach and Giancarlo Spagnolo*	2008:221
The Monetary Policy Decision-Making Process and the Term Structure of Interest Rates *by Hans Dillén*	2008:222
How Important are Financial Frictions in the U S and the Euro Area *by Virginia Queijo von Heideken*	2008:223
Block Kalman filtering for large-scale DSGE models *by Ingvar Strid and Karl Walentin*	2008:224
Optimal Monetary Policy in an Operational Medium-Sized DSGE Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E. O. Svensson*	2008:225
Firm Default and Aggregate Fluctuations *by Tor Jacobson, Rikard Kindell, Jesper Lindé and Kasper Roszbach*	2008:226
Re-Evaluating Swedish Membership in EMU: Evidence from an Estimated Model *by Ulf Söderström*	2008:227

The Effect of Cash Flow on Investment: An Empirical Test of the Balance Sheet Channel *by Ola Melander*	2009:228
Expectation Driven Business Cycles with Limited Enforcement *by Karl Walentin*	2009:229
Effects of Organizational Change on Firm Productivity *by Christina Håkanson*	2009:230
Evaluating Microfoundations for Aggregate Price Rigidities: Evidence from Matched Firm-Level Data on Product Prices and Unit Labor Cost *by Mikael Carlsson and Oskar Nordström Skans*	2009:231
Monetary Policy Trade-Offs in an Estimated Open-Economy DSGE Model *by Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E. O. Svensson*	2009:232
Flexible Modeling of Conditional Distributions Using Smooth Mixtures of Asymmetric Student T Densities *by Feng Li, Mattias Villani and Robert Kohn*	2009:233
Forecasting Macroeconomic Time Series with Locally Adaptive Signal Extraction *by Paolo Giordani and Mattias Villani*	2009:234
Evaluating Monetary Policy *by Lars E. O. Svensson*	2009:235
Risk Premiums and Macroeconomic Dynamics in a Heterogeneous Agent Model *by Ferre De Graeve, Maarten Dossche, Marina Emiris, Henri Sneessens and Raf Wouters*	2010:236
Picking the Brains of MPC Members *by Mikael Apel, Carl Andreas Claussen and Petra Lennartsdotter*	2010:237
Involuntary Unemployment and the Business Cycle *by Lawrence J. Christiano, Mathias Trabandt and Karl Walentin*	2010:238
Housing collateral and the monetary transmission mechanism *by Karl Walentin and Peter Sellin*	2010:239
The Discursive Dilemma in Monetary Policy *by Carl Andreas Claussen and Øistein Røisland*	2010:240
Monetary Regime Change and Business Cycles *by Vasco Cúrdia and Daria Finocchiaro*	2010:241
Bayesian Inference in Structural Second-Price common Value Auctions *by Bertil Wegmann and Mattias Villani*	2010:242
Equilibrium asset prices and the wealth distribution with inattentive consumers *by Daria Finocchiaro*	2010:243
Identifying VARs through Heterogeneity: An Application to Bank Runs *by Ferre De Graeve and Alexei Karas*	2010:244
Modeling Conditional Densities Using Finite Smooth Mixtures *by Feng Li, Mattias Villani and Robert Kohn*	2010:245
The Output Gap, the Labor Wedge, and the Dynamic Behavior of Hours *by Luca Sala, Ulf Söderström and Antonella Trigari*	2010:246
Density-Conditional Forecasts in Dynamic Multivariate Models *by Michael K. Andersson, Stefan Palmqvist and Daniel F. Waggoner*	2010:247
Anticipated Alternative Policy-Rate Paths in Policy Simulations *by Stefan Laséen and Lars E. O. Svensson*	2010:248
MOSES: Model of Swedish Economic Studies *by Gunnar Bårdsen, Ard den Reijer, Patrik Jonasson and Ragnar Nymoen*	2011:249
The Effects of Endogenuos Firm Exit on Business Cycle Dynamics and Optimal Fiscal Policy *by Lauri Vilmi*	2011:250
Parameter Identification in a Estimated New Keynesian Open Economy Model *by Malin Adolfson and Jesper Lindé*	2011:251
Up for count? Central bank words and financial stress *by Marianna Blix Grimaldi*	2011:252
Wage Adjustment and Productivity Shocks *by Mikael Carlsson, Julián Messina and Oskar Nordström Skans*	2011:253

Stylized (Arte) Facts on Sectoral Inflation *by Ferre De Graeve and Karl Walentin*	2011:254
Hedging Labor Income Risk *by Sebastien Betermier, Thomas Jansson, Christine A. Parlour and Johan Walden*	2011:255
Taking the Twists into Account: Predicting Firm Bankruptcy Risk with Splines of Financial Ratios *by Paolo Giordani, Tor Jacobson, Erik von Schedvin and Mattias Villani*	2011:256
Collateralization, Bank Loan Rates and Monitoring: Evidence from a Natural Experiment *by Geraldo Cerqueiro, Steven Ongena and Kasper Roszbach*	2012:257
On the Non-Exclusivity of Loan Contracts: An Empirical Investigation *by Hans Degryse, Vasso Ioannidou and Erik von Schedvin*	2012:258
Labor-Market Frictions and Optimal Inflation *by Mikael Carlsson and Andreas Westermark*	2012:259
Output Gaps and Robust Monetary Policy Rules *by Roberto M. Billi*	2012:260
The Information Content of Central Bank Minutes *by Mikael Apel and Marianna Blix Grimaldi*	2012:261
The Cost of Consumer Payments in Sweden *by Björn Segendorf and Thomas Jansson*	2012:262
Trade Credit and the Propagation of Corporate Failure: An Empirical Analysis *by Tor Jacobson and Erik von Schedvin*	2012:263
Structural and Cyclical Forces in the Labor Market During the Great Recession: Cross-Country Evidence *by Luca Sala, Ulf Söderström and AntonellaTrigari*	2012:264
Pension Wealth and Household Savings in Europe: Evidence from SHARELIFE *by Rob Alessie, Viola Angelini and Peter van Santen*	2013:265
Long-Term Relationship Bargaining *by Andreas Westermark*	2013:266
Using Financial Markets To Estimate the Macro Effects of Monetary Policy: An Impact-Identified FAVAR* *by Stefan Pitschner*	2013:267
DYNAMIC MIXTURE-OF-EXPERTS MODELS FOR LONGITUDINAL AND DISCRETE-TIME SURVIVAL DATA *by Matias Quiroz and Mattias Villani*	2013:268
Conditional euro area sovereign default risk *by André Lucas, Bernd Schwaab and Xin Zhang*	2013:269
Nominal GDP Targeting and the Zero Lower Bound: Should We Abandon Inflation Targeting?* *by Roberto M. Billi*	2013:270
Un-truncating VARs* *by Ferre De Graeve and Andreas Westermark*	2013:271
Housing Choices and Labor Income Risk *by Thomas Jansson*	2013:272
Identifying Fiscal Inflation* *by Ferre De Graeve and Virginia Queijo von Heideken*	2013:273
On the Redistributive Effects of Inflation: an International Perspective* *by Paola Boel*	2013:274
Business Cycle Implications of Mortgage Spreads* *by Karl Walentin*	2013:275
Approximate dynamic programming with post-decision states as a solution method for dynamic economic models *by Isaiah Hull*	2013:276
A detrimental feedback loop: deleveraging and adverse selection *by Christoph Bertsch*	2013:277
Distortionary Fiscal Policy and Monetary Policy Goals *by Klaus Adam and Roberto M. Billi*	2013:278
Predicting the Spread of Financial Innovations: An Epidemiological Approach *by Isaiah Hull*	2013:279
Firm-Level Evidence of Shifts in the Supply of Credit *by Karolina Holmberg*	2013:280

Lines of Credit and Investment: Firm-Level Evidence of Real Effects of the Financial Crisis *by Karolina Holmberg*	2013:281
A wake-up call: information contagion and strategic uncertainty *by Toni Ahnert and Christoph Bertsch*	2013:282
Debt Dynamics and Monetary Policy: A Note *by Stefan Laséen and Ingvar Strid*	2013:283
Optimal taxation with home production *by Conny Olovsson*	2014:284
Incompatible European Partners? Cultural Predispositions and Household Financial Behavior *by Michael Haliassos, Thomas Jansson and Yigitcan Karabulut*	2014:285
How Subprime Borrowers and Mortgage Brokers Shared the Piecial Behavior *by Antje Berndt, Burton Hollifield and Patrik Sandås*	2014:286
The Macro-Financial Implications of House Price-Indexed Mortgage Contracts *by Isaiah Hull*	2014:287
Does Trading Anonymously Enhance Liquidity? *by Patrick J. Dennis and Patrik Sandås*	2014:288
Systematic bailout guarantees and tacit coordination *by Christoph Bertsch, Claudio Calcagno and Mark Le Quement*	2014:289
Selection Effects in Producer-Price Setting *by Mikael Carlsson*	2014:290
Dynamic Demand Adjustment and Exchange Rate Volatility *by Vesna Corbo*	2014:291
Forward Guidance and Long Term Interest Rates: Inspecting the Mechanism *by Ferre De Graeve, Pelin Ilbas & Raf Wouters*	2014:292
Firm-Level Shocks and Labor Adjustments *by Mikael Carlsson, Julián Messina and Oskar Nordström Skans*	2014:293
A wake-up call theory of contagion *by Toni Ahnert and Christoph Bertsch*	2015:294
Risks in macroeconomic fundamentals and excess bond returns predictability *by Rafael B. De Rezende*	2015:295
The Importance of Reallocation for Productivity Growth: Evidence from European and US Banking *by Jaap W.B. Bos and Peter C. van Santen*	2015:296
SPEEDING UP MCMC BY EFFICIENT DATA SUBSAMPLING *by Matias Quiroz, Mattias Villani and Robert Kohn*	2015:297
Amortization Requirements and Household Indebtedness: An Application to Swedish-Style Mortgages *by Isaiah Hull*	2015:298
Fuel for Economic Growth? *by Johan Gars and Conny Olovsson*	2015:299
Searching for Information *by Jungsuk Han and Francesco Sangiorgi*	2015:300
What Broke First? Characterizing Sources of Structural Change Prior to the Great Recession *by Isaiah Hull*	2015:301
Price Level Targeting and Risk Management *by Roberto Billi*	2015:302
Central bank policy paths and market forward rates: A simple model *by Ferre De Graeve and Jens Iversen*	2015:303
Jump-Starting the Euro Area Recovery: Would a Rise in Core Fiscal Spending Help the Periphery? *by Olivier Blanchard, Christopher J. Erceg and Jesper Lindé*	2015:304
Bringing Financial Stability into Monetary Policy* *by Eric M. Leeper and James M. Nason*	2015:305
SCALABLE MCMC FOR LARGE DATA PROBLEMS USING DATA SUBSAMPLING AND THE DIFFERENCE ESTIMATOR *by MATIAS QUIROZ, MATTIAS VILLANI AND ROBERT KOHN*	2015:306

SPEEDING UP MCMC BY DELAYED ACCEPTANCE AND DATA SUBSAMPLING *by MATIAS QUIROZ*	2015:307
Modeling financial sector joint tail risk in the euro area *by André Lucas, Bernd Schwaab and Xin Zhang*	2015:308
Score Driven Exponentially Weighted Moving Averages and Value-at-Risk Forecasting *by André Lucas and Xin Zhang*	2015:309
On the Theoretical Efficacy of Quantitative Easing at the Zero Lower Bound *by Paola Boel and Christopher J. Waller*	2015:310
Optimal Inflation with Corporate Taxation and Financial Constraints *by Daria Finocchiaro, Giovanni Lombardo, Caterina Mendicino and Philippe Weil*	2015:311
Fire Sale Bank Recapitalizations *by Christoph Bertsch and Mike Mariathasan*	2015:312
Since you're so rich, you must be really smart: Talent and the Finance Wage Premium *by Michael Böhm, Daniel Metzger and Per Strömberg*	2015:313
Debt, equity and the equity price puzzle *by Daria Finocchiaro and Caterina Mendicino*	2015:314
Trade Credit: Contract-Level Evidence Contradicts Current Theories *by Tore Ellingsen, Tor Jacobson and Erik von Schedvin*	2016:315
Double Liability in a Branch Banking System: Historical Evidence from Canada *by Anna Grodecka and Antonis Kotidis*	2016:316
Subprime Borrowers, Securitization and the Transmission of Business Cycles *by Anna Grodecka*	2016:317
Real-Time Forecasting for Monetary Policy Analysis: The Case of Sveriges Riksbank *by Jens Iversen, Stefan Laséen, Henrik Lundvall and Ulf Söderström*	2016:318
Fed Liftoff and Subprime Loan Interest Rates: Evidence from the Peer-to-Peer Lending *by Christoph Bertsch, Isaiah Hull and Xin Zhang*	2016:319
Curbing Shocks to Corporate Liquidity: The Role of Trade Credit *by Niklas Amberg, Tor Jacobson, Erik von Schedvin and Robert Townsend*	2016:320
Firms' Strategic Choice of Loan Delinquencies *by Paola Morales-Acevedo*	2016:321
Fiscal Consolidation Under Imperfect Credibility *by Matthieu Lemoine and Jesper Lindé*	2016:322
Challenges for Central Banks' Macro Models *by Jesper Lindé, Frank Smets and Rafael Wouters*	2016:323
The interest rate effects of government bond purchases away from the lower bound *by Rafael B. De Rezende*	2016:324
COVENANT-LIGHT CONTRACTS AND CREDITOR COORDINATION *by Bo Becker and Victoria Ivashina*	2016:325
Endogenous Separations, Wage Rigidities and Employment Volatility *by Mikael Carlsson and Andreas Westermark*	2016:326
Renovatio Monetae: Gesell Taxes in Practice *by Roger Svensson and Andreas Westermark*	2016:327
Adjusting for Information Content when Comparing Forecast Performance *by Michael K. Andersson, Ted Aranki and André Reslow*	2016:328
Economic Scarcity and Consumers' Credit Choice *by Marieke Bos, Chloé Le Coq and Peter van Santen*	2016:329
Uncertain pension income and household saving *by Peter van Santen*	2016:330
Money, Credit and Banking and the Cost of Financial Activity *by Paola Boel and Gabriele Camera*	2016:331
Oil prices in a real-business-cycle model with precautionary demand for oil *by Conny Olovsson*	2016:332
Financial Literacy Externalities *by Michael Haliasso, Thomas Jansson and Yigitcan Karabulut*	2016:333

The timing of uncertainty shocks in a small open economy *by Hanna Armelius, Isaiah Hull and Hanna Stenbacka Köhler*	2016:334
Quantitative easing and the price-liquidity trade-off *by Marien Ferdinandusse, Maximilian Freier and Annukka Ristiniemi*	2017:335
What Broker Charges Reveal about Mortgage Credit Risk *by Antje Berndt, Burton Hollifield and Patrik Sandåsi*	2017:336
Asymmetric Macro-Financial Spillovers *by Kristina Bluwstein*	2017:337
Latency Arbitrage When Markets Become Faster *by Burton Hollifield, Patrik Sandås and Andrew Todd*	2017:338
How big is the toolbox of a central banker? Managing expectations with policy-rate forecasts: Evidence from Sweden *by Magnus Åhl*	2017:339
International business cycles: quantifying the effects of a world market for oil *by Johan Gars and Conny Olovsson l*	2017:340
Systemic Risk: A New Trade-Off for Monetary Policy? *by Stefan Laséen, Andrea Pescatori and Jarkko Turunen*	2017:341
Household Debt and Monetary Policy: Revealing the Cash-Flow Channel *by Martin Flodén, Matilda Kilström, Jósef Sigurdsson and Roine Vestman*	2017:342
House Prices, Home Equity, and Personal Debt Composition *by Jieying Li and Xin Zhang*	2017:343
Identification and Estimation issues in Exponential Smooth Transition Autoregressive Models *by Daniel Buncic*	2017:344
Domestic and External Sovereign Debt *by Paola Di Casola and Spyridon Sichlimiris*	2017:345
The Role of Trust in Online Lending *by Christoph Bertsch, Isaiah Hull, Yingjie Qi and Xin Zhang*	2017:346
On the effectiveness of loan-to-value regulation in a multiconstraint framework *by Anna Grodecka*	2017:347
Shock Propagation and Banking Structure *by Mariassunta Giannetti and Farzad Saidi*	2017:348

Sveriges Riksbank
Visiting address: Brunkebergs torg 11
Mail address: se-103 37 Stockholm

Website: www.riksbank.se
Telephone: +46 8 787 00 00, Fax: +46 8 21 05 31
E-mail: registratorn@riksbank.se