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The Impact of Import Competition on Gross Job Creation and Destruction: A Study Based on Japanese Import-Industry Data Concordance

Eiichi Tomiura and Yukio Uchida

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Eiichi Tomiura

Associate Professor, Research Institute for Economics and Business Administration, Kobe University

Former Special Research Fellow, MITI Research Institute, JAPAN

and

Yukio Uchida

Census Division, Research and Statistics Department,

Economic and Industrial Policy Bureau, Ministry of Economy,Trade and Industry

Former Research Fellow, MITI RI

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ABSTRACT

This paper investigates the relationship between import competition and employment in the case of Japanese manufacturing industries, by using data of gross job flows and by assigning instrumental variables to the industry-specific relative import price. The estimates imply that ten-percent fall of import price depresses gross job creation by more than 0.4 percent while it accelerates gross job destruction by less than 0.1 percent. Employment adjustments responding to changing intensity of import competition are mainly associated with product changes within plants and plant startups. The Japanese import data classified according to domestic industry classification, based on our data concordance between nine-digit HS import statistics and four-digit *Census of Manufacturers* data, are downloadable at the web site.

Keywords: gross job flows; entry and exit; import competition; instrumental variables; data concordance

JEL Classification: F16; J63

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1. Introduction

As has been well documented, employment declines and import share rises in many mature industries. There is no consensus as to the explanation of possible relation between these two observations. Although the controversy over jobs and imports has been especially intense in the U.S., the same issue is potentially critical in all developed countries.

Many previous studies found no systematic relation between import penetration and domestic employment decline, after controlling for various factors including industrial differentials. Recently, however, studies focusing on gross job flows, such as Klein, Schuh, and Triest (2000), have altered the conventional wisdom, finding that gross job destruction, not gross job creation, is significantly sensitive to exchange rate appreciation in the U.S.

This paper examines the relationship between import competition and employment in the Japanese manufacturing, but the following three features, all combined, will distinguish this work from previous studies: First, instead of net changes, we measure employment response in terms of gross job creation/destruction, following the approach set out by Davis, Haltiwanger, and Schuh (1996). Since Japanese firms tend to adjust employment mainly through hiring due to the supposedly high firing costs associated with the Japanese traditional "lifetime" employment, it is of particular interest to investigate whether the import sensitivity of gross job creation is higher than that of gross job destruction. As Gourinchas (1998, 1999) found that significantly sensitive to exchange rate changes is gross job destruction in the U.S. but gross job creation in France, casually observed sharp differences in employment adjustment patterns across countries induce us to expect different response of Japanese employment to import competition. Although studies of gross job flows have already revealed that gross job creation is more variable than gross job destruction over business cycles in Japan, its relationship with foreign trade has not yet been substantially explored in the Japanese data.

Second, to avoid the simultaneity problem associated with the use of the import share on which many previous studies depend, we measure the intensity of import competition by industry-specific relative import price changes. Besides, we will assign

instrumental variables to the relative import price, which we suspect of the problems due to errors-in-variables and simultaneity.

Finally, the use of Japanese *Census of Manufacturers* data enables us to distinguish not only jobs created by plant startups (entry), jobs destroyed by plant shutdowns (exit), but also jobs created/destroyed by plants changing their products, from those by surviving plants that remain in the same industries. Although plant-opening/closing decisions and product change decisions must critically affect employment response to import competition, no previous research, as far as we know, has paid attention to this distinction.

To preview our results, this paper finds that import competition has significant effect on gross job flows, especially, as expected, on gross job creation rather than gross job destruction in Japanese manufacturing industries. Our estimates suggest, evaluated at the mean, ten-percent fall of import price is responsible for more than 0.4 percent decrease in job creation and less than 0.1 percent increase in job destruction. Although thus estimated responsiveness is smaller than that previously found in U.S. data, around one-fifth of total employment decline during the yen-appreciating recession years subsequent to the burst of Bubble boom can be attributable to intensified import competition. By exploiting our detailed data set, we also find that plants changing their products and newly opened plants (entrants) play a major role in Japanese employment adjustment responding to imports. Hence, the impact of import competition on Japan's employment cannot be neglected, especially in depressing gross job creation and plant startups, rather than in directly accelerating gross job destruction and plant shutdowns. This asymmetric response could be interpreted as consistent with the limited role of firing in the Japanese traditional employment adjustment.

The remainder of this paper is structured as follows. Section 2 surveys the previous related studies. Section 3 formalizes a simple model of employment adjustment facing import competition. Section 4 explains the data. Section 5 presents the empirical results. Section 6 concludes the paper. The data appendix describes our data concordance which connects Japan's domestic industry classification in *Census of Manufacturer*s at four digits with import HS classification in *Custom Clearance Statistics* at nine digits.

The import data classified according to domestic industry classification is attached to this paper and made downloadable at the METI Web site. Although our data concordance is far from complete compared with the U.S. counterpart established at NBER by Feenstra (1996), we believe that our newly concorded import data will be

particularly useful for economists wanting to analyze the effects of import competition on Japanese manufacturing industries.

2. Related literature

Many studies have accumulated, especially in the U.S., on the relation between imports and employment. Most of the early studies, including Berman, Bound, and Griliches (1994), found that the impact of imports on domestic employment is small.

Later, the research distinguishing gross job creation and destruction from net employment changes became widespread. The gross job flow measures are more closely associated with labor adjustment than the traditional measure of net employment change because net changes do not fully account for job reallocations within sectors. The early studies of gross job flows, however, did not alter the results previously obtained from net employment change data. Davis, Haltiwanger and Schuh(1996) found no significant relationship between the gross job destruction and the exposure to international trade in the U.S. case over the period from 1973 to 1986, after controlling for the wage differentials across industries. Based on plant-level data in Chile, Levinsohn (1996) also found no systematic patterns between gross job flows and trade orientations in the period of drastic trade liberalization during 1979 to 1986. Both studies, however, relied on quantity variables, such as import share, for the international competition proxy, of which previous studies such as Grossman (1986) had already pointed out the simultaneity problem[1].

Recently, some studies have begun to find significant relationship between domestic employment and international competition by focusing on the price variable; i.e. the real exchange rate. Burgess and Knetter (1998) found that net employment growth fall is strongly related to real exchange rate appreciation in the case of G-7 countries. Gourinchas (1998) and Klein, Schuh and Triest (2000) found that U.S. gross job destruction, not gross job creation, is sensitive to real exchange rate appreciation. They have clearly paved new direction for research of jobs and trade, although there remain some problems in data and in estimation[2]. This paper is motivated by these recent studies of gross job flows and tries to apply various research strategies jointly to newly available Japanese data.

The investigation of the Japanese experience, on the other hand, has so far been limited. Especially, no established regularities have been reported for the relationship of the Japanese gross job flows with foreign trade, while previous studies (e.g. Genda

(1998)) succeeded in characterizing various gross job creation and destruction patterns in Japan. One of the reasons that hamper research efforts lies in the limit of data availability. While for the U.S. case the import data concorded to domestic industry classifications have been readily available at NBER prepared by Feenstra (1996), researchers must establish their own data concordance from scratch when they analyze Japanese data.

The U.S.-Japan comparison of the relation between gross job flows and international trade will also be interesting. Both Higuchi and Shimpo (1998) and Morikawa and Tachibanaki (1997) found that gross job creation, compared with gross job destruction, is more sensitive to business cycle fluctuations in Japan, which clearly contradicts with the finding by Davis, Haltiwanger and Schuh (1996) as they report that gross job destruction is more cyclically variable in the U.S. case. When we take account of casual observations of Japanese traditional employment characteristics, such as relatively rare firing once hired as a regular employee, however, we might reconcile these findings. Further, in our context, this contrast suggests the possibility that gross job creation, rather than gross job destruction, is more sensitive to international competition in Japan, as the previous results by Gourinchas (1998) and Klein, Schuh and Triest (2000) found greater sensitivity of gross job destruction to real exchange rate changes in the U.S.[3]

3. A simple model

This section aims to set out a simple framework, based on the model developed in Klein, Schuh and Triest (2000), for interpreting the empirical results in terms of rational optimization behavior. First, the supply-side of a firm j in industry i at time t can be summarized by the following standard cost function:

$$C_{ijt} = f_{ijt} w_{it}^{g_1+1} c_{it}^{g_2} Q_{ijt} \qquad (1)$$

,where w, c, and Q denote wage, non-labor input costs, and output quantity, respectively. The factor markets are assumed to be perfectly competitive, letting each firm be a price-taker. Other cost shifters are captured by ϕ, part of which can include firm-specific idiosyncratic components. We naturally assume $0 < g_1 + 1 < 1,\ 0 < g_2 < 1$. By Shephard's lemma, the labor demand is derived, suppressing the subscripts, as following;

$$L = \frac{\partial C}{\partial w} = f(\gamma_1 + 1) w^{\gamma_1} c^{\gamma_2} Q . \quad (2)$$

Next, consider the demand-side of the industry by introducing the following standard demand function:

$$Q_i = A\left(\frac{p_i^h}{p_i^m}\right)^{-\theta}\left(\frac{p_i^h}{P}\right)^{-\eta} y^{\gamma_3} \quad (3)$$

,with p^h, p^m, P, y denoting the price of the product which is supplied by domestic plants, the price of imported product, the aggregate domestic price level, and domestic income, respectively[4]. All the prices are denominated in home-country's currency. We assume, as in previous studies such as Grossman (1986) and Klein, Schuh and Triest (2000), that the product produced in the home country is an imperfect substitute for the imported product and for the aggregate basket of domestic goods. Other factors shifting demand are expressed by the term A. Both θ,η and γ_3 are naturally assumed positive. Plugging (3) into (2) and taking first-difference of logarithm form, we obtain the following semi-reduced form:

$$d\ln L = \alpha + \theta\, d\ln\left(\frac{p^m}{p^h}\right) + \eta d\ln\left(P / p^h\right) + \gamma_1 d\ln w + \gamma_2 d\ln c + \gamma_3 d\ln y . \quad (4)$$

From the above-explained standard setup, we expect that the signs of all the coefficients except $\gamma 1$ are positive. The coefficient on relative import price, θ, which corresponds to the elasticity of employment with respect to import price, can be interpreted as a measure of sensitivity of domestic employment to import competition. This model offers a general framework for empirical specifications.

4. Data Description

4.1. Gross job flow data

The study of the relationship between gross job flows and import competition

requires two distinct sources of data: gross job flow data and trade statistics. In this paper, we exploit the former from that published in Morikawa and Tachibanaki (1997), which documents gross job creation and destruction from the establishment-level data sampled in the Japan's *Census of Manufacturers* (Kougyou-Toukei, in Japanese). The Census collects information on all the establishments in manufacturing industries, counting more than 400 thousand establishments in their sample period[5]. Unlike other employment statistics, *Census of Manufacturers* contains data not only on number of workers, but also on average wage, output and non-labor variable inputs. As Berman, Bound, and Griliches (1994) exploited counterpart data series from U.S. *Census of Manufacturers* in studying the impact of foreign trade on labor demand changes, these related data will be valuable in explaining industrial differences.

The data set includes the annual data at the four-digit industries, compiled in the longitudinal format, for the recent three Census-years: 1988, 1990 and 1993. The choice of this sample period is of particular interest, as it covers both boom and bust as well as exchange rate depreciation and subsequent appreciation. It thus provides a natural experiment for investigating the relationship between import competition and employment. Although the census data collections are regularly conducted every two or three years, the extension of this data set to more recent years should be left to a future independent work because obtaining gross job flow data is impossible without authorized direct access to the confidential data in the original data files possessed by the government.

The basic structure of the Japanese Census is the same as the counterpart census in the U.S. We follow the definition of industry-level gross job creation rate (GJC) and gross job destruction rate (GJD), now established by previous studies as follows;

$$GJC_t = \sum_{j \in S^+} \frac{L_{jt} - L_{j,t-1}}{(L_t + L_{t-1})/2} \quad , GJD_t = \sum_{j \in S^-} \frac{\left| L_{jt} - L_{j,t-1} \right|}{(L_t + L_{t-1})/2} \tag{5}$$

,where the employment level in establishment/plant j at time t is denoted by L_{jt}[6]. S refers to a set of plants with superscripts +/– indicating the subset of plants in the industry whose employment expand/contract, respectively. Thus defined industry-level gross rates are, in other words, size-weighted sums of plant-level growth rates. The choice of the denominator enables us to portray plant openings and shutdowns symmetrically.

The net job creation rate (NJC) and the job reallocation rate (GJR) are defined as the gap (GJC–GJD) and the sum (GJC+GJD) of gross rates, respectively. Hence, decline of employment level can be decomposed into (a) increase in gross job destruction (accelerated job contraction associated with shrinking plants) and/or (b) decrease in gross job creation (depressed job expansion associated with growing plants). Previous studies, such as Davis, Haltiwanger and Schuh (1996), revealed that job destruction, not job creation, plays a major role in total employment adjustment in the U.S. This paper aims at evaluating the relative magnitudes of these two components in the case of Japanese employment.

The novel aspect of Japan's *Census of Manufacturers* data, however, is that it can further decompose gross job creation/destruction data to the following four subcategories, depending on the plant status: (a) gross job creation by entry; i.e. by newly opened plants (GJCE), (b) gross job destruction by exit; i.e. by closing plants (GJDE), (c) gross job creation/destruction by surviving plants which remain in the same industry (GJCS, GJDS), and (d) gross job creation/destruction by "transforming" plants which crossed the boundary of industry classification during the sample period (GJCT, GJDT) [7].

Table 1 presents the basic summary statistics of job changes in various categories. The change in NJC shows that total employment increased by 0.45% in Period I (1988-90) and declined by 1.5% in Period II (1990-93). Behind these small changes in NJC, relatively large GJC (7–10%) and GJD (9–10%) imply simultaneous creation and destruction of jobs in industries. As GJR figures show, 16–20% of total jobs are either created or destroyed every year. The comparison of GJC with GJD demonstrates that gross job creation, not gross job destruction, is the main source of net employment fluctuation in Japan. These observations are obviously consistent with Japanese macroeconomic fluctuation of Bubble boom and subsequent recession and also with results from previous studies such as Higuchi and Shimpo (1998).

The major role of gross job creation compared with gross job destruction in net total employment adjustment could be a reflection of Japanese traditional "lifetime" employment system. In Japanese firms, employment adjustment tends to be limited to either through (a) mandatory retirement at prefixed age (say, sixty-years old) or (b) recruitment of people upon graduation from colleges and high schools. This tradition, though they have begun to change gradually in recent years, tends to contribute to the relative sensitivity of gross job changes because the number of retiring people is relatively stable according to demographic factors rather irrespective of economic fluctuations while

the number of people newly hired varies sensitively over business cycles. Although no theoretical foundation has been provided to formalize it, we can at least contend here that this argument is consistent with the observed trends[8].

The figures in this table also reports gross job creation and destruction subcategorized depending on plant status. Plants changing their products/industry-affiliation occupy a relatively dominant share in both total gross job creation and total gross job destruction, compared with opening/closing plants and plants which remain producing the same products. This implies that job creation/destruction in Japan is largely through product changes within plants rather than entry/exit of plants. While all three sub-categories of GJC (GJCE, GJCS, and GJCT) are cyclical and GJDE is countercyclical as anticipated, GJDT curiously exhibits cyclical variation.

4.2. Data concordance of import statistics with *Census of Manufacturers*

The remaining task in data tabulation, then, is the establishment of data concordance between import data and manufacturing census data since these two statistics adopt different classification systems. Even if we trace import data back to nine-digit levels in the HS classification system which identifies more than eight thousand products, some products cannot be mapped to one particular census industry. Although one of the reasons for this failure includes our insufficient product knowledge, the difference in basic classification scheme matters. For example, many industries are classified in domestic industry classification by their production/processing method which is unknown for imports produced/processed outside of the country[9]. In the U.S. case, however, a comprehensive data concordance has already been established at NBER by Feenstra (1996) and already been extensively used by many researchers. We tried it for the Japanese case at four-digit manufacturing industries, as no formerly established concordance tables are publicly available[10].

Out of 562 industries, all the industries at the four-digit level in *Census of Manufacturers*, we choose 490 industries since other 72 industries are either nontradables or industries with negligible imports[11]. In the group of 490 industries, each of 334 industries has direct counterpart in import statistics, while others do not have one-to-one correspondence. As a result, we combine 490 industries in *Census of Manufacturers* into 390 industries, of which 56 industries are defined as the sum over several four-digit industries in census classification. No imputation across classifications was used. Since these 56 industries out of 390 industries aggregate different four-digit industries and, as

a result, have no correct data for GJCT/GJDT distinguished from GJCS/GJDS. Hence, we mainly employ the data set consisted of 334 industries, although 390 industries will be also examined to check the robustness of the results. The coverage of our data set is by far wider than that examined by Gourinchas (1988), which includes 68 tradable industries, and is roughly as comprehensive as that in Klein, Schuh and Triest (2000), which contains 442 four-digit industries. The data concordance table will be available by the author upon request. The import data listed according to four-digit domestic industry classification numbers are provided in Table 6 and downloadable at the website. The appendix of this paper describes in detail our data set.

The import penetration ratio of each four-digit industry is drawn from the data set based on our data concordance described above. Since not all four-digit industries have quantity-based import data, and since the use of unit-value indices brings problems in discussing price changes, however, we derive the import price data from WPI. The relative import price series of each four-digit industry employed in our regression is defined as the import price divided by the domestic price, both of which are drawn from WPI. While all other data used in regressions are taken from the *Census of Manufacturers* on a consistent basis, our import price data might be relatively contaminated, or measured with errors because WPI adopts a different classification system[12]. In other words, the relative import price data we employ might be different from the true price series we should incorporate into a theoretical model. Therefore, we will assign instrumental variables to the import price in answering this errors-in-variables problem in econometrics[13].

The import-related data are also summarized in Table 1. Here, the import penetration ratio (IMP) is, as usual, defined as the imports as the fraction of imports plus domestic shipment. Although the imports merely occupy around ten percent of domestic market in the case of average industry, the import penetration ratio naturally varies substantially across industries, as large standard deviation figures show. Figure 1 graphs IMP for 390 industries during Period II. The distribution drawn in the graph implies that impact of import competition must concentrate in relatively limited numbers of industries with extremely high import penetration ratio. The industry-specific import price relative to domestic price, also shown in Table 1 as $d \ln P^m$, increased by three percent on average in yen depreciating Period I and decreased by six percent on average in yen appreciating Period II, as expected from country-level macro exchange rate adjustment

trend.

5. Empirical results

5.1. Empirical implementation

Exploiting the above-described data set, we will estimate the empirical counterpart of (4) in the following form:

$$NJC_{it} = a_i + q \cdot d\ln P_{it}^m + g_1 d\ln W_{it} + g_2 d\ln C_{it} + g_3 d\ln Y_t + g_4 d\ln T_{it} + e_{it} \qquad (6)$$

,where P^m, W, C, Y, T denote relative import price, average wage rate, materials and energy costs, national income (real GDP), and productivity, respectively[14]. Due to the empirical fitness of the estimated equation, we have adapted the theoretical model (4) by adding the productivity measure and by omitting the relative domestic price, which tends to be correlated with the relative import price in some industries. All the explanatory variables are in log-differenced form. The error term ε is supposed to satisfy the standard assumption in regression analysis[15]. All the variables except for national income are industry-specific.

The dependent variable NJC corresponds to the net employment change rate defined in (5). In the following regression exercises, we will replace the left-hand side variable successively with GJC, GJD, GJCE, GJCS, GJCT, GJDE, GJDS and GJDT. The expected signs of coefficients are the same as explained in Section 3 for regressions of job creation series, while they must be opposite for regressions of job destruction series.

We must address another issue to implement this specification in our empirical analysis. Since the sensitivity of employment to imports, θ in (6), is likely to vary depending on the industry's exposure to import competition and the import penetration ratio substantially varies across industries in our sample, we adapt (6) into the following specification by interacting the import penetration ratio (IMP) with the import price:

$$NJC_{it} = a_i + b \cdot IMP_{it} * d\ln P_{it}^m + g_1 d\ln W_{it} + g_2 d\ln C_{it} + g_3 d\ln Y_t + g_4 d\ln T_{it} + e_{it} \qquad (7)$$

Needless to say, the industry-specific import-price elasticity of employment can be obtained with coefficient estimates by $q_{it} = \hat{b} \cdot IMP_{it}$[16].

5.2. Panel regression

Table 2 reports the panel regression estimates of (7). The dependent variable is NJC, GJC, GJD, or other disaggregated gross job change rates. We choose to report either the fixed-effect model (FE) or the random-effect model (RE), not both to save space, based on the Hausman's specification test whose c^2 test statistics are included in the bottom row of the table.

Since previous research has demonstrated that a) job creation, not job destruction, exhibits more variability over business cycles in Japan, b) job destruction is much more sensitive than job creation to changes in business cycle conditions in the U.S., c) job destruction compared with job creation respond more significantly to exchange rate changes in the U.S., it is interesting to investigate whether these relationships are carried over to import price changes in Japan.

Before discussing the regression results, a glimpse of simple correlation coefficient might be served as a convenient starting point. The correlation coefficient between the net employment growth (NJC) and the import share (IMP) was −0.118 and −0.032 during our sample periods. This calculation shows that employment decline is weakly correlated with import penetration, as anticipated from casual reasoning in ceteris-paribus setting. The result from correlation coefficients, however, should be interpreted with caution because it neither means causality from import to job destruction nor a confirmed result after controlling for various industrial differentials.

The most striking feature of the top panel of Table 2 is that import competition depresses more severely gross job creation (GJC), rather than accelerates gross job destruction (GJD). The import price fall of ten percent was responsible for a decrease in gross job creation of around 0.4 percent when we evaluate at the mean. This relatively higher sensitivity of GJC compared with GJD to economic fluctuation confirms the general observations of Japanese traditional employment adjustment patterns and is also consistent with the previous finding with Japanese data in the business cycle context. The coefficient of GJD is not significantly different from zero. Interpreting the estimate in the regression of net employment change (NJC) is rather obvious as it is the result of subtracting the job destruction coefficient from the job creation coefficient[17].

The estimates implies that discussions solely based on net employment changes misses the important aspect of Japanese labor response to international competition because depressed job creation, compared with rising job destruction, tends to have less

serious direct effects on wages, unemployment payment and retraining costs. This might be one of the reasons behind general ignorance to sensitivity of jobs in Japan.

Next, the estimates shown in middle and bottom panels of Table 2 reveal richer characteristics of gross job flows by taking account of plant status. On the job creation side, the highest sensitivity is found in gross job creation by plants changing their products (GJCT). Plants newly opened (GJCE) exhibit small but significant variability of job creation over changing import prices. On the job destruction side, plants changing their products (GJDT) again play a dominant role, while jobs destroyed by exit (GJDE) exhibit irregular pattern. Jobs in plants surviving in the same industry tend to be insensitive to import competition, both on creation and destruction sides. The detailed examination of these estimates, however, must wait for the results reported in the next section because these disaggregated series might be contaminated by measurement errors.

5.3. Regression with instrumental variables

As was previously discussed in Section 4, we must suspect the errors-in-variables problem for the relative import price due to measurement errors[18]. The simultaneity problem, however, may also affect our estimates because the relative import price variable is defined as divided by the domestic price which is endogenous in our industry employment adjustment framework. To alleviate the bias due to these factors, we assign instrumental variables (IV) to the relative import price. The instrument list includes the lagged relative import price[19]. The specification of the estimated equation is maintained exactly identical to that in the previous section. Although the idea of assigning IV to the relative import price in examining the import impact on employment was already explored by previous studies, Revenga (1992) depends on net employment change data and Gourinchas (1998) concentrates on limited numbers of industries.

We estimate the same specification (7) now with instrumental variables. Table 3 presents the IV estimates. As in the previous table, we choose to report either the fixed-effect model (FE) or the random-effect model (RE). We will discuss in the following these IV estimates mainly focusing on the gap from the previously obtained estimates.

The IV estimates shown in the top panel of Table 3 confirm that gross job creation exhibits more volatility over changing import competition intensities while gross job destruction plays a minor role in national-level net employment adjustment in Japan.

Although the conclusion is qualitatively the same as that in the previous direct

estimates, the coefficient estimates are now slightly larger with instrumental variables. The specification of import price interacted with import penetration ratio allows the responsiveness of employment to vary with industry import shares. Evaluated at the mean import penetration ratio (10.5%), one-percent fall of import price is associated with gross job creation decrease of more than 0.04 percent, and gross job destruction increase of less than 0.01 percent, ending up with net job creation decrease of around 0.05 percent. The decline of gross job creation due to the import price fall of comparable magnitude is around 0.06 percent in industries at the upper quartile of import penetration (13.3%), while that in industries at the lower quartile (1.7%) is less than 0.01 percent.

This magnitude of elasticity estimate is smaller than those generally found in U.S. data. For example, the elasticity in similar formulations is estimated to be around 0.4–0.5 by Klein, Schuh and Triest (2000), 0.2–0.4 by Revenga (1992), and 0.02–0.06 (quarterly estimates) by Gourinchas (1998). Even after considering the difference in import share levels in two economies, the job sensitivity, either through creation or destruction, to imports seems to be relatively small in Japan compared with that in the U.S. This observation of inactive adjustment, again, could be consistent with characteristics of the Japanese traditional "lifetime" employment.

Although it is small compared with that in the U.S., the impact of import competition on employment may be substantial even in Japan. Six-percent import price fall, observed on average in Period II, results in job creation decrease of around 0.3%, which occupies non-negligible one-fifth share in total employment decline during this period of 1.5%.

Next, results shown in middle and bottom panels of Table 3 report IV estimates for disaggregated gross job flows. First, the import-price elasticity of job creation is, now with IV, estimated to be larger for entrants (GJCE). Second, we confirm the major role of plants changing their products both in job creation and in job destruction (GJCT, GJDT). Third, the insensitivity of jobs in surviving plants to imports (GJCS, GJDS) coupled with irregularity of GJDE, both are reported in the previous table, is also confirmed by IV estimation. Based on these observations, we can argue that job creation and destruction associated with product reshuffles in plants is the main channel of employment adjustment responding to changing intensity of import competition in Japanese manufacturing, while the impact of imports on job created by plant startups (entry) cannot be ignored. In other words, although the effect of import competition on employment is significant in Japan, intensified import competition affects employment

negatively via depressing the expansion of new employment opportunities otherwise offered by entrants or by plants transforming their product mix, rather than via depriving job of incumbent workers or inducing plant exits.

To investigate the need for instruments, we apply the Hausman's specification test because the IV estimator is inefficient under the null hypothesis of no measurement errors but is consistent even if the hypothesis is false, while the OLS estimator is efficient under the null but inconsistent under the alternative. We implement this test by running the following regression which includes a fitted value from the first-stage regression for the import price as an additional regressor besides the original explanatory variables, as explained in Hausman (1978):

$$NJC_{it} = a_i + b_0 IMP_{it} d\ln P_{it}^m + b_1 IMP_{it} d\ln \hat{P}_{it}^m + Z'g + v_{it} \quad (8)$$

,where the fitted value for P^m from the regression of P^m on IV is expressed as $\hat{P}^m$. Other explanatory variables are exactly the same as before and expressed in a compressed fashion by a matrix Z.

The results of this exercise show that the coefficient on the instrumented variable (b_1) is significantly different from zero at any conventional significance levels for the case of GJCE (t= 5.045) and at modest 20% level for GJCT (t= 1.072) and GJDT (t= −1.375) cases while the null hypothesis of no measurement errors cannot be rejected in all other cases including GJC[20]. Actually, the estimates on GJCE, GJCT and GJDT vary substantially across estimation methods[21]. The downward bias is especially serious for the GJCE case. Consequently, the comparison of least-square estimates and instrumental-variables estimates suggests that measurement errors and/or a simultaneous relationship among employment, the price of imported substitute and omitted variables correlated with these must have affected our discussions neglecting IV.

5.4. Alternative industry coverage

To check the robustness of the results obtained from the above regressions employing the sample of 334 industries, we also estimate the same equation with alternative industry coverage. The specification of the equation and the instrument list are maintained identical to those in the previous case of 334 industries. All the estimates shown below are IV estimates.

First, we run the same regression over 390 industries, which include all four-digit tradable industries. Since 56 industries out of 390 industries are defined as composite of different four-digit SIC industries, no exact information on job flows across industry boundaries is available. Hence, only the regressions of NJC, GJCE and GJDE are conducted. The estimates are reported in Table 4. As a result, all the estimates are quite similar to those shown in Table 3. By thus checking the robustness using data of 390 industries, we will be able to be sure that our results well characterize the whole Japanese manufacturing.

Second, in Table 5, we display the results from 303 industries, which we select by excluding 31 directly regulated industries from the previously examined 334 industries[22]. Upon inspection of the estimates from 334 industries with those from 303 industries, we will be able to indirectly investigate the effect of regulation on trade-induced employment adjustment.

The comparison of Table 5 with Table 3 reveals interesting regularities. First, the entrants' responsiveness of job creation (GJCE) to import competition is estimated to be even larger by excluding regulated industries. This means that job creation in startup plants in deregulated industries is more sensitive to import competition than those in regulated industries. Second, the insensitivity of jobs in surviving plants (GJCS, GJDS) to imports is found to be robust irrespective of government regulations. Third, the exclusion of regulated industries from the sample substantially attenuates the elasticity estimates for plants changing their products both in job creation and destruction (GJCT, GJDT). This indirectly implies that, although job reallocation by product changes occupies a major share in total employment adjustment in Japan, most of the import sensitivity of jobs in plants changing their products can be attributable to those plants in regulated industries. In other words, the job reallocation stirred by intensified import competition might be strongly amplified by the government regulation in Japan. Although these interpretations of regulation effects on employment response attract curiosity, an independent, direct investigation of regulated industries will be required before concluding.

6. Concluding remarks

The main empirical findings of this paper can be summarized as follows: First, import competition has significant effect on employment in Japanese manufacturing industries. Second, import price fall of ten percent, evaluated at the mean import share,

decreased gross job creation by more than 0.4 percent, while it increased gross job destruction by less than 0.1 percent. Thus revealed higher sensitivity of gross job creation compared with gross job destruction, in line with the previous finding in France but contrasted with those in the U.S., could be consistent with the characteristics of Japanese traditional "lifetime" employment. Finally, gross job flows responding to import competition are mainly in plants changing their products and in newly opened plants. This paper has confirmed the robustness of these results by using instrumental variables and data with alternative industry coverage. The results of this paper must have critical policy implications since Japan is facing deeper import penetration and higher unemployment by its historical standard at the same time. This paper also brings the import data concorded to domestic industry classification to the public domain. Since this kind of Japanese data has not been publicly available, we hope our data set serves as a convenient vehicle for other researchers.

As a final note, we list three remaining issues for future research. First, although our sample period covers both boom and bust as well as exchange rate appreciation and depreciation years, studies based on data with longer time horizon, like the U.S. Longitudinal Research Database will be informative to check the robustness of the results. Second, although this paper concentrates on the relationship between imports and employment contraction, the other side of the same coin must be the relationship between export and employment expansion. Whether jobs created by plant births are more strongly correlated with exports rather than jobs created in surviving plants will be an interesting future topic, but we need to newly establish our own data concordance table between manufacturing census and export statistics. Third, since idiosyncratic factors within each industry must be enormous, we need to directly study the job flows at the plant level. All of these research agenda, however, require an authorized direct access to confidential data files of the government or labor-intensive data tabulation exercises and hence are worth independent work.

Appendix

This paper exploits the gross job flow data from those published in Morikawa and Tachibanaki (1997), which constructed gross job creation/destruction data series from the government's confidential establishment-level data files of *Census of Manufacturers*. The data set covers the recent three census years: 1988, 1990 and 1993.

The import data at nine-digit HS level are derived from "Nihon Boueki Geppyou: Hin-betsu Kuni-betsu (written in Japanese, Japan's Trade Monthly Tables: Classified by Products and Countries," published monthly by Nihon Kanzei Kyokai (Japan Tariff Association). Since 1988, no substantial tariff classification changes have been taken place.

The tables connecting the Input-Output sectors with domestic industries and with imports are from "Sangyo Renkan-hyo: Keisuu-hen (2) (written in Japanese, Input-Output Table: Analytical Appendix (2)," published by the General Coordination Agency. This paper employs the most recent table at the time of our research, i.e. the table based on data in 1990, which was published in 1994.

The information on the industry classification is found in "Kougyou Toukei Chousa-you Sangyo Bunrui (written in Japanese, Industry Classification for *Census of Manufacturers*)," edited in 1989 by the Department of Research and Statistics, Ministry of International Trade and Industry.

Out of 562 industries, all the industries listed at the four-digit in *Census of Manufacturers*, 68 industries are nontradables and four industries have recorded no imports at least in one year during our sample period. The domestic industry classification numbers of the four industries with negligible imports are 1222, 1855, 2141,and 2597. The sixty-eight industries we classify as nontradables as follows: 1224, 1225, 1241, 1295, 1296, 1297, 1298, 1341, 1362, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1494, 1514, 1551, 1555, 1595, 1613, 1625, 1632, 1641, 1693, 1694, 1713, 1721, 1791, 1834, 1893, 1951, 1952, 1999, 2393, 2421, 2514, 2522, 2547, 2548, 2571, 2581, 2582, 2584, 2585, 2592, 2598, 2653, 2661, 2663, 2692, 2693, 2699, 2861, 2862, 2863, 2865, 2866, 2869, 2983, 2993, 2995, 2998, 3142, 3211, and 3461.

In making concordance, we rely on no imputation across classifications. In other words, we aggregate four-digit industries in *Census of Manufacturers* up to the level where no imputation is necessary. The nine-digit HS import categories are accordingly

aggregated. As a result, in our data concordance, the domestic industries, some of which are aggregates of several four-digit industries, and the import data which are composites of several nine-digit HS categories, have one-to-one correspondence. To check the integrity of the SIC-reclassified data, we have compared the total value of imports with original import statistics at two digit levels and found exact match.

Our import data set may be quoted and/or used for other research without explicit permission provided that full credit is given to the source. The concorded import data are attached to this paper in Table 6 and made downloadable at the METI Web site (http://www.meti.go.jp/mitiri/m4001j.html). Data with SIC industry names in Japanese language will be also available by the authors upon request. Please note that this data set is not an official statistics authorized by any government agency.

References

Berman, E., J. Bound, and Z. Griliches [1994], "Changes in the demand for skilled labor within U.S. manufacturing: Evidence from Annual Survey of Manufacturers," *Quarterly Journal of Economics*, 367-397.

Burgess, S. and M. Knetter [1998], "An international comparison of employment adjustment to exchange rate fluctuations," *Review of International Economics* 6(1), 151-163

Davis, S., J. Haltiwanger, and S. Schuh [1996], *Job Creation and Destruction*, Cambridge, MA: MIT Press.

Feenstra, R. [1996], "U.S. Imports, 1972-1994: Data and Concordances," NBER Working Paper No.5515.

Genda, Y. [1998], "Job creation and destruction in Japan, 1991-1995," *Journal of the Japanese and International Economies* 12, 1-23

Gourinchas, P. [1998], "Exchange rate and jobs: What do we learn from job flows?" in B.Bernanke and J. Rotemberg eds. *NBER Macroeconomics Annual 1998*, Cambridge, MA: MIT Press, 153-208

Gourinchas, P. [1999], "Exchange rates do matter: French job reallocation and exchange rate turbulence, 1984-1992," *European Economic Review* 43, 1279-1316.

Grossman, G. [1986], "Imports as a cause of injury: The case of the U.S. steel industry," *Journal of International Economics* 20, 201-223

Hausman, J. [1978], "Specification tests in econometrics," *Econometrica* 46,1251-1271

Higuchi, Y. and K. Shimpo [1998], "The changes of Japanese job creation and job destruction on business cycle (written in Japanese)," *Mita Business Review* 41(4), 69-101

Klein, M., S. Schuh and R. K. Triest [2000], "Job creation, job destruction and the real exchange rate," NBER Working Paper No.7466.

Levinsohn, J. [1996], "Firm heterogeneity, jobs, and international trade: Evidence from Chile," NBER Working Paper No.5808.

Morikawa, M. and T. Tachibanaki [1997], "Entry, exit, and job change: An analysis based on the microdata of the Japanese establishments (written in Japanese)," Discussion Paper #97-DOJ-85, Research Institute of International Trade and Industry.

Revenga, A.[1992], "Exporting jobs?: The impact of import competition on employment and wages in U.S. manufacturing," *Quarterly Journal of Economics*, 255-284.

TABLE 1 BASIC STATISTICS

	PERIOD	AVERAGE	St. DEV	MAX	MIN
NJC	I	0.450056	6.463906	37.25745	-32.8943
	II	-1.5179	6.588472	55.84527	-47.4018
GJC	I	10.25631	5.283761	39.11429	0
	II	7.151685	4.718968	60.44804	0
GJD	I	9.806258	5.473632	43.57019	1.027479
	II	8.669581	4.71798	47.40177	0
GJR	I	20.06257	8.600899	57.37052	2.256944
	II	15.82127	6.756333	65.0508	2.976805
GJCE	I	2.525338	2.066123	13.13751	0
	II	1.955326	1.388598	6.652512	0
GJCS	I	2.870887	1.294853	12.94821	0
	II	1.74719	0.871749	4.695445	0
GJCT	I	4.860089	4.405772	36.1155	0
	II	3.44917	4.346034	60.15424	0
GJDE	I	2.665035	2.379618	25.0996	0
	II	2.679404	1.967733	13.43473	0
GJDS	I	2.373834	1.240203	10.77673	0
	II	2.288025	1.150133	7.351077	0
GJDT	I	4.767389	4.82321	38.05893	0
	II	3.702152	3.495347	26.61597	0
$d \ln P^m$	I	0.033616	0.0584	0.18157	-0.15001
	II	-0.06311	0.038589	0.133193	-0.15253
IMP	I	10.1752	15.34773	98.4	0.000896
	II	10.54033	15.24655	95.88407	0.003108

(NOTES)

1. All figures are for 334 industries.
2. $d \ln P^m$ denotes the log-differenced relative import price. All other figures are expressed in terms of percentage. See text for abbreviations.
3. Period I and II correspond to the years 1988-1990 and 1990-1993, respectively. Change rates are annualized.

TABLE 2 PANEL REGRESSION

	NJC	GJC	GJD
$IMP * d\ln P^m$	0.392308 (0.251598)	0.363485 (0.146346)	-0.028824 (0.149448)
$d\ln W$	42.512 (13.3710)	24.8977 (7.77744)	-17.6144 (7.94229)
$d\ln C$	15.0357 (8.88203)	7.94847 (5.16636)	-7.08722 (5.27587)
$d\ln Y$	32.1893 (19.4133)	69.2583 (11.2920)	37.0689 (11.5314)
$d\ln T$	0.832193 (5.97584)	5.36690 (3.47593)	4.53471 (3.54961)
statistics	FE ($\overline{R}^2$=0.571) c^2=7.849	FE ($\overline{R}^2$=0.495) c^2=19.456	FE ($\overline{R}^2$=0.452) c^2=16.780

	GJCE	GJCS	GJCT
$IMP * d\ln P^m$	0.087363 (0.049593)	0.009876 (0.039274)	0.266245 (0.132435)
$d\ln W$	-0.148753 (2.63557)	-0.06626 (2.08721)	25.1127 (7.03814)
$d\ln C$	-4.36878 (1.75075)	3.10100 (1.38648)	9.21625 (4.67527)
$d\ln Y$	19.0318 (3.82657)	38.5636 (3.03041)	11.6629 (10.2186)
$d\ln T$	-0.959811 (1.17790)	-2.60715 (.932827)	8.93386 (3.14552)
statistics	FE ($\overline{R}^2$=0.498) c^2=8.135	FE ($\overline{R}^2$=0.348) c^2=14.471	FE ($\overline{R}^2$=0.421) c^2=21.126

	GJDE	GJDS	GJDT
$IMP * d\ln P^m$	0.067486 (0.057509)	-0.019890 (0.032690)	-0.190027 (0.114975)
$d\ln W$	-2.68016 (3.05629)	3.28854 (1.80995)	-15.2886 (6.36488)
$d\ln C$	7.59052 (2.03022)	-3.16326 (1.20395)	-8.24705 (4.23375)
$d\ln Y$	-1.64686 (4.43740)	3.09415 (2.81742)	36.9722 (9.90412)
$d\ln T$	-1.66157 (1.36593)	0.256083 (0.780129)	5.72050 (2.74376)
statistics	FE ($\overline{R}^2$ =0.550) c^2 =48.987	RE c^2 =4.1467	RE c^2 =5.7409

(NOTES)

1. Estimated standard errors are in parentheses. The numbers of observation are 668 (334 industries in 1988-90 and in 1990-93). See text for abbreviations. The result from either the fixed-effect model (FE) or the random-effect model (RE) is shown for each regression.
2. c^2 is the test statistics for the specification test of orthogonality of the random effects and the regressors. $\overline{R}^2$, adjusted for degrees of freedom, is shown for FE.

TABLE 3 REGRESSION WITH INSTRUMENTAL VARIABLES

	NJC	GJC	GJD
$IMP * d\ln P^m$	0.519138 (0.299188)	0.435273 (0.174159)	-0.083865 (0.177821)
$d\ln W$	43.0205 (13.3500)	25.3974 (7.77108)	-17.6231 (7.93449)
$d\ln C$	15.4220 (8.87676)	8.27429 (5.16721)	-7.14772 (5.27586)
$d\ln Y$	28.2354 (20.0210)	66.9149 (11.6543)	38.6794 (11.8994)
$d\ln T$	0.588396 (5.96650)	5.13062 (3.47313)	4.54222 (3.54616)
statistics	FE ($\overline{R}^2$=0.059) c^2=8.3705	FE ($\overline{R}^2$=0.495) c^2=19.465	FE ($\overline{R}^2$=0.452) c^2=15.568

	GJCE	GJCS	GJCT
$IMP * d\ln P^m$	0.235859 (0.057859)	0.012835 (0.046743)	0.186579 (0.158253)
$d\ln W$	-0.111012 (2.58172)	-0.053318 (2.08571)	25.5618 (7.06137)
$d\ln C$	-4.19829 (1.71666)	3.11056 (1.38684)	9.36203 (4.69530)
$d\ln Y$	14.6796 (3.87182)	38.4708 (3.12795)	13.7645 (10.5900)
$d\ln T$	-0.986743 (1.15385)	-2.61334 (0.932166)	8.73070 (3.15594)
statistics	FE ($\overline{R}^2$=0.518) c^2=12.035	FE ($\overline{R}^2$=0.348) c^2=14.433	FE ($\overline{R}^2$=0.416) c^2=16.631

	GJDE	GJDS	GJDT
$IMP * d\ln P^m$	0.104182 (0.068349)	-0.006181 (0.036874)	-0.290089 (0.129484)
$d\ln W$	-2.60204 (3.04978)	3.25871 (1.80960)	-15.4471 (6.35201)
$d\ln C$	7.66742 (2.02788)	-3.14194 (1.20594)	-8.59550 (4.23295)
$d\ln Y$	-2.75656 (4.57377)	2.74816 (2.86329)	39.8119 (10.0471)
$d\ln T$	-1.70012 (1.36304)	0.244542 (0.781564)	5.96325 (2.74378)
statistics	FE ($\overline{R}^2$ =0.551) c^2 =49.770	RE c^2 =4.4010	RE c^2 =4.4409

(NOTE) All the abbreviations and specification are the same as before. See NOTES to Table 2. The results from the first-stage regressions on instrumental variables are not shown to save space, but available upon request. This NOTE applies to Tables 4 and 5.

TABLE 4 ESTIMATES FOR 390 INDUSTRIES

	NJC	GJCE	GJDE
$IMP * d\ln P^m$	0.449166 (0.274386)	0.207821 (0.054966)	0.102168 (0.063586)
$d\ln W$	41.9335 (12.1273)	0.421447 (2.42939)	-2.36888 (2.81037)
$d\ln C$	15.2782 (8.16287)	-3.90076 (1.63522)	7.21419 (1.89166)
$d\ln Y$	10.9112 (6.86669)	6.38614 (1.37557)	-1.38201 (1.59129)
$d\ln T$	1.26259 (5.48465)	-1.10199 (1.09871)	-1.50473 (1.27101)
Statistics	FE ($\overline{R}^2$=0.070) c^2=8.4787	FE ($\overline{R}^2$=0.524) c^2=14.446	FE ($\overline{R}^2$=0.560) c^2=57.376

TABLE 5 ESTIMATES FOR 303 INDUSTRIES

	NJC	GJC	GJD
$IMP * d\ln P^m$	-0.010197 (0.311694)	0.197071 (0.179187)	0.207268 (0.201010)
$d\ln W$	43.1459 (12.6977)	28.0357 (7.29965)	-15.1102 (8.18865)
$d\ln C$	-0.771534 (7.94658)	-0.115409 (4.56834)	0.656125 (5.12470)
$d\ln Y$	88.9370 (18.7869)	99.9338 (10.8002)	10.9968 (12.1156)
$d\ln T$	-13.3930 (5.60584)	-5.90899 (3.22269)	7.48397 (3.61517)
statistics	FE ($\overline{R}^2$=0.185) c^2=8.5243	FE ($\overline{R}^2$=0.561) c^2=10.283	FE ($\overline{R}^2$=0.505) c^2=20.914

	GJCE	GJCS	GJCT
$IMP * d\ln P^m$	0.356375 (0.070470)	0.011929 (0.058097)	-0.221615 (0.124793)
$d\ln W$	1.01929 (2.87079)	-0.701786 (2.36673)	27.1199 (5.71575)
$d\ln C$	-3.60134 (1.79663)	3.95067 (1.48117)	-1.72248 (3.69269)
$d\ln Y$	12.1255 (4.24750)	42.0523 (3.50171)	44.4233 (8.79031)
$d\ln T$	-1.26844 (1.26742)	-3.19583 (1.04488)	0.521694 (2.47965)
statistics	FE ($\overline{R}^2$=0.537) c^2=15.392	FE ($\overline{R}^2$=0.376) c^2=17.217	RE c^2=4.2256

	GJDE	GJDS	GJDT
$IMP * d\ln P^m$	0.234197 (0.087830)	0.015122 (0.054372)	-0.167601 (0.140719)
$d\ln W$	-5.78936 (3.57798)	-2.11231 (2.21500)	-9.48081 (6.44842)
$d\ln C$	10.0369 (2.23921)	-2.55298 (1.38621)	-5.19797 (4.16669)
$d\ln Y$	-7.15857 (5.29382)	-0.969037 (3.27721)	18.9370 (9.92050)
$d\ln T$	-1.03536 (1.57963)	1.60196 (0.977891)	9.06345 (2.79733)
statistics	FE ($\overline{R}^2$=0.543) c^2=56.178	FE ($\overline{R}^2$=0.350) c^2=9.6915	RE c^2=6.6215

TABLE 6 IMPORT DATA

(CONCORDED TO DOMESTIC INDUSTRY CLASSIFICATION)

[million yen]

SIC	1988	1989	1990	1991	1992	1993	1994	1995
ALL	15,761,025	19,627,822	22,320,790	21,541,320	19,946,474	18,582,459	20,259,841	23,733,401
12	2,120,567	2,757,086	2,983,472	3,013,720	3,111,095	2,912,875	3,061,337	3,152,854
1212	87,822	101,037	96,934	107,614	107,674	94,140	91,520	97,371
1211	722,094	855,507	915,547	884,707	960,469	878,947	900,847	1,016,108
1219								
1222	0	1	0	0	18	66	1	0
1223	1,546	2,150	2,549	2,279	1,783	1,741	2,471	2,801
1221	777,840	1,182,201	1,303,719	1,358,367	1,350,512	1,311,286	1,357,239	1,360,021
1226								
1227								
1229								
1231	214,122	249,656	269,233	281,431	294,822	268,550	300,506	311,518
1232								
1242	13,464	17,899	19,744	20,370	21,356	20,623	23,366	24,844
1243								
1244								
1245								
1249								
1251	77,106	94,584	99,100	84,322	77,825	68,014	66,779	74,037
1252								
1253	3,314	4,543	3,394	3,357	2,805	1,579	1,492	2,254
1261	1,067	1,333	1,061	1,002	1,044	4,915	45,563	726
1262								
1263	6,847	8,908	11,365	9,002	8,949	7,460	7,002	6,222
1269								
1271	50,619	57,192	58,109	50,737	51,856	49,199	52,980	57,478
1272								

1273								
1274								
1279								
1281	55,525	53,246	56,518	61,884	72,234	65,502	62,574	67,811
1282	27,757	24,346	28,642	34,783	39,470	28,024	30,463	46,761
1283								
1291	2,557	2,763	3,628	3,852	4,757	5,515	5,096	4,734
1292	10,777	11,144	12,892	11,335	13,365	13,142	10,948	10,221
1293	7,299	8,003	8,899	9,281	9,899	8,657	10,390	11,249
1294	28,082	39,518	48,545	41,661	42,427	33,010	26,403	30,866
1299	32,727	43,056	43,594	47,735	49,828	52,506	65,696	27,834
13	290,414	412,598	497,479	521,474	511,610	457,046	511,276	521,582
1311	19,783	22,411	17,050	15,528	14,610	14,786	25,037	29,655
1321	31,991	48,418	63,849	50,185	46,455	33,518	41,196	49,842
1322	7,222	9,743	14,313	14,852	16,205	14,928	30,219	23,704
1323	6	16	5	13	125	61	115	426
1324	70,694	125,723	169,855	185,329	172,928	138,654	128,863	110,577
1331	33,739	33,551	37,168	35,413	33,641	29,254	29,954	34,524
1332								
1351	30,020	41,572	43,049	53,483	57,106	57,247	59,415	67,810
1352								
1353	433	555	858	767	768	862	884	1,003
1361	96,526	130,608	151,331	165,902	169,772	167,736	195,593	204,042
14	921,668	1,090,846	1,031,519	1,044,686	1,037,024	931,866	1,096,199	1,179,569
1411	10,905	18,715	18,444	20,699	9,738	6,604	6,748	6,639
1412								
1413								
1419								
1421	80,231	80,485	72,406	85,687	66,194	56,085	69,147	72,862
1422	8,817	8,231	8,906	11,948	13,335	11,389	13,776	17,344
1423	22,737	14,873	15,673	23,825	16,691	8,957	13,863	12,802
1424	25,463	23,125	17,495	21,843	14,522	19,193	18,592	14,157
1425								
1429								

1431								
1432								
1441	88,422	109,967	100,008	95,159	81,472	63,367	78,397	74,370
1442	48,988	73,797	73,226	69,118	67,921	48,046	47,806	48,869
1443	51,029	65,761	66,363	48,570	42,286	29,527	34,282	37,764
1444	7,597	6,813	6,265	4,395	3,807	3,866	4,177	4,498
1449	2,762	3,431	3,608	3,261	4,040	2,712	2,067	2,148
1451	11,163	11,380	12,235	13,760	12,136	10,967	16,051	21,894
1452								
1453								
1454	16,770	18,276	15,648	18,050	21,285	23,580	26,456	29,176
1455	2,480	3,099	2,848	3,818	4,825	5,237	7,469	9,846
1456	341,801	415,090	399,098	440,709	496,978	500,449	592,339	670,912
1471	4,001	5,428	6,399	7,279	7,253	6,767	7,466	8,305
1472								
1479								
1484	43	67	147	173	112	111	92	100
1485	2,040	2,732	3,002	2,982	2,982	2,636	2,850	2,869
1481	1,997	2,341	2,510	1,947	2,285	1,253	1,648	2,348
1482								
1483								
1489								
1491	41,827	45,028	33,045	28,594	30,831	18,391	25,253	21,157
1493	54,760	61,320	51,235	39,606	36,583	22,577	27,639	23,598
1495	12,921	14,467	14,701	12,909	11,730	10,489	12,245	14,031
1496	40,359	54,610	61,411	52,109	49,436	45,849	51,827	49,219
1497	12,105	15,081	16,359	15,252	17,721	16,220	19,298	17,058
1498	1,417	1,251	1,011	711	601	785	707	788
1499	31,035	35,479	29,476	22,280	22,262	16,809	16,003	16,816
15	561,666	870,172	907,136	867,164	971,972	965,444	1,073,899	1,206,033
1511	121,717	177,778	188,468	194,589	238,650	236,518	248,962	280,997
1512	135,247	204,691	236,627	250,194	290,405	292,582	316,433	376,621
1513	22,547	42,765	44,985	42,635	46,968	52,522	58,380	68,674
1521	31,148	51,934	55,748	56,691	54,264	58,774	69,995	77,069
1522	16,439	27,135	26,663	20,077	28,059	29,073	37,739	39,727

1523								
1524	14,638	19,022	21,910	20,014	28,884	28,079	30,879	40,212
1531	5,404	7,595	9,734	10,969	12,733	14,881	14,434	20,955
1532								
1541	104,659	177,077	163,293	119,418	106,475	72,057	57,610	46,576
1552	11,917	17,584	22,460	20,551	20,128	18,626	19,106	18,238
1553	9,093	28,670	20,910	12,060	13,957	16,333	24,517	21,101
1554	2,253	3,647	3,486	2,902	3,291	2,872	2,988	3,760
1559	20,795	26,774	29,177	29,813	29,691	30,849	31,797	31,925
1591	31,744	40,798	38,043	37,592	43,843	56,238	90,913	92,502
1593	3,747	3,922	3,875	4,465	6,337	5,816	7,856	9,990
1594	4,591	6,586	6,579	8,158	7,406	7,337	7,126	9,930
1592	25,727	34,195	35,178	37,036	40,879	42,888	55,163	67,756
1599								
16	589,002	823,768	850,492	836,823	798,717	971,053	948,469	1,008,596
1611	318,654	419,698	412,831	384,205	376,931	473,248	464,425	477,248
1612	10,228	13,671	18,138	20,914	18,230	23,425	19,796	17,525
1614	1,082	1,188	1,673	2,394	3,297	4,053	3,722	3,853
1615	13	42	13	14	7	8	18	30
1616	727	649	601	266	221	211	129	116
1634								
1635								
1636								
1617	104	133	3	12	6	10	101	167
1618	136,930	186,548	207,579	229,422	207,405	181,431	183,413	219,142
1621	1,924	2,543	3,837	3,330	2,955	2,750	3,560	5,431
1622	77,932	147,582	148,811	134,828	128,038	219,931	196,601	197,460
1623	2,131	3,555	4,886	6,242	5,725	10,141	13,026	19,618
1624	2,411	4,001	5,731	4,375	3,930	6,121	10,026	11,204
1631	8,246	7,995	8,051	8,260	8,980	8,698	9,045	8,721
1633	260	408	517	613	413	335	339	497
1691	36	19	19	31	16	15	37	23
1692	87	106	110	150	117	94	123	157
1619	28,238	35,629	37,691	41,764	42,446	40,584	44,109	47,404
1699								

17	130,262	163,546	200,644	215,433	206,591	188,023	229,401	258,303
1711	104,448	140,314	179,120	188,845	180,613	167,411	206,613	230,365
1712								
1731	7,443	9,147	9,861	10,134	8,984	8,713	10,338	13,966
1792	773	553	656	540	518	460	600	656
1793	14,775	10,670	7,229	10,492	10,365	5,508	4,286	5,268
1794	1,337	1,850	2,448	3,199	3,181	3,150	4,044	4,531
1799	1,486	1,011	1,329	2,224	2,929	2,782	3,520	3,517
18	422,044	532,715	467,830	407,842	378,101	341,217	379,597	489,584
1811	270,953	355,274	298,438	241,334	219,993	175,298	200,826	280,116
1821	83,191	96,080	81,231	80,444	79,019	84,085	85,911	104,278
1822	19,437	21,847	21,653	20,551	17,800	11,255	9,869	9,476
1824	2,469	3,110	2,706	2,631	2,630	2,380	2,215	2,300
1831	29,220	35,922	39,920	36,808	32,308	34,223	38,308	45,177
1832	7	6	4	15	19	14	12	24
1833	662	744	921	910	888	717	1,028	1,171
1841	4,532	5,664	5,656	6,159	6,151	5,906	6,876	9,036
1842								
1843								
1849								
1851	210	295	270	223	230	182	317	483
1852	984	1,321	1,610	1,980	1,837	2,252	3,095	4,090
1853	289	409	431	612	675	741	828	1,005
1854	1,420	1,723	2,129	2,300	2,484	2,553	2,778	3,504
1855	0	0	6	4	0	0	1	14
1891	149	179	459	324	349	310	259	358
1892	3,382	3,940	5,241	6,014	6,072	12,995	17,489	17,429
1899	5,139	6,202	7,156	7,535	7,645	8,306	9,785	11,123
19	54,412	64,741	83,812	76,774	77,953	68,417	73,684	85,310
1911	3,385	245	173	116	128	119	128	207
1912								
1913								
1921	35,824	44,386	54,675	46,210	50,798	44,454	44,862	48,061

1931	15,203	20,110	28,964	30,447	27,027	23,844	28,694	37,042
1941								
1942								
1943								
20	1,754,643	2,011,837	2,131,087	2,157,995	2,005,328	1,842,736	1,912,190	2,147,782
2011	83,228	118,558	110,446	66,069	49,155	32,903	44,220	49,450
2035								
2012	19,555	20,637	21,401	19,982	18,497	16,230	18,664	19,385
2019	1,130	1,640	1,382	1,659	1,579	1,478	1,390	1,258
2021	7,099	8,409	8,598	11,199	7,042	7,582	7,935	7,291
2023	27,537	38,912	38,007	35,330	30,551	30,887	33,549	37,215
2024	2,351	3,095	3,861	3,999	4,006	3,261	3,154	3,015
2025	21,347	28,750	32,685	30,177	27,181	22,830	21,180	21,335
2022	117,479	137,066	132,828	140,281	123,653	109,460	117,618	137,199
2029								
2031	10,781	12,795	27,262	18,096	5,129	4,283	11,709	8,557
2032	175,645	183,624	154,191	167,462	143,103	127,819	126,703	164,589
2033	38,207	38,216	34,858	46,653	34,831	31,423	49,385	62,076
2036	284,778	317,657	345,259	346,928	326,449	319,080	321,652	370,784
2037	130,338	158,806	166,631	174,547	142,039	129,094	129,434	136,134
2038	19,947	20,072	20,304	22,867	19,649	19,194	20,287	20,208
2034	92,965	103,449	107,848	108,305	99,223	91,837	89,048	103,914
2039								
2041	3,100	3,925	4,800	4,153	5,164	5,965	4,528	6,068
2042	27,467	28,442	35,780	33,910	30,681	18,178	20,625	21,759
2051	14,984	19,779	19,932	21,860	22,410	19,191	23,352	26,305
2052	5,242	7,112	8,689	11,161	8,825	9,615	12,305	22,492
2053	6,754	6,257	7,089	6,578	6,681	6,417	7,230	8,196
2054	10,802	12,643	13,629	13,103	12,922	11,694	13,215	15,443
2055	871	1,054	1,120	1,076	1,213	1,356	1,728	2,097
2056	7,926	9,317	10,898	10,513	10,577	10,257	10,630	12,818
2057	1,044	1,227	1,398	1,648	1,654	1,251	1,406	1,521
2061	106,028	111,349	114,452	113,976	113,260	100,067	95,419	112,394
2062	175,244	194,203	218,994	227,283	252,667	252,645	254,838	278,966
2063	52,843	59,351	65,960	67,008	85,147	72,164	65,733	58,377

2064	4,246	5,226	5,245	4,739	4,777	3,677	3,943	4,509
2065	1,950	2,257	3,341	3,013	3,490	3,201	3,139	3,134
2091	651	755	1,318	797	776	1,090	669	1,009
2092	26,540	31,907	33,269	31,038	31,189	27,556	31,896	36,845
2093	22,398	32,895	37,218	40,782	37,091	35,392	37,306	36,960
2094	29,481	38,345	50,227	56,618	53,759	53,418	61,715	68,844
2095	4,643	5,730	7,304	7,042	6,457	5,374	6,297	7,132
2096	72,176	68,863	70,941	69,712	68,381	70,468	73,090	72,756
2097	14,802	17,294	16,805	19,572	17,769	15,157	13,572	14,749
2098	9,942	11,633	12,652	13,417	13,242	12,612	13,956	17,477
2099	123,124	150,589	184,465	205,443	185,109	158,631	159,672	175,518
21	1,146,800	1,402,982	1,762,729	1,416,569	1,174,253	877,112	771,497	862,964
2111	1,105,693	1,348,970	1,702,660	1,358,180	1,130,197	837,662	735,906	821,962
2121	275	317	383	329	284	238	224	241
2122	227	241	360	398	274	148	166	162
2131	5,862	10,870	14,196	14,309	9,236	7,495	7,334	9,230
2141	0	0	0	2	0	1	14	8
2151	775	1,240	1,204	1,248	1,225	820	860	833
2199	33,967	41,344	43,925	42,102	33,036	30,748	26,993	30,528
22	105,245	126,747	147,804	154,484	152,050	144,621	165,176	201,483
2211	15,603	17,751	20,393	19,696	18,249	16,471	21,221	23,633
2212								
2213								
2214								
2215								
2221	30,609	35,311	37,942	39,164	36,227	32,543	34,030	40,663
2222								
2223								
2224								
2225								
2231	3,368	4,056	5,282	5,603	6,091	6,398	6,600	7,861
2232								
2241	2,172	2,605	3,599	3,415	2,957	2,720	2,856	3,279
2242								

2243	3,079	2,764	3,613	3,446	3,691	3,458	3,775	5,288
2244								
2245								
2291	4,130	5,063	5,443	6,175	7,163	8,378	11,420	15,375
2292	5,208	6,808	8,942	9,779	10,366	10,081	12,181	16,019
2251	41,078	52,389	62,590	67,206	67,305	64,573	73,093	89,366
2252								
2293								
2299								
23	175,525	210,144	236,803	256,279	268,928	255,813	261,447	289,623
2311	59,401	74,693	78,414	79,013	75,483	64,340	63,974	61,422
2312								
2321	94,787	108,511	124,468	141,153	156,245	157,770	162,584	186,008
2322								
2331	3,375	4,309	5,564	5,769	5,660	4,500	4,176	5,345
2332	1,836	2,913	3,857	3,583	3,354	2,995	3,289	3,760
2333	2,129	3,081	4,490	4,729	5,342	5,188	5,505	6,880
2391	186	261	318	356	358	360	345	477
2392	2,211	2,749	2,947	3,082	2,683	2,594	2,685	2,878
2394	1	6	12	15	50	12	31	36
2395	220	243	240	287	238	222	234	257
2399	11,380	13,379	16,495	18,293	19,516	17,831	18,623	22,558
24	190,729	248,379	331,124	337,062	332,777	322,325	365,272	416,714
2411	19,961	26,605	36,338	28,562	24,341	19,574	20,662	22,144
2431	3,542	5,302	7,529	8,344	7,995	6,963	9,105	12,737
2441	48,274	46,555	63,946	69,816	65,564	60,870	68,399	80,012
2451	6,568	11,177	13,858	13,886	11,814	10,407	10,970	11,332
2461	64,816	86,585	117,801	128,166	134,814	141,636	166,902	208,943
2471								
2472	34,351	55,342	71,683	71,904	74,017	69,985	75,529	67,829
2481	6,294	5,316	5,679	3,234	2,969	2,209	2,310	1,675
2499	6,923	11,496	14,290	13,149	11,263	10,681	11,395	12,042
25	225,354	296,386	335,516	321,334	275,195	229,500	253,970	301,054

2511	13,302	20,114	18,856	16,989	12,214	11,347	10,186	14,908
2512	10,210	13,331	17,295	14,727	15,589	12,279	16,445	17,442
2513	10,134	11,584	15,457	14,196	12,572	9,012	9,475	16,555
2515	2,958	4,026	6,308	4,354	3,488	2,953	3,692	4,521
2516	10,656	14,441	15,755	14,178	12,112	10,547	12,478	12,788
2517	4,920	6,751	11,441	11,079	7,878	6,781	7,751	9,972
2519	13,680	17,350	23,686	24,277	19,637	17,541	20,843	21,098
2521	22,099	24,227	17,378	12,746	7,515	5,815	3,681	3,603
2523	5,057	7,121	9,622	8,352	6,265	4,416	4,511	5,953
2529								
2531	33	152	122	106	92	128	124	159
2532	438	743	1,893	2,213	1,632	1,728	2,732	2,776
2533	57	41	24	38	106	26	120	168
2539	738	839	1,178	1,250	1,114	1,042	1,067	1,412
2541	1,567	1,865	2,079	2,044	1,603	1,596	1,434	1,414
2542	8,411	12,884	18,300	17,623	16,254	15,230	19,474	22,976
2543	5,996	7,438	11,707	8,913	7,541	6,392	6,820	7,335
2544	589	415	609	592	662	620	673	935
2545	3,460	4,424	4,448	4,147	3,383	3,737	4,246	4,412
2546	3,167	4,512	5,311	4,228	3,259	2,444	2,215	2,918
2549	337	619	1,199	1,556	1,344	1,309	1,517	2,152
2551	1,223	1,283	2,775	2,251	2,751	2,587	2,674	5,992
2559	7,345	8,940	8,579	8,939	7,467	7,693	9,508	12,439
2561	4,394	4,947	4,735	4,568	4,157	3,445	4,417	5,968
2569	4,446	7,008	7,564	7,199	7,765	6,431	5,656	6,578
2573	1,108	1,135	1,436	1,706	1,828	1,727	1,794	1,729
2572	1,783	2,241	2,647	2,733	2,765	2,448	2,769	3,522
2579								
2583	56,035	83,013	88,623	97,814	84,634	65,084	70,336	82,262
2591	297	613	689	1,009	1,187	1,113	1,274	1,691
2593	15,913	18,325	19,063	17,772	16,584	13,474	13,669	11,848
2594	699	859	1,149	1,017	1,121	823	913	1,320
2595	2,487	2,579	3,331	2,917	3,033	2,885	2,991	3,301
2596	1,052	1,132	1,289	1,114	1,049	536	1,095	2,654
2597	1	0	0	1	2	2	5	1
2599	10,760	11,433	10,967	8,686	6,591	6,306	7,386	8,253

26	642,516	743,624	698,117	770,969	489,986	470,708	431,916	573,872
2611	593,301	668,323	625,051	692,809	419,309	408,183	366,391	498,127
2623								
2629								
2631								
2641								
2642								
2643								
2645								
2646								
2648								
2649								
2644	29,438	37,514	30,095	27,124	20,732	17,244	17,476	19,339
2647								
2652	5,978	19,556	16,670	21,390	27,451	23,999	24,751	27,805
2659	6,112	7,611	13,058	13,486	7,578	7,965	9,263	11,315
2662	473	617	1,063	1,934	1,366	744	904	1,021
2671	2,339	3,747	3,778	4,395	4,265	4,213	3,794	4,351
2672	248	102	77	75	76	71	38	77
2673	1,473	1,814	2,617	3,255	2,486	1,904	2,553	3,187
2691	3,155	4,340	5,707	6,501	6,724	6,386	6,746	8,651
27	2,110,802	2,270,307	2,384,537	2,085,295	1,548,814	1,307,000	1,409,288	1,722,172
2711	142,726	206,459	251,525	214,629	117,762	94,974	86,610	113,086
2713	18,556	36,228	36,193	24,862	18,937	11,015	7,549	13,472
2722								
2716	616,270	666,832	663,846	593,778	435,193	371,743	387,269	501,085
2723								
2719	1,068,982	1,060,195	1,089,848	919,611	732,866	619,490	690,609	795,146
2721								
2729								
2731	9,344	11,250	13,454	14,885	10,319	12,388	17,995	21,455
2732	49	70	333	246	249	105	111	133
2733	32,829	36,126	29,928	33,295	27,638	19,971	22,761	34,656
2739	30,364	38,622	48,296	28,770	17,875	15,165	19,037	22,900

2741	568	528	601	616	474	553	666	975
2742								
2792								
2751	29,278	44,128	62,030	75,919	78,786	71,656	79,104	105,457
2791	1,670	949	2,408	2,784	2,655	2,593	1,416	1,865
2799	160,166	168,920	186,076	175,901	106,062	87,348	96,161	111,942
28	153,521	198,513	248,102	265,581	241,628	226,480	248,571	297,225
2811	6,564	9,291	11,864	12,726	11,914	13,607	14,362	21,106
2843								
2821	1,483	1,580	1,833	2,038	1,760	1,489	1,884	2,822
2822	2,400	3,030	3,634	3,519	3,312	3,108	3,257	3,808
2823	15,189	16,943	19,188	18,889	16,523	14,245	16,189	20,021
2827								
2824	8,112	9,905	12,326	11,601	11,290	10,369	10,492	13,025
2825	361	447	478	391	393	263	286	327
2826	3,740	4,473	5,051	4,741	4,212	3,271	3,509	4,136
2829	10,147	12,018	15,027	15,867	15,978	14,952	15,809	19,158
2831	9,984	14,359	19,698	21,983	18,619	16,438	17,512	23,311
2832	1,703	2,019	2,498	2,608	2,237	2,503	3,151	3,763
2833	797	587	923	561	581	662	893	1,028
2839	849	1,001	991	975	1,177	1,119	1,592	1,816
2841	9,924	12,191	21,377	25,023	20,250	19,407	21,667	22,935
2842	5,489	14,402	19,385	17,920	15,406	13,936	16,475	17,966
2851	12,228	13,491	10,726	14,197	14,425	16,962	19,670	17,407
2852	7,889	10,530	11,187	13,108	12,295	12,670	15,795	18,880
2864	1,809	2,479	3,158	2,430	1,924	1,589	1,725	1,582
2871	4,681	6,449	8,208	8,380	8,741	7,241	8,241	9,921
2879	4,091	4,901	5,719	6,460	6,229	5,582	6,071	7,982
2881	11,634	14,483	20,412	22,452	20,886	17,709	18,775	23,477
2892								
2891	101	176	287	400	401	373	349	609
2899	34,345	43,758	54,131	59,312	53,076	48,985	50,866	62,144
29	685,063	880,930	1,165,036	1,091,254	984,926	828,115	863,741	1,064,019
2911	779	446	491	1,524	889	665	1,457	2,682

2912	18,987	25,174	32,427	39,312	38,050	49,719	58,884	73,760
2913	9,778	15,321	18,832	15,471	15,618	12,998	17,401	20,253
2919								
2921	17,872	22,858	28,702	28,864	25,093	21,133	18,584	22,075
2931	21,135	30,064	44,291	34,226	27,825	23,897	30,958	38,890
2932	20,107	22,998	30,477	22,299	19,056	18,310	20,187	18,226
2941	25,437	34,324	52,404	46,155	33,663	15,489	12,896	14,683
2942	23,266	25,836	41,334	35,669	38,700	23,329	16,210	19,638
2943	10,837	14,871	21,274	22,190	15,271	11,965	15,949	22,539
2944	27,235	37,047	46,831	45,379	37,063	29,651	31,597	40,248
2951	6,459	7,447	7,659	6,873	3,833	2,454	1,631	2,086
2952	11,994	15,776	18,941	13,915	12,194	7,165	7,949	8,346
2953	4,866	6,864	8,135	6,615	5,761	4,913	5,862	6,141
2954	13,956	15,904	20,773	18,241	16,047	11,008	9,836	11,739
2961	31,640	39,445	47,944	46,880	41,279	33,394	39,286	49,049
2962	7,180	11,258	13,454	11,602	7,533	5,390	9,505	9,038
2963	6,963	6,554	13,340	3,527	3,413	2,762	2,024	2,453
2964	46,722	55,766	80,512	76,512	54,376	41,743	37,333	46,568
2965	3,539	5,175	5,705	4,117	5,414	2,309	4,460	4,707
2966	15,461	14,300	22,615	20,403	15,562	12,177	12,368	17,793
2969	63,367	87,356	116,171	113,636	112,052	100,238	98,957	120,819
2971	45,225	57,715	80,823	78,864	74,174	60,646	63,382	87,507
2972								
2977								
2973	16,843	23,507	36,234	31,704	31,030	23,340	21,741	29,008
2974								
2975	16,382	20,185	28,695	27,648	26,450	20,982	21,841	25,963
2976	2,212	4,006	5,536	5,106	4,148	2,676	3,970	3,735
2978	29,184	33,929	47,529	51,183	53,756	50,419	48,528	53,659
2979	901	1,237	1,478	1,453	1,176	966	1,413	856
2981	38,087	47,200	49,516	52,653	43,430	43,997	62,009	86,801
2982	14,711	18,275	23,513	19,597	22,425	17,484	16,877	19,171
2984	17,594	24,569	22,028	22,563	33,498	26,790	24,559	32,415
2989	9,687	13,372	20,816	22,114	19,274	24,260	19,040	24,850
2991	305	442	526	522	434	391	270	429
2992	39,683	50,699	59,135	56,713	49,750	42,187	43,379	51,543

2994	29,951	35,867	43,779	44,875	37,622	32,003	31,235	37,097
2996	7,652	10,884	14,163	17,089	15,132	11,507	12,618	15,363
2997	18,393	30,929	41,660	27,723	28,676	23,877	24,739	26,345
2999	10,675	13,330	17,293	18,036	15,259	15,885	14,809	17,546
30	1,532,327	2,083,721	2,487,393	2,616,751	2,492,967	2,606,023	3,209,837	4,628,339
3011	45,349	60,497	74,009	75,101	77,132	74,692	88,929	110,830
3012	25,188	32,291	40,831	45,891	38,296	41,398	46,712	53,011
3013	44,388	50,782	66,887	68,412	61,583	60,653	62,046	81,060
3014	31,493	40,272	48,451	49,407	44,639	41,561	45,330	57,136
3015	6,343	7,701	10,206	9,711	6,531	5,731	5,537	7,534
3016	2,957	6,273	7,172	5,995	8,185	7,186	7,942	8,409
3019	31,693	46,984	57,010	67,189	60,025	57,897	69,213	95,464
3021	43,082	60,171	75,205	101,397	93,023	88,440	95,981	138,898
3031	11,620	14,286	17,358	17,389	16,956	15,956	15,964	15,387
3032	13,856	19,046	29,084	24,211	22,878	20,458	24,599	35,616
3041	46,712	70,324	82,936	88,486	72,621	105,783	119,014	164,977
3042	19,064	24,875	41,618	43,682	31,380	39,654	82,793	137,854
3043	61,328	92,341	65,212	81,782	101,412	120,284	168,400	222,967
3044	104,519	138,185	147,067	162,350	164,138	158,620	189,081	222,519
3045	81	5	226	363	398	297	275	165
3049	4,490	6,391	8,907	8,222	7,844	7,429	7,789	10,186
3051	388,610	569,312	720,316	718,319	734,476	735,395	896,414	1,441,983
3061	16,154	14,959	19,705	18,319	17,807	20,836	26,656	30,214
3062	11,402	16,058	10,359	10,248	13,062	15,487	29,605	58,417
3069	18,622	25,021	26,771	23,463	17,349	18,000	22,372	37,475
3071	145,397	179,196	183,929	181,541	147,629	146,609	159,972	179,387
3072	23,615	30,885	44,418	40,613	35,633	33,084	34,562	36,500
3081	36,124	38,487	48,669	54,007	56,642	57,310	55,316	48,268
3082	35,160	48,791	59,010	72,386	67,723	68,372	77,256	90,364
3083	226,973	311,792	377,427	408,699	388,878	471,171	622,217	1,020,313
3089	67,021	83,430	106,360	116,139	103,073	98,672	113,182	133,154
3091	4,576	5,882	7,479	9,470	9,293	9,449	13,639	20,423
3092	2,249	3,936	6,386	6,944	7,270	5,631	6,326	9,210
3099	64,262	85,548	104,384	107,015	87,091	79,966	122,714	160,615

31	920,642	1,121,803	1,785,748	1,556,902	1,445,190	1,280,898	1,477,607	1,604,924
3111	414,192	584,325	933,316	739,087	666,041	596,331	750,169	975,355
3112	3,101	5,349	8,552	8,708	7,941	5,908	9,930	12,217
3113	70,606	98,939	140,608	152,414	174,632	165,711	162,394	183,472
3121	564	2,232	4,174	5,917	8,004	9,932	10,266	8,044
3122	2,581	4,314	1,989	1,977	3,302	1,636	2,171	2,356
3131	11,305	13,411	16,373	22,649	21,453	23,568	32,459	41,764
3141	17,251	9,239	4,313	10,466	5,028	8,083	9,143	5,654
3143	15,299	28,148	53,368	48,165	28,487	12,148	10,226	13,097
3144								
3145	3,773	4,639	6,366	4,631	3,319	6,506	4,414	4,487
3151	194,671	162,563	360,161	366,178	347,646	296,671	335,602	198,466
3152	118,444	129,361	145,841	116,263	102,574	89,263	83,012	92,900
3159	61,383	77,183	99,748	76,139	72,010	62,124	54,984	62,007
3191	2,046	1,960	2,842	3,715	4,130	2,886	4,087	4,732
3199	5,426	140	8,098	593	621	132	8,751	374
32	333,293	440,443	541,912	561,599	552,650	537,553	603,757	702,003
3212	306	348	546	475	516	511	297	461
3213	1,900	2,765	3,183	3,629	3,129	2,425	2,810	3,373
3214	192	130	106	111	132	104	122	234
3215	7,129	9,492	12,453	12,958	11,036	9,710	10,112	11,572
3216	1,271	1,882	2,695	2,222	1,880	1,407	1,659	2,049
3217	21,713	29,374	31,620	29,162	28,921	29,119	33,630	33,766
3218	14,627	18,271	24,861	25,450	24,384	21,516	23,106	22,591
3219	21,441	30,886	28,686	29,804	25,574	23,828	25,651	30,017
3221	2,865	4,871	4,018	3,476	2,990	3,485	3,471	3,307
3231	71,549	83,366	106,505	102,797	108,785	110,817	122,137	146,166
3232	7,014	7,409	9,613	9,081	9,328	7,850	9,241	9,549
3233	11,349	17,657	24,626	28,640	35,057	39,073	46,446	58,895
3234	16,995	22,220	29,795	32,985	35,262	39,080	42,019	46,733
3235	1,796	1,929	2,285	2,371	2,566	2,557	2,536	2,999
3241	14,686	16,932	16,275	16,615	14,273	15,562	18,981	24,381
3251	3,174	3,456	3,821	4,460	4,113	4,420	6,533	7,562
3252	29,979	37,280	42,607	56,332	61,939	53,119	64,114	80,082
3253	2,753	3,652	4,018	3,689	3,506	3,318	3,222	2,509

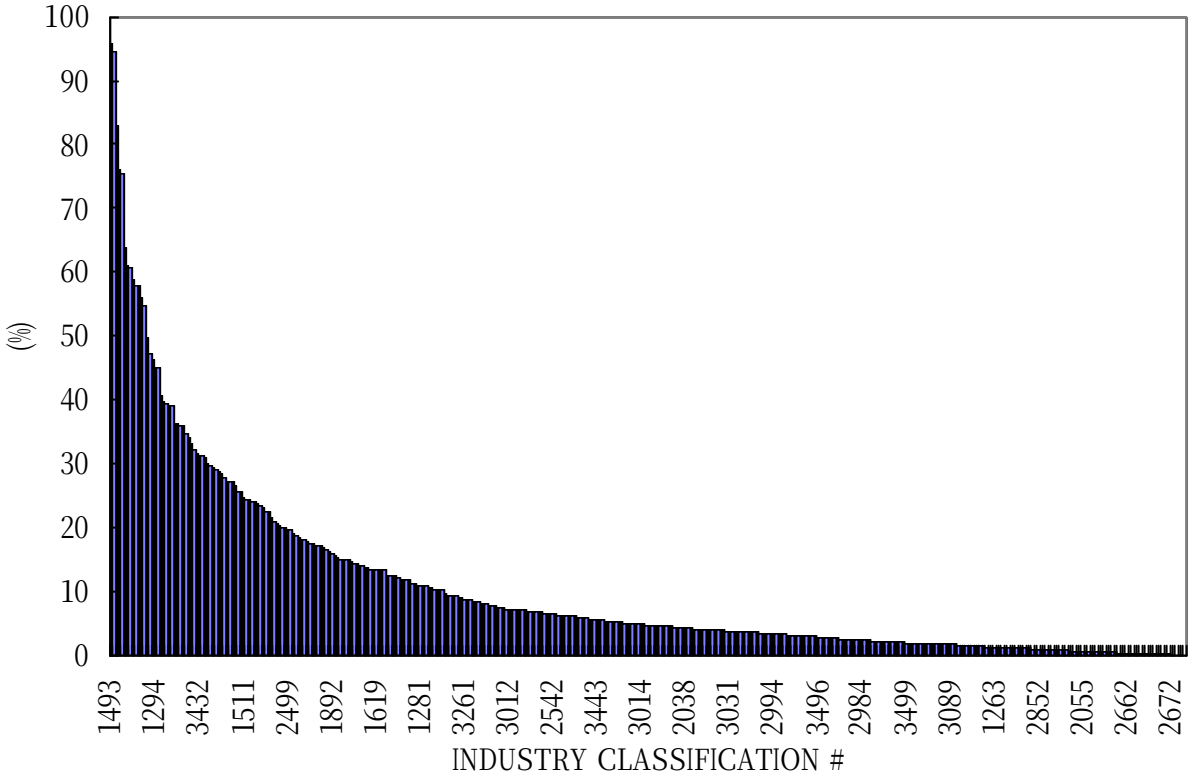
3254	8,391	9,423	11,810	15,854	17,172	15,997	16,251	19,126
3261	14,764	16,873	22,048	23,423	22,984	21,624	25,359	32,436
3271	75,246	116,675	153,330	150,917	134,824	128,042	142,087	160,526
3272	4,154	5,553	7,009	7,147	4,281	3,988	3,974	3,666
33	12,939	13,891	15,422	47,744	23,983	17,213	42,169	31,789
3311	12,939	13,891	15,422	47,744	23,983	17,213	42,169	31,789
34	681,592	862,642	1,027,077	917,585	864,735	800,419	869,542	987,607
3411	367,192	444,096	539,008	436,640	366,418	326,684	356,520	376,597
3412	1,642	2,186	2,337	2,439	2,244	1,785	1,731	2,062
3421	2,984	2,735	3,895	3,227	2,674	2,792	3,237	2,908
3422	2,221	3,708	5,768	5,710	5,337	6,261	7,891	9,085
3423	30,715	44,229	49,699	53,755	56,910	59,851	79,453	99,161
3429	12,905	16,845	24,310	20,418	19,742	18,379	20,664	20,775
3431	30,961	35,859	38,604	42,093	45,284	43,298	46,193	69,749
3432	17,926	21,769	26,886	33,799	45,507	41,918	35,351	32,815
3433	1,339	1,792	1,877	2,075	2,278	2,509	4,131	6,432
3434	108,717	146,720	178,268	163,563	165,320	162,207	166,622	200,951
3441	8,699	9,904	11,904	12,057	12,319	9,584	11,483	12,623
3442								
3443	894	1,216	1,187	1,135	1,395	1,491	1,638	1,826
3444	301	373	384	395	439	512	625	595
3449	4,835	8,085	11,271	10,495	9,732	9,677	10,336	13,857
3451	7,220	11,396	11,955	14,031	13,496	10,715	10,563	10,169
3452	7,239	8,646	10,663	8,517	8,716	7,392	7,251	7,477
3453	1,691	2,448	2,449	2,566	2,394	2,286	2,436	2,394
3454	2,573	3,387	3,784	3,899	3,773	3,481	3,578	3,593
3481	5,107	5,744	4,141	4,895	6,914	7,863	11,869	10,983
3483								
3482	4,304	4,735	2,998	2,675	1,964	1,395	1,365	878
3484	6,937	8,508	8,329	8,513	9,004	9,132	9,184	10,799
3485	2,284	3,416	2,884	2,316	2,263	1,981	2,128	2,278
3486	17	192	211	163	159	155	138	136
3487	3,723	4,575	5,708	5,826	4,964	4,516	3,661	3,719
3488	1,284	1,968	7,390	1,497	2,065	1,362	1,152	1,775

3489	3,295	3,193	3,017	4,198	4,352	3,990	3,965	4,434
3491	20,843	32,462	31,094	31,586	35,968	28,123	28,786	22,962
3492								
3493	342	282	236	161	196	257	236	369
3494	3,849	3,469	6,219	5,079	5,139	5,429	5,489	5,698
3495	945	1,457	1,771	2,086	1,739	1,935	3,661	5,004
3496	681	1,291	2,510	2,663	2,145	1,827	1,744	2,424
3497	5,652	7,954	7,482	9,689	8,984	8,368	9,039	10,017
3499	12,273	18,003	18,840	19,423	14,901	13,264	17,423	33,065

(NOTE) This table identifies industries by the domestic industry classification numbers in Japan's *Census of Manufacturers*. The import data shown above are also available at the METI Web site. See Appendix for detailed information.

FIGURE 1

IMPORT PENETRATION RATIO (1990-93)



(NOTE) All four-digit tradable 390 industries are arrayed in descending order of the import penetration ratio during 1990-93. Four-digit numbers are the industry classification numbers in the *Census of Manufacturers*. See Appendix for detailed description of the data.

Notes

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[1] Levinsohn (1996) divides, based on the industry-level trade orientation, the whole sample into export, import-competing and non-traded sectors and compares the gross job flows among these three groups. Davis, Haltiwanger and Schuh (1996) use the import penetration ratio in grouping industries. As Grossman (1986) pointed out, both measures should be affected by the simultaneity problem because they must be endogenous.

[2] The industry list of Gourinchas (1998) includes only 35 nontraded and 68 traded (exporting or import-competing) sectors, defined at the four-digit level. Burgess and Knetter (1998) choose 14 industries from broadly classified two/three-digit levels and depend on net, not gross, employment change data, while they accomplish cross-country comparisons. On the other hand, Klein, Schuh and Triest (2000) use data of 442 four-digit industries. For real exchange rates, although Gourinchas (1998) constructs industry-specific exchange rates, both Burgess and Knetter (1998) and Klein, Schuh and Triest (2000) constrain exchange rates equal across all industries.

[3] Gourinchas (1999) found that job creation is more volatile than gross job destruction in French industries, by applying the same method developed in Gourinchas (1998).

[4] Burgess and Knetter (1998) take a relatively ad-hoc shortcut in modeling exchange rate changes as a demand shock rather than relative price changes.

[5] Although the census covers all the establishments, data of individual establishments with three or less employees are not available even within the original confidential data files of the government. As a result, this data set consists of establishments with four or more employees. In this paper, we use the terms “plants” and “establishments” interchangeably.

[6] Since the sampling frequency is not constant in the *Census of Manufacturers* (twice in five years, i.e. every two or three years), we transform all the change rates into annualized rates.

[7] We must note, however, that, due to the sampling threshold in the original statistics, GJCE and GJDE may not correctly represent the true entry and exit. Since our sample consists of all plants with four or more employees, the figures GJCE and GJDE include continuing plants that crossed the sampling threshold at any census year during the period, but exclude entries/exits on smaller scales than the sampling threshold, for example. The reported figures neither count plants that entered after any census year and exited before the next census year. We set the number of employees in plants before “entry” and that after “exit” equal to zero. Other previously used data sets such as U.S. Longitudinal Research Database have the same problem caused by their similar sampling thresholds. Although there are many plants with small number of employees, however, the impact of this threshold problem cannot be substantial in our study of employment changes since the employment share of small plants is limited.

[8] Although it sounds consistent with observations, we must admit that it is rather difficult to formally incorporate these Japanese characteristics into the dynamic optimization framework. For example, Gourinchas (1999) evaluates his own finding of higher

volatility of gross job creation as a failure of the theoretical model since his dynamic model predicts higher volatility for gross job destruction. Davis et.al (1996) list explanations for a concentration of gross job destruction during recessions, including reduced option value of continued operation (more plant shutdowns), lower opportunity costs of reallocation, curtailment of credit availability (pp.109-110).

[9] For example, in the steel industry, trade statistics offer numbers of classified products based on product characteristics, while manufacturing census classify the industry into groups based on production technology.

[10] We rely on the Annex Table to Input-Output Table, which connects each IO sector to corresponding products in trade statistics at HS nine-digit level and in manufacturing census data at six-digit level. The number of IO sectors in manufacturing industries is 336 at seven-digit level. The tables are available in *Input-Output Table* published by General Coordination Agency (Soumu-cho, in Japanese).

[11] We define "industries with negligible imports" by industries whose imports were below one million yen in any year in our sample period because the import data we use are measured in million yen unit.

[12] We assign to each industry the domestic and import price data from the WPI category that most closely corresponds to each four-digit SIC industry. No imputation was used. While domestic price indices are provided in relatively detailed classifications, import price indices are only broadly classified. The data concordance table between domestic and import price indices in WPI and *Census of Manufacturers* is available upon request.

[13] Although another remedy for errors-in-variables with longitudinal data is found in the combination of fixed-effect with differenced estimators, we cannot pursue this approach due to the limit of data availability especially in the time horizon.

[14] The wage is defined as the total wage payment divided by the number of employees in the *Census of Manufacturers*. The price index to deflate nominal wage is the CPI general index. The material and energy cost is also derived from *Census of Manufacturers*. Since we divide this cost figure by the shipment value, the variable in the regression is the non-labor cost share. Given the labor productivity, however, this cost share approximates to the deflated non-labor average costs. The real GDP series compiled by Economic Planning Agency is used for the national income variable. The real productivity is defined as the shipment value divided by the number of employees. The domestic WPI of most closely corresponding category is used to deflate the productivity.

[15] Klein, Schuh and Triest (2000) incorporate time-varying aggregate component into the error structure and corrects for non-independence of errors across industries. Although this three error-component form is also suitable to our case, we restrict our attention to the standard two error-component models because our data covers only three different years.

[16] A similar interactive specification is chosen in Klein, Schuh and Triest (2000).

[17] Most of estimated coefficients on other variables are also significant, while the signs of estimates need discussions. First, we naturally expect that wage is negatively/positively related with job creation/destruction. Most of the obtained estimates, however, show otherwise. Some previous studies share this observation. For example, wage is not significant in similar specification by Klein, Schuh and Triest (2000) and Higuchi and Shimpo (1998) found higher GJC in high-wage industries in Japan. Second, the non-labor cost is often positively/negatively related with job creation/destruction, as anticipated. Third, as anticipated, job creation rises with GDP, but GDP enters in the job destruction equation with the same sign. The latter observation may be because job destruction through product reshuffle was active in the Bubble boom years in Japan, as Higuchi and Shimpo (1998) reported. Finally, the productivity growth can have

ambiguous sign since rising productivity reduces labor demand but at the same time plants with rising productivity tend to expand their employees.

[18] This paper has so far assumed import prices as given to domestic industries. This assumption seems plausible unless the domestic industry under investigation exerts strong market power over foreign competitors. Even if this assumption is not satisfied, however, the instrumental variable method we employ can alleviate the problem due to this simultaneity.

[19] The list of instruments for log-differenced relative import price consists of log-differenced relative import price with lead and lag, and all the right-hand side variables except for the relative import price included in the estimated equation. As long as the disturbance terms are not correlated over time and other variables are free from measurement errors, this choice consists a group of valid instruments. The first-stage regression of relative import price on instruments is with industry-specific fixed-effect dummies. We also conduct pooled OLS estimation, but the final estimates are quite similar to those from FE estimation. The power of these instruments is also strong since $\overline{R^2}$ in the first-stage regression is near 0.9 in most cases. Even if we exclude instrumental variables with low correlation, the second-stage regression coefficients are not substantially altered.

[20] The test statistics are not shown in the paper to save space, but available upon request.

[21] We might attribute most of the possibility of misspecification in these cases to measurement-errors because product reshuffle decisions must be based not only on comparison with import price but also with prices of related industries.

[22] We pick up 31 industries under direct industry-specific regulation mandated explicitly by laws, following Morikawa and Tachibanaki (1997).