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Repurchase Agreements:
Their Dramatic Growth

The Teenage Labor Market:
Its Distinctive Characteristics

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Repurchase Agreements: Their Dramatic Growth

Barbara K. Pence

The market for repurchase agreements, or RPs, has grown dramatically in recent years. RPs have long been a traditional source of funds for government securities dealers for financing their securities portfolios. In the late 1960s, however, banks increased their use of the RP market as a source of funds when rising interest rates and Regulation Q ceilings caused a runoff of CDs. Banks' use of RP money jumped a second time during the 1973–1974 tight money period, and again in 1976 when bank and dealer borrowings through RPs increased by more than half. In addition, other market participants besides dealers and banks have increasingly resorted to the RP

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market as a source of funds through dealers. By May 1978, total RPs accounted for an estimated 14 percent of total money market instruments outstanding and were at about $40 billion, twice the level as at year-end 1975.

This article explores the impact of the growth of RPs on the structure of financial markets through competition with other sources and uses for short-term funds. It also examines the significance of the rapid growth of the RP market for monetary policy and some of the factors affecting future market development.

The Instrument

A repurchase agreement is the sale of securities accompanied by an agreement that the seller will re-buy the securities after a specified

period of time. RPs are essentially a secured means of borrowing and lending short-term funds.

The major, but not exclusive, borrowers in the market are commercial banks and U. S. government securities dealers (see box: Bank and Dealer Markets). They form two markets for RPs: a regional one dominated by local banks and a national market operating through the dealers. In the regional market, commercial banks—except for transactions with their correspondent banks and with government securities dealers—are exclusively on the borrowing side of the market. The lenders are the banks' customers, primarily nonfinancial corporations and state and local governments. In the national market, dealers are on both the borrowing and lending sides. In some instances, dealers borrow to finance their own holdings of securities; in others, they borrow to finance RP loans to others.

Another major participant in the national market for RPs is the Federal Reserve System. In its day-to-day efforts to offset the effect of market factors on the supply of bank reserves, the Open Market Desk of the Federal Reserve Bank of New York frequently undertakes sizable repurchase agreements and matched sale-purchase agreements, or "reverse" repurchase agreements, with recognized government securities dealers and their customers. Under repurchase agreements (securities are sold to and funds are obtained from the Federal Reserve), the Desk supplies bank reserves; under matched sale-purchase agreements (securities are sold and funds obtained by the Federal Reserve), the Desk withdraws reserves.[1]

As an investment outlet for short-term funds, repurchase agreements are used primarily by large investors because of sizable transaction

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[1]For a more complete discussion, see the author's "Federal Reserve Repurchase Agreements and Matched Sale-Purchases," *Economic Commentary*, Federal Reserve Bank of Cleveland, November 1, 1976.

Repurchase Agreements — The Basics

A repurchase agreement is the sale of securities accompanied by an agreement that the seller will re-buy the securities after a specified period of time. The price at which the securities are exchanged is fixed, and the seller, in addition, pays interest for use of the funds acquired. Normally, the price is somewhat lower than the securities' market value, thereby protecting the buyer should a seller default on the repurchase agreement. The funds acquired are available to the seller, or borrower of funds, for use on the same day.

The securities most frequently exchanged in RPs (the securities are usually termed "collateral") are U. S. Government and U. S. agency securities. Banks must use these issues as RP collateral in order to exempt the funds acquired from reserve requirements. Dealers largely use U. S. Government and agencies securities, but to a lesser extent also use and accept large negotiable CDs or commercial paper as collateral. The RP markets using the latter two securities as collateral, however, are much thinner than those using U. S. Government or agency securities; investors are reluctant to accept CDs and commercial paper as collateral and, additionally, transfer of this type of collateral from seller to buyer is more expensive. Treasury securities on a book-entry basis may currently be transferred for a nominal fee between customers' banks over the Federal Reserve wire.

Little data is available on the maturity structure of outstanding RPs. However, a survey of 46 large banks, carried out by the Federal Reserve System in the first week of December 1977, showed that about half of all RP borrowings had either a one-day maturity or were under continuing contract. The survey also showed that about 22 percent of banks' RPs had maturities of more than one week but less than 30 days, while about 10 percent

requirements. Government securities dealers generally require $1 million minimums or higher, while banks ask for minimums of about $100,000. RPs therefore compete in the marketplace with other money market instruments used by these investors, including Treasury bills, commercial paper, large negotiable certificates of deposit, bankers acceptances and, finally, demand deposits or money itself.

RPs offer several advantages to investors. They represent a high quality asset, second in safety only to Treasury securities themselves. Indeed, many investors in RPs choose to show ownership of U. S. Government securities on their books rather than ownership of repurchase agreements.[2] This reporting feature is particularly attractive to institutions such as savings and loan associations and state and local governments, required by law to invest a proportion of their funds in Treasury securities.

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[2]Commercial banks are the exception. They may not report their RP investments as part of their government securities holdings.

RPs offer as another advantage the ability to tailor maturities precisely to the needs of the lender, even for as short a period as one day. For finance companies, state and local governments and corporations, which have no access to the Federal funds market, the next best alternative investments are large negotiable CDs, issued for a minimum of 30 days, and commercial paper and bankers acceptances, issued for shorter periods than 30 days but generally not for as short a period as one day. Even for longer periods, alternative securities with the precise maturity desired may be difficult to locate. Prior to the development of the RP market, firms with very short-term funds to invest frequently held cash, preferring to earn no income rather than risk capital loss by investment in an instrument which would be sold before maturity.

RP investments using U. S. Government or agency securities as collateral are also somewhat more liquid than CDs, commercial paper or bankers acceptances. The lender, having received U. S. securities in exchange for funds, may in turn temporarily sell them through an RP if cash is

had maturities of over 30 days. Maturities of bank RPs thus appear to be generally very short, but with a significant percentage of sufficiently long maturities to make RPs competitive with short-term money market instruments other than overnight Federal funds.

Government securities dealers' data show only about 5 percent or less of their unmatched RP borrowings (that is, RP borrowings whose maturities are not matched with those of equivalent RP loans on the dealers' books) have maturities over 15 days, while 35 to 40 percent of their RP loans (or "reverse" RPs) have maturities longer than 15 days. Thus, in their unmatched RP activities, dealers borrow short and lend long, a strategy which exploits the yield spreads in an upward sloping yield curve. In their matched maturity portfolios, dealers report that 30 to 40 percent have maturities of greater than 15 days.

RP rates, of course, are related to those of competitive money market instruments. Because overnight RPs are alternatives for banks and other major money market institutions to lending or borrowing in the Federal funds market, their rates tend to follow the Federal funds rate.* Generally, overnight RP rates are somewhat less than the funds rate because effectively RPs are collateralized borrowings.

The spread between the funds rate and the overnight RP rate depends on both the supply and demand for RP funds. On average, the overnight RP rate tends to fluctuate between 20 and 25 basis points under the funds rate. However, the RP rate may be

*Since 1970, certain nonbank institutions have been allowed to buy or sell Federal funds to banks. These institutions are U. S. agencies, savings and loan associations, mutual savings banks and agencies and branches of foreign banks.

needed prior to the maturity of the original RP.[3]

For borrowers, RPs are alternatives to various other sources of funds, depending on the borrower. For banks, RPs substitute largely for Federal funds borrowings and in the case of longer maturities, for large CDs. For government securities dealers, RPs are an alternative to money market bank loans which, because they carry a substantially higher rate than RPs, are used by dealers only for residual, or last-resort, financing.

Other RP borrowers besides banks and dealers—such as nonfinancial corporations, savings and loans, state and local governments, finance companies, insurance companies, and trust departments of banks—are increasingly becoming involved in the market. Dealer lending to these borrowers has grown from about $5 billion in

December 1975 to $14 billion in June 1978.[4] For these nonbank borrowers, dealer RPs represent an alternative to commercial paper issuance, bank loans, or the outright sale of securities.

RPs offer several advantages to these more recent market entrants, including a somewhat lower interest cost of acquiring funds than commercial paper issuance and bank loans, primarily, again, because RPs effectively are collateralized loans. Furthermore, any firm owning U. S. government or U. S. agency securities may obtain funds through RPs, while only the larger and better known firms tend to have access to the commercial paper market. On the other hand, commercial paper and bank loans may supply funds in blocks far smaller than the $1 million minimum obtainable through RPs with dealers. Furthermore, some potential borrowers may still prefer bank loans to RPs out of concern for maintaining relationships established with their banks. Their continued goodwill and willingness to

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[3]As indicated in the box, "Repurchase Agreements—The Basics," an RP market in CDs and commercial paper also exists, but the market is much thinner and borrowing costs higher. For that reason, RP investments with government securities as collateral are more "liquid" than holdings of CDs and commercial paper.

[4]Total RPs held as investments must be estimated because dealer and bank data available to the Federal Reserve do not fully reflect total RP activity.

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higher or lower depending on whether dealers, major borrowers of RP funds, are holding larger or smaller inventories of securities needing to be financed. The rate may also rise or fall if the Open Market Desk of the Federal Reserve Bank of New York, in its frequent need to temporarily manipulate reserves, finds itself either borrowing or lending heavily in the RP market for a short period of time.

RP rates are also influenced by the level of Treasury bill rates because RPs provide a close substitute for Treasury bills for many investors excluded from the Federal funds market. The joint influence of the Treasury bill and Federal funds rates on the RP rate helps explain why 1973 and 1974 were watershed years for the development of the RP market. During the high-interest-rate periods of those years, the Federal funds rate generally exceeded the three-month bill rate by a substantial margin, reaching as high as

five percentage points. The increased spread was apparently the combined result of a relative scarcity of Treasury bills and a high demand for the type of investment safety provided by Treasury bills. The overnight RP rate during this period fluctuated between the two rates and tended to offer both a substantial bargain over the Federal funds rate to short-term borrowers, as well as a considerably more attractive rate relative to Treasury bills to short-term investors. In 1974, the RP rate generally lay between one-half and two percentage points below the Federal funds rate while standing between one and three and one-half percentage points above the three-month Treasury bill rate.**

** For further discussion on RPs see Charles M. Lucas *et. al.,* "Federal Funds and Repurchase Agreements," Federal Reserve Bank of New York *Quarterly Review* (Summer 1977), 33–48.

lend may be considered crucial during tight money periods when growing corporate credit needs force borrowers to turn to their banks for financing.

Borrowing funds on RPs also offers an attractive alternative to selling securities prior to maturity, particularly if the rate of interest earned on the security exceeds the interest cost of borrowing funds through an RP. The interest rate on the RP may also be less than the effective interest cost incurred by selling a security at a capital loss prior to maturity. Borrowing funds on RP against a security is also particularly attractive if the need for funds is very short term, and the borrower desires to maintain the original investment.

RPs and Market Efficiency

The development of the RP market has led to increased efficiency in the financial markets. First, like any new widely accepted instrument, RPs offer to investors and borrowers alike a combination of risk, maturity, flexibility, and liquidity characteristics not previously offered by other money market instruments. RPs have filled a market "gap," which, judging by their rapid growth over the past few years, must have been substantial.

Further, RPs have increased the liquidity of the instruments eligible as collateral against RP borrowings, including, as indicated, relatively long-term instruments. The securities become more "liquid" in the sense that they may be used to raise funds on short notice without incurring the risk of capital loss inherent in an outright sale prior to maturity. This liquidity effect should increase buyers' willingness to extend the maturities of their securities holdings, allowing them to capture the higher interest income generally available on longer term securities. This increased liquidity of longer term securities should be particularly attractive to such investors as insur-

Chart 1
Dealer Gross Short Sales and Reverse RPs
billions of dollars, (3 month level from 1972 through June 1978)

Reverse repurchase agreements

Gross short sales

8

6

4

2

0

1972   '74   '76   '78
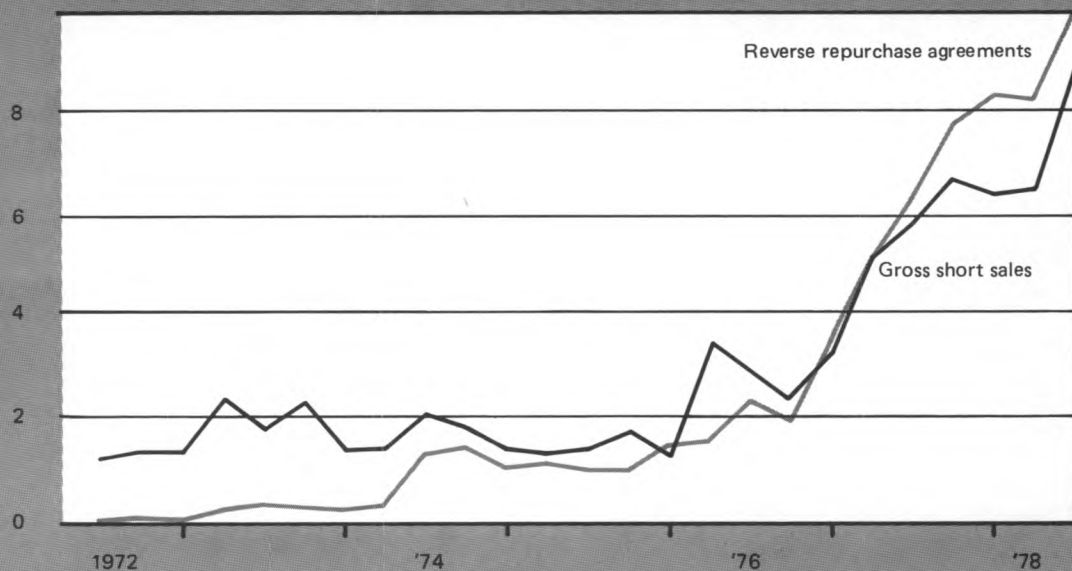
ance companies or pension funds which, because of the long-term nature of their liabilities, prefer to keep the maturity of their asset portfolios as long as possible. The net effect should be a modest broadening of the market for longer term securities.

Most importantly, perhaps, RPs facilitate arbitrage between financial instruments, both in the spot market and the futures market. They provide a convenient means either to obtain the funds needed to purchase other instruments or to obtain the securities desired to undertake short sales (see box: Money Market Arbitrage). The enhancement of money market arbitrage helps eliminate differentials between interest rates which would otherwise be unjustified on authentic

Money Market Arbitrage

RPs are used not only as a straightforward source of cash or investment outlet for short-term funds, but also as a facilitator of specialized money market trading techniques. In fact, for many money market participants, that is the primary function of RPs.

Short selling of securities is a specialized transaction increasingly being facilitated by the RP. Under short sales, traders either borrow securities or, in recent years, obtain them through reverse RPs, and then sell the securities outright to other customers. Traders are betting that when the time comes to return securities to original owners, they will be able to profit by purchasing securities in the open market for a lower price than they sold them for.

Increasing participation in the RP market in recent years has broadened the sources of securities available to traders active in "shorting the market" when securities prices are expected to fall. Most prominent among such traders are the government securities dealers. The growth of the RP market has apparently facilitated a sharp surge in the volume of dealer short sales (see Chart 1). By July 1978, dealer gross short sales against both U. S. Government and agency securities had grown to $10.5 billion, almost four times greater than the maximum of $2.9 billion reached during the 1973–1974 period, the last comparable period of rising interest rates. But in that period, the RP market was far smaller than today.

The recent high volume of gross short sales by dealers does not necessarily reflect outright speculation that prices will fall. Dealers' gross "long" position, that is their holdings of securities, has increased as well, thereby largely hedging their exposure to the risk of price increases.[*] The growth of both dealer long and short positions therefore appears to reflect increased dealer arbitrage between various security issues. Increased market arbitraging is a hallmark of growing market efficiency and in this case is largely attributable to the development of the RP market.
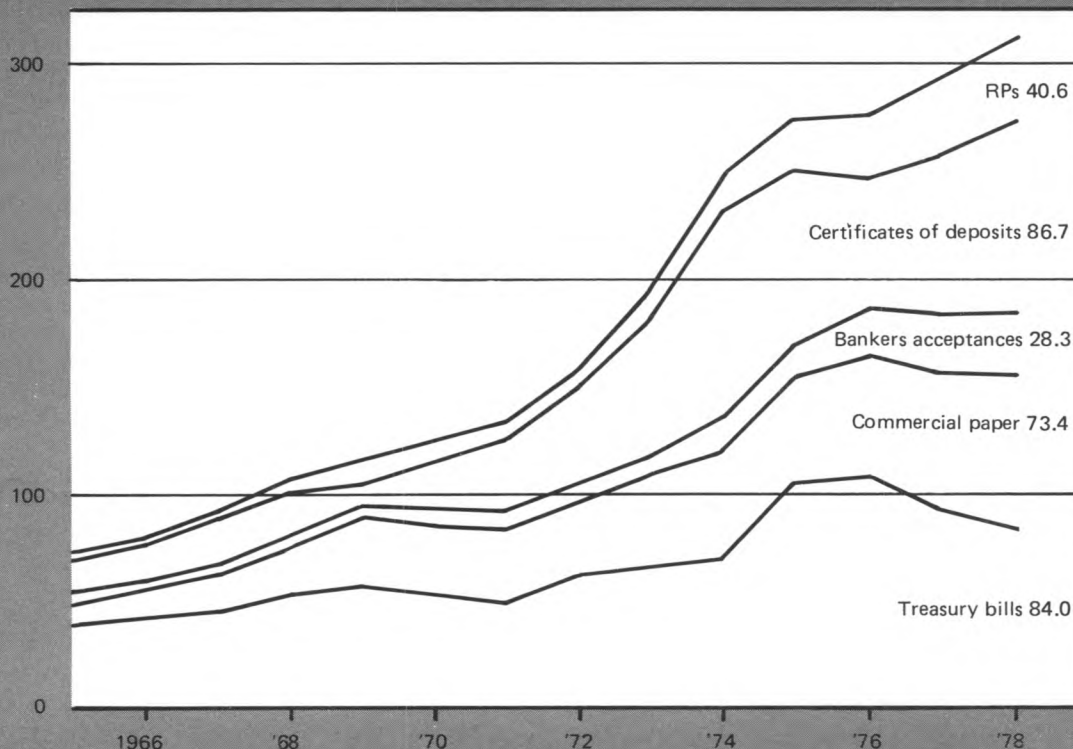
RPs may also be used to improve the yield on portfolios by allowing investors, during a period of rising interest rates, to invest in higher yielding instruments without having to sell outright and take a capital loss on older, lower yielding instruments. Those instruments may be sold under an RP and the funds used to purchase the new securities. Similarly, institutions which must by law hold substantial amounts of Treasury securities, such as savings and loan associations or state and local governments, may improve yields on their portfolios by raising funds on RP using Treasury securities as collateral and purchasing higher yielding instruments, such as negotiable CDs. Accounting methods allow them to continue to show ownership of Treasury securities while they actually earn the higher interest on another instrument.

[*]This is not to say that individual dealers necessarily hedged their short positions, but only that all dealers, on average, had hedged their positions.

Chart 2
The Money Market: RPs Increase Their Share
billions of dollars, (semi-annual level from 1965 through May 1978)

RPs 40.6

Certificates of deposits 86.7

Bankers acceptances 28.3

Commercial paper 73.4

Treasury bills 84.0

| | 300 | 200 | 100 | 0 |

1966   '68   '70   '72   '74   '76   '78

economic grounds of relative scarcity of particular instruments or relative characteristics of risk or liquidity. Prior to the widespread use of RPs, such differentials might have persisted because of such barriers to arbitrage as unwillingness to realize capital losses if other instruments were sold outright or because of institutional restrictions limiting investments to U. S. Government securities.

RPs and Monetary Policy Issues

RPs can affect monetary policy because they increase the liquidity of securities eligible as RP collateral and because the RPs themselves are highly liquid money market instruments. An adjustment for RPs should thus be made in liquidity analyses of the economy. The higher the perceived level of liquidity, the less restrained borrowers will be in incurring more debt or increasing their current expenditures for real goods and services.

The estimated volume of RPs being held as investments exceeded $40 billion by mid-1978, about half the amount of outstanding negotiable CDs or Treasury bills and more than half the amount of commercial paper (see Chart 2).

Bank and Dealer Markets

Typically, only relatively large banks offer RPs. Minimum transactions reported by Fourth District banks are about $100,000. To the extent that bank RPs are undertaken with non-customers and therefore pull new funds into the bank, they are also generally a good alternative to purchases of Federal funds or Eurodollars.

Bank borrowings through RPs offer bank customers a convenient and safe means of earning interest on short-term balances, rather than holding funds in non-interest-earning demand deposits. For the banks, RPs with customers partly represent a defensive effort to hold onto balances which might otherwise be invested in RPs with other banks or with dealers. However, RPs with customers also represent for banks a generally attractive alternative to the issuance of negotiable CDs since RPs against U. S. Government or agency securities are not subject to reserve requirements.

In the national market, government securities dealers have increasingly come to use the RP market not only to finance their own holdings of U. S. Government and agency securities and of large negotiable CDs, but also to lend to customers through "reverse" RPs.* A reverse RP is an RP viewed from the other side of the transaction; dealers purchase securities, rather than sell them, with an agreement to resell them to their original owners in the future. Thus dealers have become intermediaries in the RP market, and through them other market participants have gained access to the borrowing side of the market. Dealer customers include banks, corporations, savings and loan associations, pension funds, and other financial institutions. Rates earned on RPs with dealers tend to be higher than with banks because of the somewhat higher perceived risk involved with dealer transactions rather than with bank transactions and because dealer RPs are not so conveniently arranged by customers. Furthermore, minimum RP transactions with dealers are for $1 million or more.

Dealers pursue two strategies in their RP intermediary activities: they exactly match the maturities of their RPs (dealer borrowings) and reverse RPs (dealer lending) or they tend to fund longer term reverse RPs with either longer- or shorter-term RPs, depending on the shape of the yield curve, that is, whether yields on shorter-dated RPs or reverse RPs are higher or lower than on longer-dated RPs or reverse RPs. When matching maturities, dealers lock in a profit by lending at a rate which is slightly higher than the rate at which they borrow. When financing reverse RPs with longer- or shorter-term RPs, dealers may attempt to increase their profits by more than the simple matched maturity spread, but at the risk that shifting rate relationships over the life of the RP or reverse RP may eliminate any profitable spread or even result in a loss.

Many dealers undertake reserve RPs simply to accommodate their customers and remain competitive with other dealers. They do not view their RP business as a source of profit and are thus more likely to match maturities, and avoid the interest rate risk. Other more aggressive dealers view their RP intermediary activities as a profit center for their business. These dealers "make markets" in RPs by quoting firm rates for either borrowing or lending RP funds over a broad range of maturities and, consequently, are less likely to match their RP and reverse RP maturities. That many dealers view their RP-reverse RP activities as profitable suggests that dealers have been, and are likely to continue to be, active in promoting the growth of the RP market.

*See Christopher J. McCurdy, "The Dealer Market for United States Government Securities," Federal Reserve Bank of New York *Quarterly Review* (Winter 1977–78), 35–47.

Nevertheless, RPs are often excluded in analyses of total short-term credit demands, even though their growth contributes to pressures on short-term interest rates in the same way as more conventional money market instruments.

Of further interest to policymakers is the impact of RPs on the rate of growth of the measured money stock. For several years the growth rate of the money stock, primarily M_1, has been used as an intermediate target for monetary policy goals.[5] In 1975 and 1976, the demand deposit portion of M_1 registered unexpectedly slow growth, evidenced by accumulated prediction errors of $36 billion or 16 percent for demand deposits in major econometric models at the end of 1976. The growth of RPs has been linked with the puzzling slowdown. The arguments run that RPs, with their extremely short maturities and thus very high liquidity, substitute not only for other money market instruments, but also, and perhaps primarily, for demand deposits of such holders as nonfinancial corporations, state and local governments, or financial institutions.

Eileen Mauskopf and Richard Porter recently addressed this question. Using a model developed by Daniel Orr, they demonstrated how and why RPs have been substituted in firms' portfolios for both demand deposits and other money market instruments.[6] RPs exhibited unusually rapid growth in 1976, they suggested, as a result of increasing bank and dealer competition for RP funds and as a result of technological innovations. Both factors tended to lower transaction costs on RPs and raise interest rates on RPs relative to those on competing instruments. Further, they argued, the development and use of certain corporate cash management techniques since the mid-1970s have increased the demand for RP investments by reducing corporations' uncertainty

with respect to the availability of cash for investment over the next business day, although not necessarily beyond that day. RPs are the most convenient instrument available to some investors for one-day investments. This cash management development has thus increased the demand for RPs relative to other money market instruments.

The RP market may affect the demand for demand deposits in another way. The increasing ability of others besides dealers and banks to borrow on short notice by putting U. S. Government securities out on RP reduces the risk to those investors despite uncertainty over periodic cash needs. The risk-adjusted rate of return on Treasury securities thus rises, inducing firms to substitute Treasury securities for demand deposits, as well as other short-term assets. Treasury securities would become more attractive, not only relative to demand deposits and other money market instruments, but also relative to RP investments themselves. This effect may explain why the growth of RP investments by nonbanks slowed in 1977 and 1978, while RP borrowings by nonbanks accelerated.

RPs also raise some issues with respect to the type of demand for funds they reflect. Some RP borrowings from dealers by nonbanks may simply reflect money market arbitrage, with the RP borrowings used merely to purchase other securities. The primary impact of these transactions is on the alignment of interest rates and thus only indirectly affects goods and services spending and the economic activity pace.
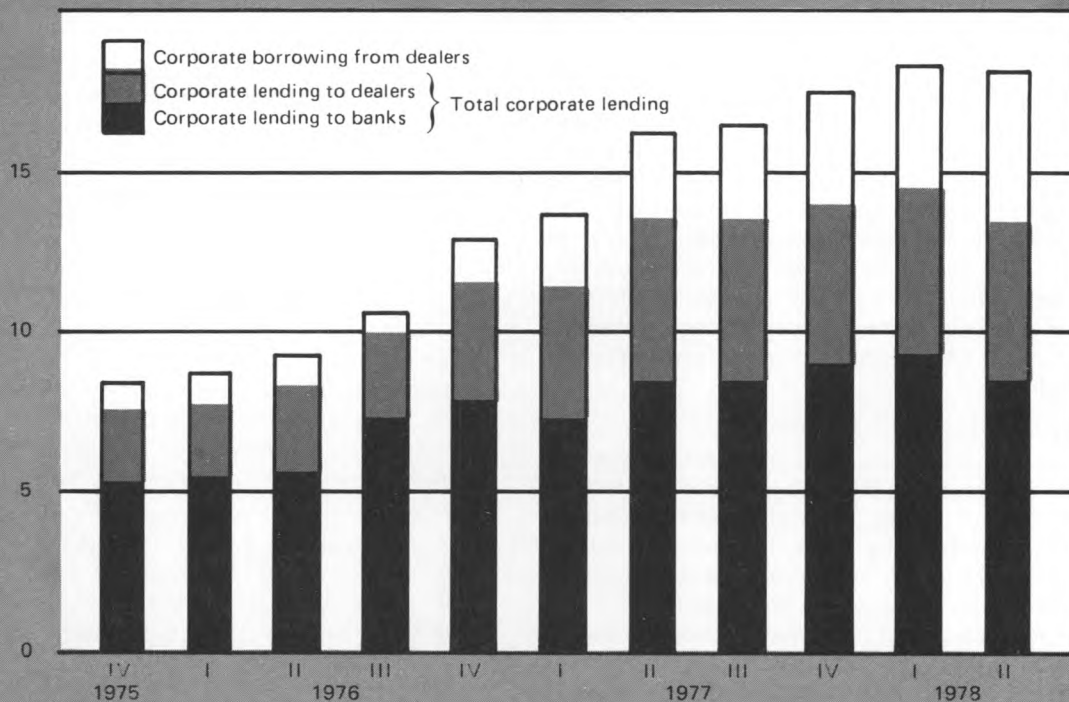
However, to the extent that RP borrowings from dealers are undertaken to raise cash, such borrowings may directly reflect spending for goods and services. These RP borrowings, moreover, would be in lieu of other sources of borrowed funds, such as bank credit or commercial paper issuance, measures of which are conventionally used to reflect the extent of short-term business credit demands.

An examination of the RP lending and borrowing activity of corporations suggests that some of the recent growth in RP borrowings by nonbanks and nondealers indeed reflected borrow-

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[5]M_1 is presently defined as currency in circulation plus checking accounts at commercial banks.

[6]Unpublished manuscript. Richard D. Porter and Eileen Mauskopf, "Some Notes on the Apparent Shift in the Demand for Demand Deposits Function," Board of Governors of the Federal Reserve System, 1978.

Corporate Activity in the RP Market

billions of dollars

Corporate borrowing from dealers

Corporate lending to dealers ⎱ Total corporate lending
Corporate lending to banks ⎰

ings for cash. Corporate lending on RPs to both banks and dealers actually declined between March and June 1978 (see Chart 3).[7] Corporate borrowing from dealers, on the other hand, grew from about $4 billion to $4.8 billion over the same period, a period which corresponded with similar rapid growth of other business credit. This pattern suggests that a significant portion of these RP borrowings, at least, were for purposes of raising cash rather than for money market arbitrage.

[7]Corporate lending through RPs to banks is estimated as the proportion of total bank RPs provided by corporations as found in the Federal Reserve's one-week surveys conducted in 1974 and 1977.

The growth of the RP market has changed the relationship between Federal Reserve control over the supply of bank reserves and the rate of short-term credit expansion in two ways. First, banks may finance credit expansion through RPs without incurring additional reserve requirements. Unpledged U. S. Government or agency securities held by banks may be used to obtain RP funds, which in turn may be used to increase bank loans. On the other hand, if banks' securities are already wholly pledged, the ability to undertake RPs will allow them to purchase more U. S. Government and agency securities, but not to increase bank loans.

Second, a substantial amount of RP activity does not pass through the banks at all, but only through the government securities dealers over which the Federal Reserve exercises no direct control. Indeed, growing dealer activity in the RP market suggests that dealers are beginning to behave somewhat like banks. That is, dealers accept short-term liabilities (by borrowing through RPs) from some customers and lend on short term through RPs to other customers. To be sure, the comparison of dealer activities with banking is limited. The RP liabilities offered by dealers are imperfect substitutes for the money, or demand deposit, liabilities of banks. Nor are dealer RPs offered in such small denominations as CDs or even RPs of the banks. Also, the RP loans that dealers offer are generally very short term and available only to customers with the appropriate collateral who desire to borrow upwards of $1 million.

Outlook for the RP Market

The expansion of the RP market over the past few years can be attributed to several factors. As a result of the extraordinarily high money market rates during 1973–1974, market participants, alert to the increasing opportunity cost of holding cash, were willing to invest the time and funds to acquaint themselves with the RP market and establish the market connections necessary to exploit it. Also, as previously stated, innovations in cash management techniques may have made RPs a uniquely suited instrument for exploiting new short-term investment opportunities. Increasing interest on the part of several aggressive dealers in exploiting the profitability of the RP market also has resulted in greater familiarity of potential participants with the market and its opportunities. Additionally, increasing competition in the market and the consequent narrowing of spreads between RP and reverse RP rates have enhanced the profitability of arbitrage activity through RPs, in turn increasing their use for that purpose. Finally, transaction costs, in the form of "per ticket" charges of transactors' banks for processing and effecting the necessary transfer of securities, are reported to have declined, further increasing the profitability of RP activities by dealers and thus providing an incentive for their expansion.

How much further can the RP market expand? Its rapid growth over the past few years suggests that participants have already exploited to a significant degree the special advantages offered by RPs to both borrowers and lenders of funds. Nevertheless, certain factors point toward possible further growth of the RP market over the near future.

First, dealers' demand for RP funds has been tempered in the last two years by reductions in their positions in U. S. Government and agency securities needing to be financed. In 1976, dealer positions averaged about $8.2 billion daily, while in 1977 they averaged only $5.8 billion. In the first six months of 1978, they averaged only $4 billion. Dealers reduced their positions because of concern over rising interest rates and hence, risks of capital loss. Their corresponding reduction in demand for RP funds has thus tempered the growth of RPs and masked a swell of demand for RP funds arising from nondealers. Later, when dealers seek to rebuild their positions, RPs should exhibit another spurt of growth as dealer financing needs increase.

Second, rising short-term interest rates and competition could lead to an expansion into the RP market by a second tier of money managers whose use of certain cash management techniques has remained limited and their incentive to adopt them tempered, until recently, by relatively low short-term interest rates. Adoption of those techniques by a significant number of firms or institutions should further expand the RP market. Additional reductions in transactions costs, induced perhaps by technological innovations affecting costs of transferring securities, might also lead to increased market use.

The amount of collateral eligible for use against RPs suggests that the market has room to expand, provided participants receive sufficient inducement. At the end of 1977, corporations, state and local governments, commercial banks and other private nonbank finance companies, such as insurance companies and savings and loans, held over $300 billion of marketable Treasury and U. S. agency securities. All of these factors should lead to further expansion of the RP market in the years ahead.

The Teenage Labor Market

“ This article describes the teenage labor market and focuses on the characteristics that distinguish it from the adult market, especially the seasonal nature of teenage labor force participation, commitment to education, minimum wage restrictions, and lack of skills and experience. **”**

The Teenage Labor Market: Its Distinctive Characteristics

Mark Sniderman

The teenage labor market differs from the adult market in a number of ways, but certainly no more visibly than in the level of unemployment.[1] Although teens accounted for only about 10 percent of the civilian labor force in 1978, they comprised almost 25 percent of the nation's unemployed. And because the jobless rate of teens has always exceeded that of adults, teenage unemployment has traditionally been regarded as a problem requiring special attention (see Chart 1).

This article describes the teenage labor market and focuses on the characteristics that distinguish it from the adult market, especially the seasonal nature of teenage labor force participation, commitment to education, minimum wage restrictions, and lack of skills and experience. Using unpublished gross-flow data, a model of the teenage labor market was tested to identify and explain the forces associated with teen movement into and out of the labor force. The investigation considers such policy-related issues as the effect of minimum wages on teenage labor market activity and the behavior of teens as "secondary" workers in a labor market dominated by adults.[2]

How Teenagers Differ

Confusion about job preference and lack of experience and skills put teenagers at a disadvantage in the labor market. In addition, teenagers experiment in the labor market by sampling jobs with varying time schedules, skill requirements, and working conditions. These circumstances—inadequate preparation and intense job search activity—produce the same result: high turnover rates. From the employer's perspective, poor job training and experience translate into low productivity and facilitate discharge from a job; from the employee's perspective, low wages prompt job search activity and resignation. Both low productivity and market sampling result in continual flows of teenagers into and out of the labor force every month.

The factors contributing to high rates of teenage unemployment are long standing, but some have become more important as the mix of jobs and composition of the labor force changed. Fewer people are now trained on the job; more workers enter the labor force at a later age with more education, reflecting the increased skills required for specialized jobs.
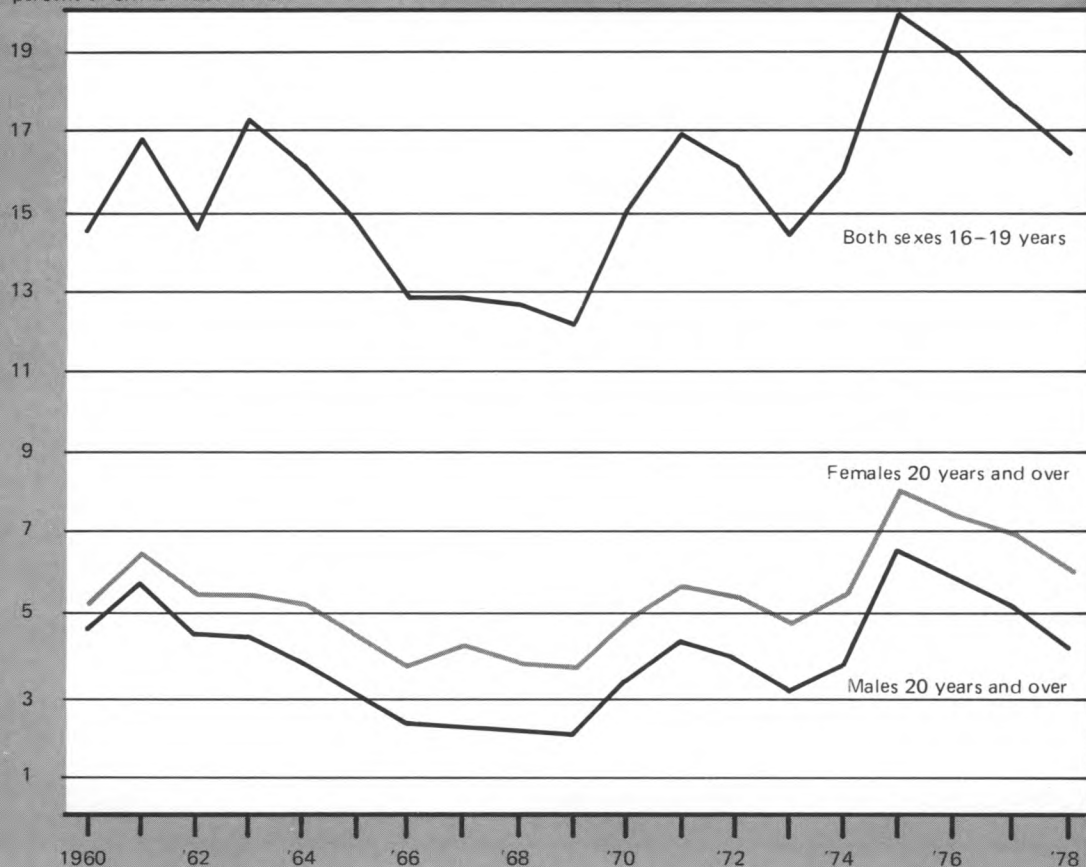
Another change occurring in the last 30 years is the composition of households and their labor supply decisions. Fewer people are either permanently in or out of the labor force. More desire part-time participation, preferring to spend nonworking hours on other activities. Because teenagers enter and leave the labor market frequently, they are likely to experience more unemployment. But this is not to imply that teenagers are "better" or "worse" off than adults, or that their situation relative to adults has improved or worsened. Job searching and sampling often are appropriate behavior patterns for this group and, to some extent, are indicative of a wealthy society. Only when turnover is involun-

[1]Hereinafter, teenagers refer to people 16 through 19 years of age.

[2]Secondary workers are those whose primary time allocation is to non-market activity.

Unemployment Rates
percent of civilian labor force

Chart 1. Unemployment Rates, percent of civilian labor force, 1960–'78, showing Both sexes 16–19 years, Females 20 years and over, and Males 20 years and over.

tary does teenage unemployment become a social concern.

Cyclical Aspects of Teenage Labor Markets

The standard framework for examining labor force participation is the labor-leisure choice model. Prospective workers compare the value of selling their labor in a market to the value of engaging in nonmarket activities, becoming either primary or secondary workers. Primary workers, those committed to full-time market participation, are almost always employed during normal labor market conditions. Even in slack periods when they become unemployed, only rarely will they leave the labor force.

Secondary workers have less commitment to work. Some of them enter the labor force only in tight labor markets, when jobs are readily available and wages are high. Others enter only during slack markets, when family workers have lost income through layoff or reduced work hours. What distinguishes the two types of secondary workers is their response to changes in relative wages, family income, and the value of their time in the market.[3]

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[3]The literature of this aspect of labor supply is quite large. For a good understanding of the issues see Bowen and Finegan (1969), Mincer (1966), and Fleisher and Rhodes (1976).

Teenagers tend to be secondary workers. About half of all teens participate in the labor force, even though 70 percent of them are enrolled in school. Because a large proportion of teenagers are not committed to full-time work, their employment status may reflect the status of others in their households. Thus, teenagers may be influenced directly and indirectly by cycle conditions: direct effects operate through job opportunities for teens; indirect effects operate through adult labor markets and family income positions.

Seasonal Aspects of Teen Unemployment

For a population whose major activity is education rather than work, it is only natural that teenagers exhibit considerable seasonal labor force participation (see Chart 2). The monthly transitions out of a labor force category frequently measure 10 percent, and, in some months, are larger than 20 percent. However, the charted figures do not tell the entire teen labor market story, since they do not indicate movement between unemployment and either of the other two labor market categories. Between May and June, a substantial number of teenagers enter the labor force, but do not find jobs. By July, most of those who will be employed have advanced to that state. In August, job separations increase, and by September the seasonal exodus from the labor force ends.

Education very strongly influences these teenage labor market flows. Depending on the school status, teens will exhibit differences in their seasonal patterns of labor force activity and the number of hours worked per week. Furthermore, the changing proportion of teenagers who are in school has, in part, altered the race-sex-education composition of the youth labor force over time.[4]

For example, the labor force participation rates of all teen groups changed dramatically during the 1967—1976 period. Participation rates of white female teens soared from 40.6 to 52.0 percent; for those in school it went from 29.3 to 43.4 percent. Among nonwhites, both males and female rates declined; male out-of-school rates fell from 85.4 to 72.2 percent and female in-school rates dropped from 26.1 to 18.8 percent. The number of whites participating in the labor force from 1967 to 1976 increased greatly because of changed female patterns. In contrast, nonwhite participation decreased, primarily because out-of-school males left the labor force. These trends suggest that different sex-race groups may be expected to exhibit different seasonal patterns of labor supply.
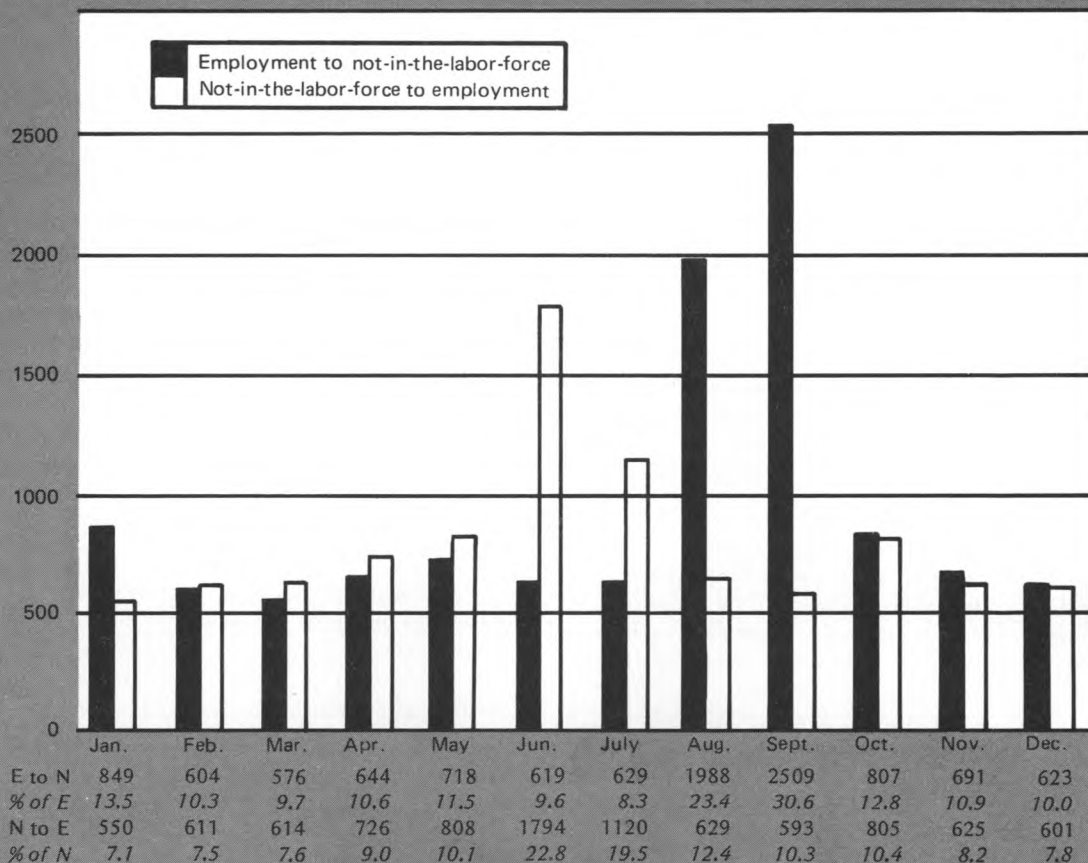
Education is not the only factor causing seasonal fluctuations in the teenage labor force. In certain industries, weather affects current and prospective employment. Agriculture, for example, is a seasonal industry and one in which teenagers are heavily represented. Retail trade, another major employer of teenagers, is also influenced by weather patterns and holiday shopping periods.

Minimum Wages

Minimum wage legislation also affects the youth labor market, through research studies support conflicting hypotheses.[5] While a standard theoretical treatment of the issue suggests that increases in the minimum wage would reduce employment, the magnitude of the effect on the labor force is not clear. In their research, Mincer and Ragan found a minimum wage increase significantly reduced employment, but they differed on the impact of the minimum wage on labor force participation.

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[4]For a more complete description of the unemployment of teenagers by enrollment status, see Stephen P. Zell, "The Rising Problem of Teenage Unemployment: A Reappraisal," *Economic Review*, Federal Reserve Bank of Kansas City (March 1978), 12—26. See especially Table 2, p. 20.

[5]A summary of previous studies and points of contention can be found in Robert S. Goldfarb, "The Policy Content of Qualitative Minimum Wage Research," Industrial Relations Research Association Proceedings (Winter, 1974), 261—268. Since then, other pertinent articles have been published. See Jacob Mincer, "Unemployment Effect of Minimum Wages," *Journal of Political Economy*, Vol. 84, (August, 1976, pt. 2), S87—S104, and James F. Ragan, Jr., "Minimum Wages and The Youth Labor Market," *Review of Economics and Statistics*, Vol. 59 (May 1977), 129—136.

	Employment to not-in-the-labor-force
	Not-in-the-labor-force to employment

	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.
E to N	849	604	576	644	718	619	629	1988	2509	807	691	623
% of E	13.5	10.3	9.7	10.6	11.5	9.6	8.3	23.4	30.6	12.8	10.9	10.0
N to E	550	611	614	726	808	1794	1120	629	593	805	625	601
% of N	7.1	7.5	7.6	9.0	10.1	22.8	19.5	12.4	10.3	10.4	8.2	7.8

Labor market theory recognizes that the labor force could either contract or expand as the minimum wage increases. Formerly employed teenagers who continue to look for work will be unemployed but still in the labor force. If they do not look for work, they are no longer considered part of the labor force. To the extent that teens leave the labor force after losing jobs, their unemployment rate will be lower than it would be had they remained in the labor force. Any analysis of the effect of minimum wages on the labor force must consider both the participation and employment rate consequences.

Measuring Teenage Labor Force Behavior

Labor force behavior of teenagers generally is examined through their rate of employment and unemployment in relation to several other variables, such as the business cycle, season of the year, and minimum wage. By focusing only on the level of employment or unemployment, however, some important information is lost. At each point in time a teenager is either employed (E), unemployed (U), or not-in-the-labor-force (N). Teen-

agers frequently move among these states from month to month, depending on such variables as the season and the state of the economy. Concentration on the levels of these labor force states ignores the size of the flows among the states. For example, changes in employment levels from one month to the next measure only *net* flows into and out of employment. *Gross* flows from one state to another may provide a better measuring framework for understanding how economic variables influence teenage labor force patterns.

Suppose, for example, that in November and December in a given year, the number of employed teenagers is 7 million. The net employment change is zero, but from November to December, one million teenagers may have left the labor force or become unemployed, while an equal number found jobs. The net change figure masks the size of the underlying gross flows.

Gross-flow data permit different tests of some labor market hypotheses. Recently, Smith and Vanski used gross-flow data in fitting a model of the teenage labor market.[6] They found strong trends in both the labor force entry and exit rates influencing the growth in white teenage participation. Furthermore, they found that entry decisions are related to business cycle conditions in a way that reduces participation during recession. Finally, they confirmed that the extremely large unemployment rates of teenagers directly result from their frequent movements among labor force states.[7]

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[6]Ralph E. Smith and Jean E. Vanski, "The Volatility of The Teenage Labor Market: Labor Force Entry, Exit, and Unemployment Flows," in *A Report on Employment Statistics and Youth*, ed. by R. Taggart and N. Burger Davidson (Washington, D. C.: U. S. Government Printing Office, 1978).

[7]Stephen T. Marston first decomposed the unemployment rate in this manner. See his "Employment Instability and High Unemployment Rates," in *Brookings Papers on Economic Activity*, (Washington, D. C.: Brookings Institution; 1976), pp. 178–188.

Comparing Adult and Teen Transitions

To show the differences between teenage and adult labor force activity, the transition patterns between labor force states of teens are compared to those of adult while males, the largest and most stable age-sex-race group (see figure). Compared are the average monthly flows for several different groups across labor force states from July .1967 to December 1973.[8] The flows are standardized to represent the average number of people progressing from one state to another in an initial group of 100 people.

An obvious difference between adult white males and teenagers appears in the proportions leaving employment. Virtually no employed men exited from the labor force during this period, while 12 to 20 teenagers out of 100 did so.[9] These exits from the labor force increase the rate of teenage unemployment, since the labor force is reduced while the number of unemployed does not change.

Another important difference between the two age groups is the employed-unemployed flow. Proportionally, far more teens than adult white males lose or quit jobs, becoming unemployed. However, if job leaving is the predominant cause of employment separation, teenagers may be shopping the labor market and comparing jobs. In this event, a higher jobless rate would result from the voluntary behavior of the teens. More informed about the labor market, adults have less tendency to quit jobs, only to become unemployed.
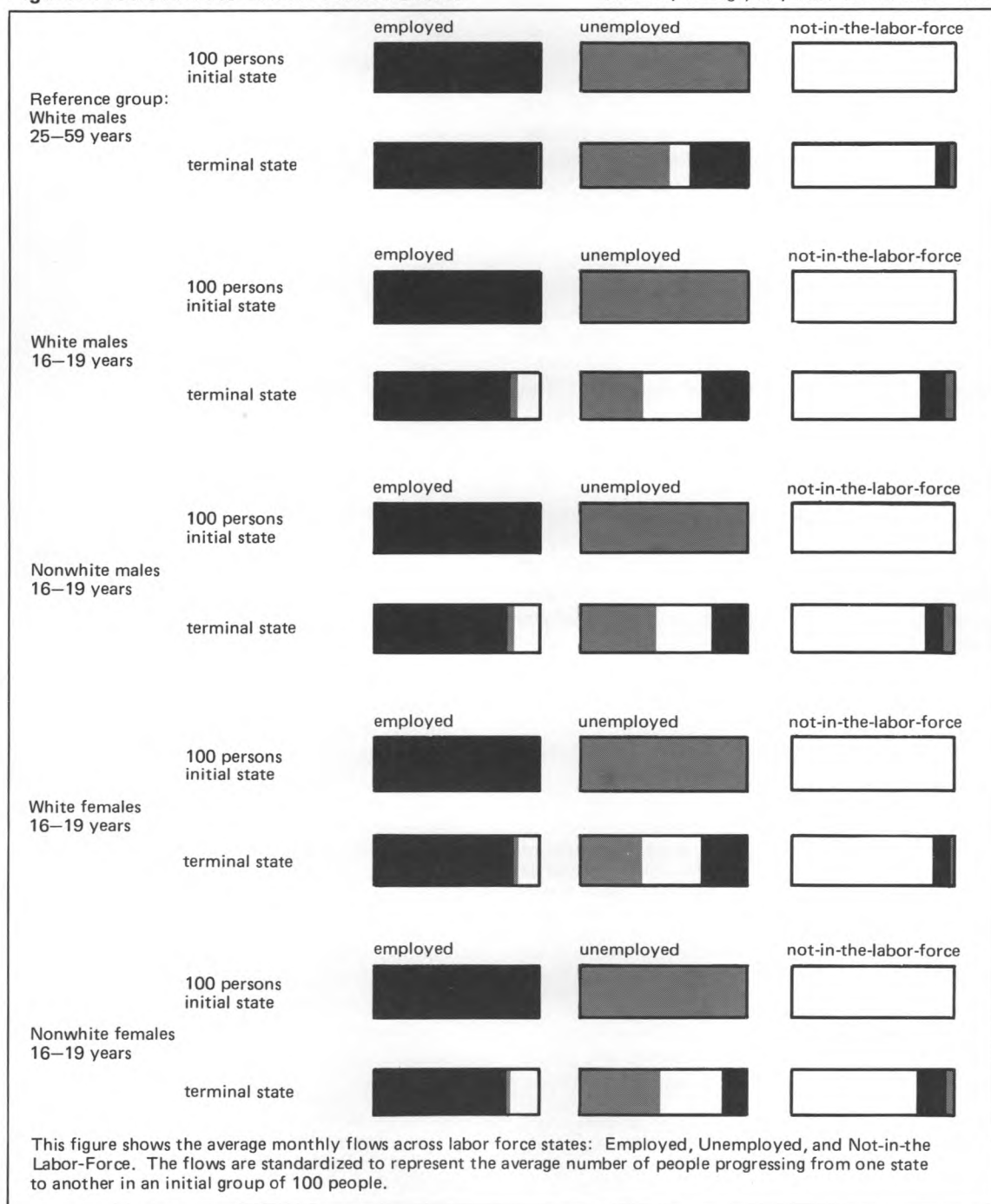
Other patterns distinguish adult and teenage labor force activity. Among the unemployed, adults are far less likely than teens to leave the labor force. In general, all adults exhibit more stable labor market behavior and remain in a given category, while teens tend to change states frequently.

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[8]The numbers presented in the figure are based on Table 1, *ibid.*, p. 175. They differ little from a period extending to September 1977.

[9]These figures are rounded. Actually, about 37 out of 10,000 men went from E to N on average.

Figure: Flows Across Labor Market States

(monthly average, July 1967 to December 1973)

This figure shows the average monthly flows across labor force states: Employed, Unemployed, and Not-in-the-Labor-Force. The flows are standardized to represent the average number of people progressing from one state to another in an initial group of 100 people.

Not all "flow" differences between teens and adults result in larger teenage unemployment rates. The large flow of teenagers from unemployment to not-in-the-labor-force reduces teenage unemployment rates. However, almost all the higher unemployment rates of teenagers can be attributed to their greater probability of leaving employment.[10] These facts correspond with some widely held concepts about the teenage labor market.

A Model of the Teenage Labor Market

A model characterizing the relationships among the gross flows and several variables was constructed to test several hypotheses concerning teenage labor market behavior (see box). The model was estimated for each group of teenagers: white males, white females, nonwhite males, and nonwhite females. Twenty-four equations (six flows per group) were estimated.[11]

Seasonal Variables—The seasonal dummy variables overwhelmingly affect teenage flows from one labor force state to another. A test of the joint significance of these seasonal variables substantiates the hypothesis that noncyclical economic variables strongly influence teenage labor force behavior (see Table 1).[12]

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[10]See Marston, "Employment Instability," p. 181, for a decomposition of teenage unemployment differentials by flow.

[11]The six flows are E to U, E to N, U to E, U to N, N to U, and N to E where E, U, and N represent the three labor market states discussed previously. The estimating procedure was ordinary least squares. There was a possibility that error terms across regressions within the ith group might be strongly correlated, in which case Zellner's seemingly unrelated regressions technique would be appropriate. The intergroup correlations were not large, and the dependent variables in each of the regression "sets" were almost identical so OLS was retained. For more discussion see J. Johnston, *Econometric Methods*, (New York: McGraw-Hill, Inc., 1972), pp. 238—241.

[12]An F-test determines whether a set of variables exerts an independent influence on the variable to be explained. Rather than report the effectiveness of each monthly seasonal variable here, the F-statistic for the group is presented.

Cyclical Effects—Given the direct relationship between seasonal activities and teenage flows, what independent influences do cyclical conditions exert? The answer depends on the particular race-sex group and labor force flow considered (see Table 2).[13] In the case of nonwhite males and females, an increase in economic activity corresponds with larger flows from employment to not-in-the-labor-force (E to N). As their employed pool grows, the flow from employment to not-in-the-labor-force increases, but the employed to unemployed flow does not change. These flow patterns, in concert, damage nonwhite unemployment rates. Perhaps nonwhites feel more confident about sampling jobs in tight labor markets, whereas whites sample regardless of cyclical conditions. Among white females, tight labor markets are associated with smaller flows from employment to unemployment, with no change in the flow from employment to not-in-the-labor force. This pattern

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[13]A t-test determines whether an individual variable is significant in the model. The numbers reported on the t-test tables are the coefficients on the independent variables in the model. The coefficient shows by how many thousands of teens per month a flow will change when the independent variable changes by one unit.

somewhat reduces their unemployment rate. Only employment flows of white males are unaffected by cyclical activity.

Differences can also be found in the movements from unemployment as labor markets tighten. For all groups except nonwhite males, the flows from unemployment to not-in-the-labor force become significantly smaller, as do those from unemployment to employment, most likely because of the decreased number of unemployed persons and the desire of those unemployed to continue job searching during tight conditions. Among nonwhite males, however, the number of people going from unemployment to not-in-the-labor-force is not significantly reduced and the unemployment to employment transitions actually increase, indicating that tight labor markets pull nonwhite males teenagers out of unemployment. Still, the magnitude of the employment increase is lessened because, with time, many of these newly employed will quit or be fired.

Cyclical activity affects the number of people entering the labor force, but again, this varies by race and sex. Nonwhite female teens benefit more than white females from tighter labor markets. Such markets reduce the number of not-in-the-labor-force to employment changes of white females, but increase them for nonwhite females. These same conditions, however, do not significantly affect N to E behavior for males. All groups of teens, except nonwhite males, benefit through lower unemployment rates as a result of cyclically reduced not-in-the-labor-force to unemployment flows.

What is the cumulative effect on teenage unemployment of the cyclical influence on the various flows? The unemployment rate of each group of teens falls as markets tighten, although the numerical impact on the unemployment rate differs by group and by cycle stage.[14] Changes in labor market conditions more strongly affect nonwhite unemployment rates than those of

[14]Small changes in the unemployment rate for any group can be expressed as a function of the levels of employment and unemployment and the six flows. The formula is

$$d\frac{U}{(E+U)} = \frac{1}{(E+U)2}\{(E+U)(EU\text{-}UE) + E(NU\text{-}UN) \text{-} U(NE\text{-}EN)\}$$

To calculate an unemployment rate change due to cyclical change, use the average values for the levels over the sample period and the estimated coefficients on the cyclical variable.

whites. The cyclical variable was highest (.368) in the spring of 1969 and lowest (.081) in the spring of 1975. A change of one tenth in the cyclical variable produced an unemployment rate change in the opposite direction by .03 percentage points for white males, .13 percentage points for white females, .56 percentage points for nonwhite males, and .35 percentage points for nonwhite females. According to this method of calculation, a change of three tenths in the cyclical variable—about the maximum experienced in the sample period—would yield unemployment rate changes of three times these sizes.[15]

Trend Effects—Although the teenage labor market is only irregularly affected by cyclical activity, this market continuously responds to other factors on a regular basis. The trend variable in each model captures the influence of many factors, probably including the effects of changes in the proportion of students, the location of jobs and people, skills offered and required, and preferences for market versus non-market activities.

Among nonwhite males and females, significant time trends appear in the movement between unemployment and not-in-the-labor-force (see Table 3). For example, other conditions being equal, an additional 350 male and 350 female teens drop out of the labor force from unemployment each month. Similarly, an additional 250 nonwhite male and 270 nonwhite female teens unsuccessfully enter the labor force monthly.

These trends indicate growing traffic between not-in-the-labor-force and unemployment over time. The dismal N to U trend for nonwhite female teens is partially offset by a growing trend into employment from unemployment of 130 of these teens per month.

Among the white teens, nearly all trend variables are significant. Because so many trend terms are large and significant, the white teens can be characterized as displaying increased activity in almost all aspects of labor force behavior. The largest trends are those from not-in-the-labor-force to unemployment and from unemployment to employment, the logical sequence for job seeking. The movements out of both employment and unemployment also show strong trends, but only about one-half the magnitude of the movements into these two states. On balance, white teens have greatly improved their ability to move from unemployment to employment.

Minimum Wage—Changes in the minimum wage affect teenage labor force flows in only 3 out of 24 models, and none of these instances involve movements into or out of the labor force (see Table 4). This finding seems to be at odds with most current research, which has found that the minimum wage strongly affects teenage employment.[16]

In the model specified here, the minimum wage does not significantly influence any white male or nonwhite female labor force activity. For

[15]Notice from the formula in 14 how the change in the unemployment rate depends upon the levels of employment and unemployment. The estimates in the text are based upon the means of E and U; surely, however, the appropriate E and U when CYC is .368 will differ from the appropriate E and U when CYC is .081.

[16]Typical of this work is that by Ragan. His sample was quarterly from 1963, first quarter, to 1972, fourth quarter, and he divided teenagers into student and non-student groups. Ragan also used a variable for youth manpower programs in his regressions. The construction of my minimum wage variable differed slightly from his. See his "Minimum Wages," p. 129.

Table 3
t-Tests for Trend Variables

Flow:	E to N	E to U	U to N	U to E	N to E	N to U
White Males	.27	.36*	.29*	.75*	.16	.75*
White Females	.23	.43*	.33*	.81*	-.08	.68*
Nonwhite Males	.06	.03	.35*	.03	.13	.25*
Nonwhite Females	-.08	.00	.35*	.13*	.00	.27*

*Significant at 1 percent level.

Table 4
t-Tests of Minimum Wage Variables

Flow:	E to N	E to U	U to N	U to E	N to E	N to U
White Males	57.47	-214.36	68.03	-66.33	-152.46	228.97
White Females	4.63	8.25	-12.91	218.87*	-173.25	122.97
Nonwhite Males	-33.41	-98.99*	126.63	-120.11*	59.60	15.34
Nonwhite Females	32.44	-3.49	42.80	44.50	40.55	14.74

*Significant at the 5 percent level.

white female teens, however, a dollar increase in the minimum wage produces a flow in this group of 219,000 from unemployment to employment each month. Although counter-intuitive, this finding could reflect employer preference for white females over some other teens. That is, in those firms that cannot substitute machinery for labor, employers may discriminate according to their perception of productivity differences among workers. On the other hand, if the actual number of jobs available shrinks because of a higher minimum wage, white female teens may have better "connections" to these jobs and find them faster.

An increase in the minimum wage reduces the numbers of nonwhite male teens who move from unemployment to employment and from employment to unemployment. From the employer's perspective, the reduced flow from U to E is consistent with expectations based on theory, particularly if employer discrimination is a factor. Employment to unemployment flows are reduced because, from the employee's perspective, the cost of quitting increases when the wage is raised.

Adult Influences—If teenagers act as secondary workers, their movements into and out of the labor force should be sensitive to adult labor force activities. Therefore, in the models of teenage flows into and out of the labor force, three variables reflecting adult patterns were included: flow from employment to unemployment, reflecting adult job loss, flow from unemployment to employment and flow from not-in-the-labor-force to employment, both reflecting improved job conditions for adults. Adult flow variables pertain only to females because adult males do not change states as often and because teenagers are more likely to compete with adult females than adult males.[17]

The adult female flows affected teenage labor force patterns in only two instances (see Table 5). Adult female flows, especially those from employment to unemployment, significantly influence movement of white male teens from not-in-the-labor-force to unemployment. When adult white females lose or leave jobs and become unemployed, fewer white male teens advance from N to U, indicating perhaps a discouraged-worker effect.

[17]The coefficients for individual adult female flows are not reported here. Rather, the F-statistic for the set is presented.

Table 5
F-Statistics of Adult Female Flow Variables*

Flow:	E to N	E to U	U to N	U to E	N to E	N to U
White Males	1.22	NA	1.19	NA	1.25	3.34**
White Females	1.83	NA	0.65	NA	2.87†	2.08
Nonwhite Males	0.62	NA	0.97	NA	0.53	2.43
Nonwhite Females	0.83	NA	0.73	NA	1.06	1.21

*Test results refer to the effect of the adult female flows, current and lagged up to 3 months.
**Significant at the 5 percent level.
†Significant at the 1 percent level.
NA — not applicable; no adult female variables in the model.

The summary statistics of the models themselves, R^2 and Durbin-Watson, indicate that the fits of all 24 regression models are quite good and the error terms relatively free of serial correlation (see Table 6). The most notable failures in fitting the equations pertain to the E to U and U to N flows, particularly the E to U flow for nonwhites. This is regrettable because the changes in status from employment to unemployment comprise a large part of the labor force instability of nonwhite teenagers. The E to U turnover for nonwhites cannot be explained by trend or cyclical variables: that which can be explained is attributed primarily to seasonal factors. The average actual flows per month are presented in Table 6 for better interpretation of the size of the changes that occur in that flow as a result of trend, minimum wage, or cycle.

Conclusions

The results indicate that employment policies designed to ameliorate the high unemployment rates of teens must focus on their large rates of turnover—voluntary and involuntary. This study does not directly quantify the proportion of turnover that is voluntary or involuntary, but it considers the possible causes of each. Voluntary turnover should be accepted, in most instances, as responsible and appropriate behavior. Involuntary turnover may result from forces beyond the control of the teens.

A teenage unemployment problem is present to the extent that job opportunities do not exist for teens wanting to work, or that teens do not adequately meet required job skills. Opportunities and skills are not directly considered here, but the trends indicate that whites have become adept at finding jobs, while nonwhites have not.

Much of the aggregate labor force activity of teenagers can be attributed to seasonal events, particularly education. Consequently, a large proportion of the transitions from one labor force status to another is voluntary and reflects the fact that teens are secondary workers whose primary commitment is not to the labor market.

Against this backdrop of seasonality, cyclical conditions clearly influence the numbers of teens changing labor force classifications. Nonwhite

Table 6
Summary Statistics for Flow Models

Flow: White Males	E to N	E to U	U to N	U to E	N to E	N to U
R^2	.97	.72	.70	.89	.92	.93
Durbin-Watson	2.43	1.78	1.70	1.72	2.21	1.74
Average Flow (000)	388.00	138.00	159.00	163.00	371.00	184.00
Average Level (000)*	3,355.00	3,355.00	546.00	546.00	2,567.00	2,567.00
White Females						
R^2	.96	.70	.70	.85	.91	.93
Durbin-Watson	2.17	2.08	1.85	2.14	2.56	2.18
Average Flow (000)	385.00	81.00	144.00	133.00	337.00	199.00
Average Level (000)*	2,747.00	2,747.00	464.00	464.00	3,384.00	3,384.00
Nonwhite Males						
R^2	.94	.44	.67	.80	.77	.86
Durbin-Watson	1.88	1.64	1.63	2.19	2.38	2.10
Average Flow (000)	55.00	22.00	49.00	27.00	50.00	54.00
Average Level (000)*	344.00	344.00	141.00	141.00	563.00	563.00
Nonwhite Females						
R^2	.91	.41	.72	.74	.75	.85
Durbin-Watson	2.22	2.10	2.12	1.76	2.18	2.13
Average Flow (000)	48.00	10.00	51.00	26.00	34.00	64.00
Average Level (000)*	248.00	248.00	134.00	134.00	739.00	739.00

*Figures pertain to level of flow origin.

female teens appear to benefit from tight markets more than white females; their chances are improved for entering the labor market with a job. Unfortunately, both male and female nonwhites leave jobs and the labor force as employment conditions improve. Whites, however, do not exhibit to such a degree this form of participation instability. Tighter markets improve their unemployment rates by reducing unsuccessful labor force entry.

Finally, the minimum wage exerts a very small influence on teenage labor force activity relative to the other variables studied. Only the behavior of nonwhite males is influenced by the minimum wage. By increasing the earnings to be forfeited through resignation, a higher minimum wage may persuade some teens to remain employed rather than to quit and seek other employment, possibly risking unemployment.

Appendix: Data and Sources

The gross flow data used in this study were supplied by the Urban Institute and adjusted by the Urban Institute according to the method of Holt *et. al.*[18] The unadjusted data are derived from the monthly Current Population Surveys of the Bureau of Labor Statistics. The data used for AFLWS were the flows of females aged 25–59, with the appropriate race selected to fit the particular regression. Little difference resulted from using females only as opposed to all persons aged 25–59.

The cyclical variable, CYC, was the Conference Board Help Wanted Advertisement Index divided by the aggregate unemployment rate, not seasonally adjusted. Another cyclical variable, quits minus layoffs in manufacturing, was tested. Although not reported here, the findings were similar. An increase in either of these cyclical variables implies an expansion in economic activity. Before testing these variables, a set of variables measuring income changes and employment in retail trade and manufacturing was tried. The variables in the set were highly colinear.

The formula for constructing the minimum wage variable is:[19]

$$MINWG_j = \Sigma_i \, (I_{ij}(p_i MP + n_i MN))/AHE$$

where:

$MINWG_j$ = the effective minimum wage of race-sex group j (there are four groups)

MP = minimum wage for previously covered workers

MN = minimum wage for newly covered workers

AHE = average hourly earnings of nonsupervisory employees in the private nonfarm economy, not seasonally adjusted

I_{ij} = fraction of youth employment of group j coming from industry i

p_i = fraction of nonsupervisory workers in industry i covered by previous minimum wage legislation

n_i = fraction of nonsupervisory workers in industry i covered by most recent minimum wage amendment

i = major industry division (wholesale and retail trade treated separately)

Using a single minimum wage variable for all teens, constructed similarly to Mincer's, yielded similar results.[20]

Employment in industries by race-sex groups was provided by the Bureau of Labor Statistics. Coverage data can be found in the Labor Department's "Minimum Wage and Maximum Hours Standards."[21] The earnings data can be found in the Bureau of Labor Statistics' *Employment and Earnings.* For a description of the "effective minimum wage" concept, see U. S. Bureau of Labor Statistics Bulletin No. 1657, pp. 11–14.

[18]Charles C. Holt, *et al., Labor Markets, Inflation, and Manpower Policies: Final Report,* (Washington, D. C.: Urban Institute, 1975), Appendix C.

[19]See Ragan's "Minimum Wages," p. 129.

[20]See "Unemployment Effect of Minimum Wages."

[21]U. S. Department of Labor, "Minimum Wage and Maximum Hours Standards Under the Fair Labor Standards Act," (Washington, D. C.: U. S. Government Printing Office, 1977), pp. 57–58.